

# **FY2010 PROGRAM PLAN**

**January 29, 2010**

**SOUTH DAKOTA SPACE GRANT CONSORTIUM**

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**\* NOTE: Individual Subaward Plans were submitted to NASA, but are not included in this on-line version**

## Consortium Concurrence

1. By their signatures below, the Director of the SD Space Grant Consortium and affiliate representatives indicate their agreement with the contents of the FY2010 proposal.  
*(Signatures were included in the hard copy document submitted to NASA via Fed-Ex.)*

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Edward F. Duke, Ph.D. – Director, SDSGC  
SD School of Mines & Technology (Lead Inst.)

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Gregg Johnson – Program Manager, \*ASRC  
Research & Tech. Solutions, EROS Contractor

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Kevin Dalsted – Assoc. Director, SDSGC  
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Daniel Swets, Ph.D. – Assoc. Director, SDSGC  
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Kristie Maher – Assoc. Director, SDSGC  
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Left Organization (Replacement being sought)  
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Andy Johnson, Ph.D. – Assoc. Dir., Center for the  
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William Figg, Ph.D., Associate Professor  
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Thomas Zeller, President  
RESPEC

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Mark West, President and Chief Engineer  
Aerostar International, Inc. (Raven Industries)

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Margaret Norris  
Sanford Underground Science & Engineering Laboratory at Homestake

\* SAIC representative prior to 2008. ASRC initiated a separate EROS contract in 2008.

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## **B. ABSTRACT**

The vision of the South Dakota Space Grant Consortium (SDSGC) is to expand opportunities for all South Dakotans through education, research, and public service in the fields of aerospace, earth science, and supporting STEM disciplines. We specifically seek to include women, Native Americans, and other underrepresented groups in all programs and activities supported by SDSGC. At both the higher education and precollege level, student participants in SDSGC programs are provided hands-on research and learning experiences that emphasize interdisciplinary problem-solving skills that are directly relevant to NASA mission challenges.

In the course of the previous five-year grant period, SDSGC implemented key adjustments to improve the impact of its programs. Inactive affiliates were dropped and strategic new partnerships were established, resulting in a smaller but more engaged network. The fellowship/scholarship program has become increasingly competitive and more focused on state and NASA research priorities. Close coordination with the state NASA EPSCoR program has advanced targeted research collaborations in support of the Exploration Systems and Science Mission Directorates, most notably with NASA projects at the Ames and Glenn Research Centers. Consortium management has responded to supplementary opportunities from the Office of Education, allowing SDSGC to expand its programs and increase participation. These include successful competitions in NASA EPSCoR, several ESMD Space Grant programs, two Consortium Development Competitions, INSPIRE Collegiate Experience (Tier 2A), Competitive Programs for Science Museums and Planetariums, as well as separate STEM education grants from NSF and other sources. The consortium has increasingly shifted precollege and public service programs to partnerships with its informal education affiliates and NASA's Aerospace Education Services Program (AESP), allowing greater resource allocation for Outcome 1 activities without sacrificing critical components of the state's STEM pipeline. These programs include two highly successful precollege STEM summer programs on college campuses. Finally, SDSGC has shown a commitment to implementing evidence-based assessment of all of its programs including retention of an independent evaluation specialist.

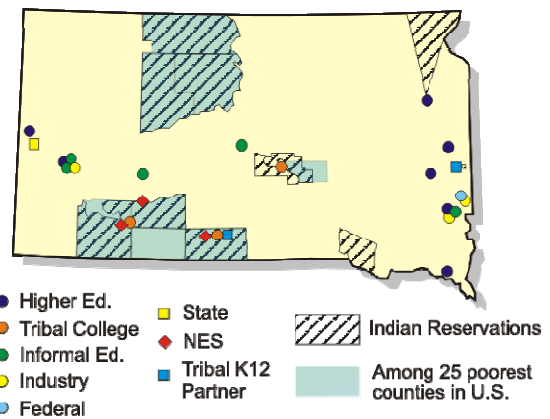
The management structure of SDSGC has demonstrated the ability to respond to the changing needs of the state and evolving NASA priorities. During the next five-year grant period, SDSGC will continue to serve as a model for innovative state-based public/private education initiatives featuring strong interagency partnerships. Unique new opportunities exist for partnerships with aerospace companies that have recently begun operations in the state. SDSGC will continue to advance NASA science priorities at the state's two major research facilities, the USGS Center for Earth Resources Observation and Science (EROS) and the Deep Underground Science and Engineering Laboratory (DUSEL).

During the 2010-2014 period, SDSGC programs will contribute to the state of South Dakota by leveraging educational investments to sustain its unique STEM education pipeline, spanning elementary through graduate levels. SDSGC programs will contribute to NASA by providing a responsive and flexible in-state network that connects NASA research and development needs with talented students and teachers and strengthens the nation's STEM workforce. Despite its small population and limited research infrastructure, South Dakota institutions will continue to support NASA through science and engineering research programs and through the advancement of Native American student in STEM fields. The 2010 Program Plan that follows demonstrates that SDSGC programs will make significant contributions to NASA's PART measures in higher education and elementary/secondary education.

### C. CONSORTIUM PROFILE

In recent years, SDSGC and other state organizations have fostered significant advances in STEM capabilities of South Dakota, including progress toward the goals of the Governor’s *Research 2010 Initiative*. Still South Dakota faces many challenges in efforts to develop a competitive and sustainable science and engineering infrastructure. The state ranks 47<sup>th</sup> in population and has the fifth lowest population density. Population sparsity hinders access to STEM education resources for the state’s rural students and teachers. In addition, South Dakota has five of the seven poorest counties in the nation, all of which are located on or adjoining the state’s nine Indian reservations. With respect to key science and engineering (S&E) indicators, South Dakota ranks between 49 and 51 in the following:<sup>1</sup> federal R&D (51); industry R&D (49); academic R&D (51); S&E doctorates awarded (50); science, engineering and health (SEH) post-docs in doctorate-granting institutions (50); and employed SEH doctorate holders (51). Enrollment at the state’s six public universities for fall 2009 was 33,779 of which only 3,709 were in graduate programs. There are no degree programs in aeronautics or aerospace, and until recently, there have been no aerospace-related industries with operations in the state.

In response to these challenges, and in order to improve STEM education, research, and economic activity, SDSGC maintains a statewide network of 20 organizations representing public, private, and tribal universities, a technical institute, informal education centers, technology-based industry, a state science and technology authority which operates DUSEL, and a federal research facility (EROS) that supports NASA missions (see adjacent map). In keeping with SDSGC’s status as a Capability Enhancement Program, emphasis is on NASA Education Outcome 1, especially in the areas of undergraduate and graduate student support, student involvement in interdisciplinary engineering design teams and summer internships, targeted programs at Tribal Colleges, and higher education curriculum enhancement including robotics programs that are integrated with precollege robotics activities. Support of NASA Education Outcomes 2 and 3 includes an internal network of informal education providers across the state, educator professional development in collaboration with NASA’s Aerospace Education Services Program (AESP), and targeted teacher and student involvement programs at tribal schools including three NASA Explorer Schools.



Unlike other capability enhancement programs in the state (e.g., NSF EPSCoR), Space Grant is in a unique position to have a comprehensive impact across all educational levels and across all sectors – public, private, tribal, government. SDSGC uses this opportunity to advance two major themes across its programs: development of the state’s STEM workforce, and improving educational and research opportunities for the state’s Native American population. SDSGC will continue focusing on statewide development of robotics programs that link university faculty and students with precollege teachers, students, and community-based organizations such as 4-H. These efforts have directly contributed to the first state robotics competition in 2010 (30 teams) and to a new and unique M.S. program in Robotics and Intelligent Autonomous Systems.

<sup>1</sup> National Science Foundation, Science and Engineering State Profiles: 2006-2008, NSF 10-302, November 2009

## D. PROGRAMMATIC ELEMENTS

### **D.1. NASA Education Outcome 1**

#### **D.1.a. Diversity**

Based on latest data from the National Center of Education Statistics Digest (Fall 2007),<sup>2</sup> South Dakota's minority enrollment in degree-granting institutions is 10.8% (9.8% as adjusted for Asian students) of which 7.1% are Native American. With regard to student awards through SDSGC's Fellowship/Scholarship, Higher Education, and Research Infrastructure programs, awards to minorities and women will equal or exceed targets of 10% to minorities and 40% to females.

Diversity remains a cross-cutting theme with strategic objectives in all five program areas as well as Management strategies that are designed to recruit and support women and underrepresented minorities. SDSGC's Strategic goal for Diversity is "To model diversity in all Consortium programs and activities, with an emphasis on Native Americans, which make up the state's largest minority group." The goal for Minority Serving Institutions is "To ensure that Minority-Serving Institutions in South Dakota, which are exclusively Tribal Colleges and Universities, are represented in the planning and implementation of all Consortium programs." Specific objectives, strategies and outcome indicators for these goals are provided in the Consortium's *2010 Strategic Plan* (Appendix. G.1). Special efforts will continue to be made by Consortium staff to place minority and female students funded by SDSGC's higher education programs at NASA Centers to conduct internships and related research projects, as well as to facilitate employment at NASA upon graduation. Two female Space Grant graduates in recent years are now employed by NASA at KSC and JSC.

The Consortium's Management Team will continue to work with the Space Grant contacts at SDSGC's 10 academic affiliates (three of which are Tribal Colleges or Minority-focused institutions), three Informal Education affiliates, and two K-12 Tribal Partner Schools to improve recruitment of qualified female and minority students. Recruitment strategies include support of the following precollege and college bridge programs: Women in Science Conferences, Flandreau Indian School Success Academy held on the campus of South Dakota State University (SDSU), St. Francis Indian School, Native American South Dakota GEAR UP Program held on the campus of South Dakota School of Mines and Technology (SDSM&T), NASA Explorer Schools, and South Dakota Space Days. Strategies to maintain and support participation include targeting women and minorities in the Fellowship/Scholarship announcement, a 2007 Consortium Development Competition grant that targets women and Native Americans (one Native American and one Hispanic student have been recruited into STEM MS programs at SDSM&T), support for remote sensing research test sites located near Tribal Colleges, and support for Native American student members of the American Indian Science and Engineering Society. SDSGC is currently developing a Summer of Innovation proposal that would offer a summer residential STEM experience for Native American middle-school students.

*NASA Education Outcomes and PART Measures: SDSGC diversity efforts support Objectives 1.2 and 2.3, and contribute to the Outcome 1 PART Measure on underrepresented students*

<sup>2</sup> [http://nces.ed.gov/Programs/digest/d08/tables/dt08\\_228.asp](http://nces.ed.gov/Programs/digest/d08/tables/dt08_228.asp)

### D.1.b. Fellowship/Scholarship

*Description* – The goal of the SDSGC Fellowship/Scholarship program is **“To administer a Fellowship/Scholarship program that offers educational and research opportunities to students from diverse backgrounds who are pursuing degrees in fields of STEM that align with NASA’s mission and those of SDSGC members and affiliates.”** The *2010 Strategic Plan* (Appendix G.1) identifies seven specific objectives for achieving this goal (box at right); associated with each objective are operational strategies and outcome indicators that the Consortium uses to measure the success of the program.

#### Fellowship/Scholarship Objectives

- B.1.1: Competitiveness
- B.1.2: NASA & EROS ties
- B.1.3: Industry ties
- B.1.4: Mentoring and professional development
- B.1.5: Diversity
- B.1.6: Long. tracking
- B.1.7: Evaluation

In order to track the next step that students take after Space Grant funding in terms of workforce or advanced education, SDSGC will continue to secure the services of the National Space Grant Foundation throughout FY2010 and beyond to provide longitudinal tracking of all students who receive significant support from Space Grant. In South Dakota, students receiving \$1,000 or more in a single award will be included in our longitudinal tracking surveys and respective database. Based on the fact that 55 students were selected from among six Consortium universities in 2009 to receive significant fellowship/scholarship funding, it is projected that a similar number of STEM degree seeking students will be selected and longitudinally tracked in 2010. This proposal for the first increment of FY2010 funding will provide \$110,000 in fellowship/scholarship awards with a higher amount anticipated in a projected proposal for a second increment. Because SDSGC does not award fellowship/scholarship awards less than \$1,000, there will be no funded students who are not tracked. Evaluation methods are discussed further in section E.1 Consortium Management.

*Competitiveness* – SDSGC invites applications from all undergraduate and graduate students of U.S. citizenship enrolled at any South Dakota institution of higher education who are engaged in the study of STEM disciplines that align with NASA’s mission and those of SDSGC affiliates. The Consortium specifically encourages applications from women, underrepresented and Tribal College students, and persons with disabilities. The announcement for the FY2010 Fellowship/Scholarship program will be released at the start of the fall 2010 semester. The announcement is distributed through the designated Space Grant representatives at each affiliate college, and where campus regulations permit, the announcement is sent directly to all student e-mail addresses. The announcement is also posted on the SDSGC website and the state NSF EPSCoR website along with links to other statewide STEM fellowship and internship opportunities.

Applications are reviewed by SDSGC’s Management Team and selections are made based on academic excellence, alignment with the goals of NASA and SDSGC, and an assessment of the applicant’s motivation toward an earth science, aerospace, or engineering career or research. Special consideration is given to applicants interested in internships at NASA Centers, EROS, or other federal or aerospace industry internships. As a result of broader promotion of the program and an increase in applications, the selection process has become more competitive. In 2006, 86% of the applicants who requested NASA funding received awards (36 awardees from 42 applicants), whereas that percentage dropped to 71% by 2009 (55 awardees from 78 applicants). During the past six years, the number of institutions receiving SDSGC Fellowship/Scholarship awards increased from three to eight including three Tribal College affiliates. In 2009, the Management Team restructured the funding strategy in the fellowship/scholarship program. A

small number of \$1000 awards are made to outstanding freshmen and sophomores in order to attract them into the cohort of Space Grant students and the NASA pipeline. Upper-level students who demonstrate continued interest and successful progress are eligible for \$2500 awards, and senior or graduate-level students proposing specific NASA-related research projects are awarded up to \$12,000.

*NASA Education Outcomes and PART Measures: SDSGC Fellowship/Scholarship programs support Objectives 1.1, 1.2, 1.3, and 1.5, and contribute to Outcome 1 PART Measures on employment, advanced education, and underrepresented students*

### D.1.c. Research Infrastructure

*Description* – The goal of the SDSGC Research Infrastructure Program is **“To promote the improvement of research programs and capabilities of institutional and affiliate members with an emphasis on the fields of aerospace, earth science, and supporting STEM disciplines.”** The *2010 Strategic Plan* identifies seven specific objectives for achieving this goal (box at right); associated with each objective are operational strategies and outcome indicators that the Consortium uses to measure the success of the program.

#### Research Infrastructure Objectives

- B.2.1: Research proposals
- B.2.2: Research support
- B.2.3: Collaborations
- B.2.4: Facilities
- B.2.5: Integrate research & education
- B.2.6: Diversity
- B.2.7: Evaluation

Students awarded campus research funds and funds to assist with off-campus internships of >160 hours at NASA Centers and industry are awarded those funds through SDSGC’s Fellowship/Scholarship Program described above. Those students meet SDSGC’s longitudinal tracking threshold and are tracked under that program. So as to avoid duplicate counting, students receiving fellowship/scholarship funds are not counted under the Research Infrastructure program.

SDSGC Research Infrastructure programs include: (1) A statewide competition for Program Initiation Grants for research development offered at all 10 higher education affiliates including three Tribal Colleges; emphasis is on interdisciplinary research focused on NASA, DUSEL, or EROS priorities. (2) Support for collaborative research proposals in NASA areas. (3) Support for Tribal College research roundtables in conjunction with NASA EPSCoR. In recent years, SDSGC has partnered with its tribal college affiliates on two NSF TCUP (Tribal College and Universities Program) proposals and an NSF proposal for a Pre-engineering Education Collaborative (PEEC). The annual number of participants is estimated to be about 65 during FY2010.

*Interdisciplinary* – Students and faculty supported through the Research Infrastructure, Higher Education, and Fellowship/Scholarship programs represent more than 35 disciplines. The Consortium prioritizes support of interdisciplinary projects, including engineering design teams (Aero Design Team, Unmanned Aerial Vehicle Team, IEEE Robotics Team, Mars ASME Mars Rock Retriever, Autonomous Underwater Vehicle, and ESMD Lunabotics). Since its inception, SDSGC has promoted research in support of NASA’s Earth Observing System, especially through cooperative programs with the Land Processes DAAC at EROS. EROS is a key partner in the nation’s efforts to monitor global climate and environmental change. EROS is staffed by approximately 600 USGS and private sector employees, some of whom are deployed at NASA Goddard. EROS employees also maintain offices on the campuses of SDSGC



affiliates. Research collaborations with EROS are inherently interdisciplinary in nature, bringing together specialists in remote sensing, geography, geology, hydrology, atmospheric science, physics, plant science, agronomy, computer science and engineering, and electrical engineering. For example, the Augustana College “Remote Sensing Pipeline Project” is in partnership with EROS and SDSU to provide quality undergraduate students from a wide range of disciplines who upon graduation from Augustana, enter graduate school at SDSU and conduct meaningful research in the SDSU/EROS Remote Sensing Center of Excellence. SDSGC supports students conducting interdisciplinary research at the Deep Underground Science and Engineering Laboratory (DUSEL) at the site of the former Homestake mine in the Black Hills mentioned earlier and discussed in more detail below. For example, six students provided with stipends through the FY2009 Fellowship/Scholarship program are members of an interdisciplinary research senior design team that is constructing an Autonomous Underwater Vehicle (AUV) robotic submarine to be field tested at DUSEL. An additional \$10,000 was made available to the AUV project.

The DUSEL concept initially started as a SDSGC initiative in 2001 through collaboration with the University of Pennsylvania. Today, DUSEL is unquestionably the state’s number one research and development priority. In 2007, NSF selected the site from among seven sites as the preferred location for a national and international deep science facility, and more than 50 scientists from across the U.S. and abroad are actively involved in the project. State, private and federal funds of \$85 million are now committed to the project to develop an interim lab at the 4,850-foot level, near the site of measurements of solar neutrino flux by Ray Davis that lead to the 2002 Nobel Prize in Physics. Currently, a faculty member from the lead institution, along with a physicist from UC-Berkeley/Lawrence Berkeley National Laboratory, is a Principal Investigator on a \$15 million NSF grant to develop the final science and engineering plans for a deeper laboratory at the 7,400-foot level. The project will next be submitted as an NSF Major Research Equipment expenditure, which would pave the way for \$300 million in federal funds to develop the infrastructure down to the 7,400-foot level. Once fully operational, DUSEL will be a multi-disciplinary facility with research in neutrino physics, particle physics, dark matter, nuclear astrophysics, nucleosynthesis, microgravity, geomicrobiology, hydrology, and geology, as well as the site of a comprehensive Education and Outreach center that will be managed by an SDSGC affiliate. Science and engineering experiments will be funded primarily by DOE and NSF, but research in astrophysics and dark matter may also attract NASA funding. The lead institution is already working with NASA Ames researchers on possible experiments and student internships. Faculty from all eight of the Consortium’s four-year universities (including two Tribal Colleges) are involved in research, education, or outreach components of the DUSEL project, and SDSGC will continue to invite and fund Program Initiation Grant applications related to DUSEL research. In 2009, SDSGC was awarded a Consortium Development Competition grant that supports six affiliate institutions in development of a “NASA-DUSEL Research Center for Probing the Earth’s Interior.” Furthermore, several DUSEL research projects have been funded by SD NASA EPSCoR seed grants, and a NASA EPSCoR Major Research proposal will be submitted in February 2010 involving laser pulsed cold atom interferometry (AI) in collaboration with NASA Ames and Stanford University.

Building on the national visibility of DUSEL, a new joint Ph.D. degree program in Physics was approved by the SD Board of Regents in December 2009. Under this new physics program, each of three state universities and members of the Consortium (SDSM&T, USD, and SDSU)

will have individual authority to award the PhD. Faculty from two other Consortium universities will also assist in teaching courses and serving on dissertation committees.

*NASA Education Outcomes and PART Measures: SDSGC Research Infrastructure programs support Objectives 1.1, 1.2, and 1.5, and contribute to Outcome 1 PART Measures on underrepresented students and institutions in EPSCoR state*

#### **D.1.d. Higher Education**

*Description* – The goal of the SDSGC Higher Education Program is **“To build interdisciplinary programs related to NASA’s Education Outcome 1 at the state’s institutions of higher education and to support related programs that serve to strengthen STEM education in South Dakota.”** The *2010 Strategic Plan* identifies six specific objectives for achieving this goal (box at right); associated with each objective are operational strategies and outcome indicators that the Consortium uses to measure the success of the program.

##### **Higher Education Objectives**

- B.3.1: Curriculum and NASA content
- B.3.2: NASA and EROS ties
- B.3.3: State government
- B.3.4: Industry involvement
- B.3.5: Diversity
- B.3.6: Evaluation

Students awarded funds for participation in higher education experiences of >160 hours are awarded those funds through SDSGC’s Fellowship/Scholarship Program described above. Those students meet SDSGC’s longitudinal tracking threshold and are tracked under that program. So as to avoid duplicate counting, students receiving fellowship/scholarship funds are not counted under the Research Infrastructure program.

SDSGC Higher Education funding during FY2010 will support for: (1) A statewide competition for Program Initiation Grants for course development offered at all 10 higher education affiliates including three Tribal Colleges; emphasis is on NASA disciplines. (2) Interdisciplinary student engineering design teams in NASA priority areas. (3) Summer STEM “bridge” programs for precollege students on college campuses with emphasis on Native American students (see below and section D.2.a Precollege).

Higher education college-preparatory “bridge” programs will be provided to secondary students on college campuses through the continuation of SDSGC-supported programs such as the six-week, residential South Dakota GEAR UP program held on the campus of SDSM&T, and the Flandreau Indian School (FIS) Success Academy held on the campus of SDSU. Both the SD GEAR UP and FIS Success Academy are college-preparatory programs each involving over 200 Native American high school students from Tribal schools on reservations within South Dakota who express interest in science and engineering. An objective of these two programs is increased enrollment in STEM disciplines and interest in STEM careers. The two programs use tracking and evaluation tools to assess interest in STEM disciplines.

About 85% of the participants in the SD GEAR UP program are Native American students and two-thirds are female. Over the six-week period, faculty, campus researchers, and administrators offer daily seminars on technology and career exploration to start the day. Students then attend classes throughout the day in math, science, English, computers, and life sciences. Mini-courses are provided in a wide variety of science and engineering subjects with a hands-on, engaging approach including tours of the many campus laboratories, a science fair, and professional development training. SDSGC personnel provide NASA content to the

curriculum and explain Space Grant-funded opportunities that the students can access when they enter college. Over the 17 years that the SD GEAR UP program has been offered, statistics show that of those students who graduate from the program, virtually 100% graduate from high school and 87% attend college. The director of SD GEAR UP is a former SDSGC student and NASA USRP intern. In January 2010, he was awarded the Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring at the White House. Planning for the Summer of Innovation proposal focuses on extending the reach of SD GEAR UP to add additional programs for middle-school students and additional NASA content.

Based on metrics from recent years, it is estimated that about 720 college and university students will participate in the Consortium's Higher Education programs during FY2010. An estimated 400 of the 720 students consist of Native American precollege students participating in the SD GEAR UP and Flandreau Indian School (FIS) Success Academy programs held on the campuses of SDSM&T and SDSU where many of them will take college courses for credit. Because SD GEAR UP and FIS Success Academy are college-preparatory programs, the 400 Native American precollege students are considered "other participants" in the area of higher education. Pursuant to NASA guidance, those 400 students are included in SDSGC's PART Measure total number of underrepresented students participating in NASA higher education programs rather than in precollege (see Appendix G.4).

*Interdisciplinary* – As emphasized above in the Higher Education program goal, SDSGC focuses on interdisciplinary experiences for individual students or design teams such as the following that provide hands-on, engineering programs that integrate a wide variety of STEM fields: 1) Aero Design Team, 2) Unmanned Aerial Vehicle Team, 3) interdisciplinary robotics teams such as IEEE Robotics, ASME Mars Rock Retriever, and AUV Robotic Submarine Teams. Additionally, a combined team representing SDSM&T and Oglala Lakota College is among 25 qualifiers for the May 2010 Lunabotics Mining Competition. These activities are focused around challenging engineering design problems, but also incorporate real-world, systems-engineering aspects, such as logistics, planning, resource development, and deadlines, that prepare students for the STEM workforce. Four students from affiliate Oglala Lakota College were among 16 tribal college students selected for a six-week NASA-AIHEC (American Indian Higher Education Consortium) summer robotics program at Southwest Indian Polytechnical Institute in Albuquerque, capped by a week-long program at Johnson Space Center.

The Interdisciplinary Robotics Initiative (IRI) began at SDSM&T three years ago through an SDSGC Project Initiation Grant and has seeded additional growth in robotics education at both the university and precollege level. The IRI project is aimed at increasing the number of graduates in computer science and engineering and promoting careers in science and technology. Furthermore, the IRI activity sparked a fundamental change in SDSM&T's Computer Science graduate program in that a new M.S. program was developed with NASA support and approved by the SD Board of Regents in April 2009. SDSM&T formally converted its M.S. in Computer Science from a broad survey degree to an interdisciplinary program in Robotics and Intelligent Autonomous Systems (RIAS). The RIAS program covers the essentials of robotics, artificial intelligence, control, communications, sensors and signal processing. It is one of fewer than a dozen graduate programs in the U.S. providing this kind of educational opportunity. Students will have the opportunity to gain advanced knowledge in focus areas such as pattern recognition, computer vision, nonlinear control, digital signal processing, and communications. The new

program promotes additional growth in robotics education at both the university and precollege level and will increase the number of graduates in computer science and engineering that go on to pursue STEM careers. Faculty in the RIAS program are actively engaged in the development of the statewide South Dakota Robotics Association and the integration of advanced robotic designs into precollege robotics programs.

In February 2010, Dr. Jennifer Karlin of SDSM&T's Industrial Engineering will represent SDSGC in NASA's Education Forum entitled "*STEM Education Research: Current Findings and Needs*" at Kennedy Space Center. Dr. Karlin leads SDSM&T's Taskforce on STEM Education Research.

*NASA Education Outcomes and PART Measures: SDSGC Higher Education programs support Objectives 1.2, 1.3, 1.4, and 1.5, and contribute to Outcome 1 PART Measures on employment, underrepresented students, course development, and institutions in EPSCoR states*

## **D.2. NASA Education Outcome 2**

### **D.2.a. Precollege Education**

*Description* – The goal of the SDSGC Precollege Education Program is **“To increase student awareness and access to educational and career opportunities in aerospace, earth science, and supporting STEM disciplines.”** The *2010 Strategic Plan* identifies seven specific objectives for achieving this goal (box at right); associated with each objective are operational strategies and outcome indicators that the Consortium uses to measure the success of the program. In keeping with the focus of a capability enhancement consortium, SDSGC allots only about 13% of its budget to precollege education programs so the focus remains on NASA Education Outcome 1 objectives. Leverage of outside funding such as from SDSGC affiliates will be sought as a means of augmenting the Consortium's precollege programs. SDSGC maintains targeted e-mail distribution lists for special interest groups in precollege education and participates in the annual state science and math teachers conference and the annual technology in education conference. An estimated 590 teachers and 3,400 students will directly participate in SDSGC's FY2010 precollege programs. Major precollege efforts are summarized here.

#### **Precollege Objectives**

- D.1.1: NASA dissemination
- D.1.2: Partnerships
- D.1.3: In-service teacher training
- D.1.4: Science & education events
- D.1.5: State standards
- D.1.6: Diversity
- D.1.7: Evaluation

➤ SDSGC will continue to sponsor statewide competition for a precollege STEM teacher grant. The \$5,000 Kelly Lane Earth and Space Science grant is awarded annually to a select science or math teacher in South Dakota to recognize and support outstanding teachers and innovative educational programs at the precollege level.

➤ SDSGC will continue to support teacher training workshops in NASA priority areas. A major emphasis will continue to be SDSGC's two-day robotics training workshops, which will be targeted at the middle school level during FY2010. Teachers will be trained by a NASA AESP specialist from JSC and provided hands-on curriculum enhancement capabilities in the field of robotics. Workshops will continue to be held at three SDSGC affiliate locations and will involve direct support of consortium affiliate staff. With assistance from SDSGC (specifically through the Consortium's Associate Director at Augustana College), the “South Dakota

Robotics Association” was formed two years ago. In January 2010, the inaugural South Dakota FIRST LEGO® League (SD FLL) Tournament was held, with children, coaches, and mentors from 30 middle and elementary school teams. The number of students involved with the FLL activities in South Dakota has grown from 140 students in the 2008/09 season to 290 students in 2009/10, to an estimated 400 in the upcoming 2010/11 season. SDSGC’s Associate Director at the SD Discovery Center plans to start a FIRST LEGO League Advisory Team with the goal of recruiting additional students, coaches, mentors and sponsors for the League.

➤ Through its partnership with affiliate SD Discovery Center (SDDC), SDSGC will continue to financially support and participate in six Women in Science (WIS) conferences held throughout South Dakota in 2010. An estimated 1,200 middle and high school girls will participate. SDDC will also provide “Great Explorations in Math & Science” (GEMS) training and “Advancing Teacher Learning in Space Science” (ATLaSS) workshops for precollege teachers. Ken Graupmann, retired teacher from Kadoka NES school and currently on contract to do space-related informal education program at SDDC, was accepted by NASA to the Solar System Educator Program. He will receive SSEP training in early 2010 and train well over 100 precollege teachers annually in South Dakota.

➤ SDSGC will continue to use its higher education and precollege network to coordinate collaborative proposals for innovations in precollege STEM education with an emphasis on programs that improve STEM opportunities for Native American youth. The consortium is currently consulting with a multi-institution team representing public, private, and tribal groups regarding its response to the Summer of Innovation opportunity. Successful past collaborations include the NSF Opportunities for Enhancing Diversity in the Geosciences, and NASA grants for the INSPIRE Collegiate Experience (Tier 2A) and the Competitive Programs for Science Museums and Planetariums.

➤ SDSGC has a long and successful history of supporting summer STEM programs for precollege students on college campuses, especially those with an emphasis on Native American students. In addition to the summer college-preparatory programs of SD GEAR UP and FIS Success Academy described above under Higher Education, summer opportunities will also be provided to precollege students on college campuses through the continuation of the following SDSGC-supported programs: (1) the Aerospace Career and Education (ACE) Camp held at SDSU, (2) the Space Adventures Camp held at SDSM&T, and (3) the NASA INSPIRE Collegiate Experience (Tier 2A) program at SDSM&T. All of these programs seek to increase enrollment in STEM disciplines and interest in STEM careers, and all programs use tracking and evaluation tools to assess interest in STEM disciplines. Data collected from SDSGC Fellowship/Scholarship applications indicates that former participants in summer precollege programs are now entering the higher education part of the STEM pipeline.

➤ SDSGC will continue to support precollege educators by sharing NASA educational resources and providing appropriate training. These include portable StarLabs, robotic kits, and telescopes. SDSGC affiliate the Journey Museum received notification from NASA in January 2010 that it will be the recipient of a \$492,778 Competitive Programs for Science Museums and Planetariums grant for their proposal entitled “Journey Into Space,” which was submitted in fall 2009 with Consortium support. The grant covers costs for a Uniview Geodome (an inflatable and portable dome with state-of-the-art Uniview planetarium software for space science programming). The grant also covers the salary for a science teacher who will conduct a space science outreach program to schools within South Dakota and neighboring states, stipends for

annual teachers' workshops, and support for additional space science programming and events to be created and conducted by the Journey Museum with assistance from Consortium personnel.

*NASA Education Outcomes and PART Measures: SDSGC Precollege programs support Objectives 2.1, 2.2, 2.3., and 2.4, and contribute to the Outcome 2/3 PART Measures on educator development, student interest, and student numbers*

### **D.3. NASA Education Outcome 3**

#### **D.3.a. Informal Education**

*Description* – The goal of the SDSGC Informal Education (Public Service) Program is **“To enhance public scientific literacy in aerospace and earth science; to complement community efforts in STEM education; and to inspire citizens of diverse backgrounds through the excitement of scientific exploration and discovery.”** The

*2010 Strategic Plan* identifies four specific objectives for achieving this goal (box above); associated with each objective are operational strategies and outcome indicators that the Consortium uses to measure the success of the program. In keeping with the focus of a capability enhancement consortium, SDSGC allots less than 3% of its budget to informal education programs. SDSGC maintains targeted e-mail distribution lists for special interest groups in informal education.

#### **Informal Education Objectives**

- E.1.1: NASA dissemination
- E.1.2: Science and education events
- E.1.3: Diversity
- E.1.4: Evaluation

Implementation of the informal education strategies has increasingly involved partnerships and linkages with the Consortium's three Informal Education affiliates and statewide organizations such as the StarBase Department of Defense Youth Program and 4-H. 4-H is especially effective at reaching rural populations through USDA County Extension educators. SDSGC informal education affiliates are members of the NASA Museum Alliance, and these organizations leverage outside staff and funding as a means of augmenting the Consortium's programs in this area. This has provided a significant pool of qualified presenters of NASA aerospace content who are now able to interact with large numbers of participants across the state. As with its precollege program, SDSGC also shares educational resources (robotics kits, StarLabs, etc.) across this network of informal education providers. It is estimated that 2,885 direct participants will be impacted by SDSGC's informal education programs during FY2010.

➤ SDSGC will continue to partner with informal education affiliates to disseminate NASA content, share NASA educational resources, and host major NASA science education events.

The largest program in this category is South Dakota Space Days, an event held in different communities each year designed to promote STEM literacy and awareness of NASA's mission to the general public. Thousands of students, teachers, and members of the general public from throughout the state participate in hands-on educational activities and visit with experts in aerospace, aeronautics, earth science, engineering, computer science, physics, and other disciplines about their field. Guest speakers with nationally recognized credentials such as NASA astronauts, scientists, and managers present programs and meet with the public. News coverage and interviews with NASA speakers are broadcast by local and statewide media. Numerous exhibits on space and earth science and technology are provided by NASA, SDSGC affiliates, and other organizations. Standards-based educational materials are provided and exhibits are staffed by qualified STEM professionals. Students and teachers are exposed to the

excitement and opportunities of various STEM careers and they learn firsthand about the impact that NASA has on their lives. SDSGC's program evaluator and Management Team continue to evaluate how Space Days events can be improved.

Through matching funds, SDSGC sponsors *StarDate*, heard twice daily on South Dakota Public Radio. NASA and SDSGC are acknowledged, and upcoming consortium events such as the fall Fellowship/Scholarship competition are advertised.

*NASA Education Outcomes and PART Measures: SDSGC Informal Education programs support Objectives 3.1, 3.2, and 3.3, and contribute to the Outcome 2/3 PART Measures on student interest and student numbers*

## E. CONSORTIUM MANAGEMENT

### E.1. Consortium Management

*Management structure* – SDSGC’s management structure, goals, and policies and procedures are clearly defined in two documents: (1) the *SDSGC Strategic Plan* (Appendix G.1) which is assessed and updated annually, and (2) the *SDSGC Roles and Responsibilities of Members* (Appendix G.1.a) which was adopted in July 2005 and clearly defines the Consortium’s decision-making process. The organizational structure of the Consortium consists of the Director and Deputy Director (Program Coordinator) at the lead institution, four Associate Directors, and designated Space Grant representatives at each of the remaining 15 affiliates.

The Consortium currently operates under an eight-member Management Team consisting of the Director, Deputy Director, four Associate Directors, one representative from another affiliate, and an ex-officio member of the SD Board of Regents. The Management Team meets on a monthly basis via teleconferences to a) conduct business, b) evaluate program success, c) make/revise policy, d) plan activities, e) develop the budget, and f) make selections of Fellowship/Scholarship and Program Initiation Grant awards. Quarterly meetings are open to all 20 affiliates; these are face-to-face meetings held at different venues in order to encourage participation of affiliates. The Consortium Program Evaluator is present at all meetings.

*Operational policies and procedures* –The *SDSGC Strategic Plan* lays out nine strategic objectives of management (see box at right). Associated with each objective are specific operational strategies and outcome targets to aid in implementation and assessment of the management goals and objectives.

#### **Management Objectives**

- A.1: Reporting
- A.2: National network
- A.3: Consortium network
- A.4: State government
- A.5: State industry
- A.6: Link to public
- A.7: Increase resources
- A.8: Diversity
- A.9: Evaluation

*Evaluation* – All South Dakota Space Grant Consortium (SDSGC) projects are required to build on both formal and informal learning research, practice, and prior work and then add to this knowledge base through evaluation. Summative evaluation procedures vary widely depending on the activity that is being evaluated given the diversity of deliverables. In terms of higher education, fellowship and scholarship program applications, educational programs, and research funding and collaboration, opportunities are announced to all higher education members and affiliates including Minority-Serving Institutions in South Dakota, which are exclusively Tribal Colleges and Universities. Applications are competitively reviewed to ensure the fair distribution of funds to member universities, educational affiliates, and to ensure funding for women, members of underrepresented minorities, and persons with disabilities. Before-and-after surveys are administered to faculty and students who have received significant support from SDSGC to assess the impact of the support on the individual’s education, career, and professional development. In addition SDSGC scholars and fellows are longitudinally tracked through the National Space Grant Foundation’s (NSGF) Longitudinal Tracking system to document, measure, and assess the impact of such programs. The NSGF report is reviewed annually by the SDSGC Management Team to assess the effectiveness of SDSGC programs and funding. After careful review of evaluation reports and the NSGF report by the SDSGC Management Team, adjustments are made to program activities to strengthen activities that are working and drop or improve activities that are not working.



A similar approach to evaluation is also undertaken for both elementary and secondary education and informal education. Before-and-after surveys are developed and administered to precollege program participants and informal education program participants to assess: (1) the impact of such programs on the individual's scientific literacy of aerospace, earth science, and supporting STEM disciplines; (2) their awareness of NASA's mission and educational and career opportunities in STEM disciplines; and (3) the ability of such programs to inspire participants of diverse backgrounds through the excitement of scientific exploration and discovery. After careful review of survey results and evaluation reports by the SDSGC Management Team, adjustments are made to program activities to strengthen activities that are working and drop or improve activities that are not working.

## **E.2. Consortium Structure/Network (Internal)**

SDSGC's statewide network of 20 affiliate institutions including the lead organization consist of 10 public, private, and tribal universities (including one technical institute and one community college), three informal education centers, three technology-based industries, one private observatory that conducts astronomical research, one astronomical society that provides informal education, one state science and technology authority working to develop an underground science and engineering laboratory in the Black Hills, and one federal research facility that supports NASA missions. The map on page ii (Consortium Profile) shows the distribution of these 20 institutions plus five additional institutions consisting of three NASA Explorer Schools and two Tribal K-12 school partners that are not formal affiliates.

As referenced above, the *SDSGC Roles and Responsibilities of Members* (Appendix G.1.a) defines the Consortium's decision-making process. All decisions are made by a vote of a quorum of the Management Team. Most votes are subject to a simple majority, but some decisions, such as changes in membership, or change of Director or lead institution, require a two-thirds vote. Each of the 20 affiliates maintains contact with the Consortium Management Team through a designated Space Grant representative. Affiliate representatives are eligible to apply for a rotating two-year position on the Management Team. Affiliate members receive no regular Consortium funds, but they are eligible to apply for a variety of special programs, many of which provide funding to the organization or to individuals. All of the other roles and responsibilities of affiliate representatives can be found on pages 4-5 of Appendix G.1.a.

In recent years, the consortium's strategies to improve participation have resulted in significantly greater engagement of several affiliates (Oglala Lakota College, Sinte Gleska University, University of South Dakota, Dakota State University, Black Hills State University, and the Journey Museum). An important new affiliate was added in 2009, the South Dakota Science and Technology Authority, which manages research and education programs at DUSEL. Preliminary discussions are underway with three aerospace industries that have recently begun operations in the state: Northrop Grumman, General Atomics, and Lunar Trans LLC (competing for the Google Lunar X Prize).

## **E.3. Consortium Operations**

At the lead institution, the Director's staffing level is 0.26 FTE (10% NASA funds plus 16% match). The Deputy Director (Program Coordinator) is supported at 0.9 FTE NASA funds. Each receives additional support from the state's NASA EPSCoR funds which ensures alignment and collaboration between the two programs. Space Grant clerical support at the headquarters office increased from 0.1 to 0.15 FTE in FY2010 through cost-sharing input from SDSM&T.

The four Associate Directors at affiliate institutions are staffed at a combined total of 0.46 FTE through a combination of NASA and matching funds (0.28 FTE funded by NASA only). The total FY2010 NASA funds for the salaries of the Director, Deputy Director, and four Associate Directors is \$85,451. The fringe is \$21,946 and supplies are \$5,557 in NASA funding. As a whole, the allocation of management staff resources is approximately 70% for management and administrative tasks, 20% for resource development, and 10% for project implementation.

The composition, role and meeting frequency of SDSGC's Management Team is described above. The "internal" advisory/executive committee for SDSGC is the eight-member Management Team as described above (page 11) along with its meeting frequency. The "external" advisory/executive committee for SDSGC is the 29-member state "Research Excellence: A Critical Hallmark" (REACH) Committee which meets three times per year and provides the advisory function for both Space Grant and NASA EPSCoR as well as oversight of the state's other federal STEM capability enhancement programs. Starting in 2009, the Vice President for Research of the South Dakota Board of Regents has served in an ex-officio capacity on both the SDSGC Management Team and the SD NASA EPSCoR Steering Committee. This important addition has allowed SDSGC to achieve closer alignment with other statewide initiatives in research and education.

The policies for adding and removing members of the Consortium are specifically explained on pages 7-9 of Appendix G.1.a (*SDSGC Roles and Responsibilities of Members*) along with specific policies for change of Director and lead institution and change of Associate Director.

#### **E.4. Collaborations and Partnerships Outside the Consortium**

SDSGC has developed a number of collaborations and partnerships outside the membership of the consortium for the purpose of promoting STEM education and workforce initiatives.

*At the state level, these include:* (1) Through SDSGC-funded programs at Flandreau Indian School and St. Francis Indian School, approximately 700 Native American precollege students participate each year in specialized aerospace disciplines, earth science programs, and college-preparatory courses in order to increase training and recruitment of underrepresented minorities in STEM degrees and eventual careers. (2) SDSGC affiliates work very closely with the NASA AESP specialist for South Dakota, who typically assists with at least six workshops or other events each year. (3) SDSGC affiliates have been instrumental in establishing the first statewide robotics association and competition, and are planning to establish a 501(c)(3) organization for a multi-state, regional network. (4) SDSGC informal education affiliates work closely with the state's 4-H educators and the Department of Defense StarBase program to add robotics training and other NASA content to these programs. (5) Dr. Dan Swets, SDSGC Associate Director at Augustana College, serves as co-partner for SD FLL and serves on the Planning Committee responsible for overseeing and supporting the FLL activities in SD.

*With respect to the national Space Grant network, these include:* (1) SDSGC collaborates with several other state consortia to develop the Space Grant Internet Telescope Network program, which began operations in August 2007. (2) SDSGC Associate Director Kevin Dalsted at SDSU will serve on a technical review panel of fellowship applicants for the Indiana Space Grant Consortium. (3) Tribal college affiliate Sinte Gleska University is participating in the Wisconsin Space Grant Consortium's first National Tribal College Rocket Competition. (4) Affiliate Lake Area Technical Institute is participating in the Colorado Space Grant Consortium's Starting Student Space Hardware Programs Workshop.

## **F. BUDGET: NARRATIVE AND DETAILS**

### **SDSM&T BUDGET NARRATIVE / JUSTIFICATION**

**TITLE: FY2010 South Dakota Space Grant**

This narrative applies to the detailed budget page titled:

**SDSM&T PROPOSAL BUDGET**

**NASA Space Grant Consortium**

**Year One: May 15, 2010 - May 14, 2011**

**A. & B. PERSONNEL:** The salaries that will be charged for this work will be those regularly approved for the individuals involved by the governing body of the South Dakota School of Mines and Technology; namely the Regents of Education of the State of South Dakota. The rates for FY 2010 (July 1, 2009 through June 30, 2010) are based on current contractual agreements.

Eligible personnel earn vacation at the rate of 10 hours per month if they have 15 years or less of service and 13.33 hours per month if their period of service exceeds 15 years. This vacation is handled in the budget by including the appropriate accrual adjustment in the salary rate. This procedure is utilized for all sponsored research to insure that each project pays only its pro rata share of the vacation authorized.

**FRINGE BENEFITS:** Fringe benefits have been budgeted at 24% of salaries and wages for faculty and staff personnel and 8% for students. The benefits consist of contributions to social security, the unemployment insurance program, the workmen's compensation program, the flexible benefit fee program, a group insurance program and matching contributions to the state employee retirement program. Only the actual costs of the fringe benefit programs are charged to the project.

**C. EQUIPMENT:** None Requested

**D. TRAVEL:** See specifics in Year One (FY2010) SDSM&T detailed budget. Locations of biannual National Space Grant Directors meetings during FY2010 are Portland, ME and Washington, DC. Location of (Western) Regional Space Grant Meeting is Omaha, NE.

**E. PARTICIPANT/TRAINEE SUPPORT COSTS:** Includes the Consortium's fellowship/scholarship program funding for college/university students.

### **F. OTHER DIRECT COSTS**

1. **Materials and Supplies:** Expenditures reflected in these categories are based on best estimates now available. In no case will the project be charged for more than actual costs incurred.

2. **Publication Costs**

3. **Consultant Services**

5. **Subawards/Consortium/Contractual Costs:** Individual subaward budgets and statements of work are attached.

6. **Equipment or Facility Rents/User Fees**

7. Alterations and Renovations

8. Other: Expenditures reflected in these categories are based on best estimates now available. In no case will the project be charged for more than actual costs incurred.

Table of Director's Time

<u>Director</u>	<i>Dollars</i>	<u>NASA Funding TOTAL Dollars</u> for a 12-month period (academic year + summertime)  \$9,816	<u>Matching Funds TOTAL Dollars</u> for a 12-month period (academic year + summertime)  \$15,706
	<i>Time</i>	<u>NASA Funding Percentage of TOTAL time</u> for a 12-month period (academic year + summertime)  10%	<u>Matching Funding Percentage of TOTAL time</u> for a 12-month period (academic year + summertime)  16%

H. INDIRECT COSTS (F&A): The latest indirect cost rate approved by the cognizant government audit agency for the South Dakota School of Mines and Technology is 37.0% of modified total direct costs. This rate has been used in the budget calculations. The cognizant government audit agency for the institution is:

Director, Division of Cost Allocation  
DCA Western Field Office  
Department of Health and Human Services  
90 7<sup>th</sup> Street, Suite 4-600  
San Francisco, CA 94103

HHS Representative: Jeanette Lu  
Telephone Number (415) 437-7820

4. COST SHARING: 1:1 excluding the Fellowships

General comment: If NASA announces any amendments to the FY2010 Space Grant solicitation and an opportunity for a second increment of FY2010 funding is made available later this year, SDSGC's budget line items that currently show \$0 in the NASA column will be populated with dollar figures at that time.

**OFFICE OF SPONSORED PROGRAMS**

**SDSM&T PROPOSAL BUDGET**

**NASA Space Grant Consortium - New Funding**

Year One: May 15, 2010 - May 14, 2011

	A. Grant Expenses						B. SDSM&T Match					All (A + B) Total
	Annualized Base Salary	Acad	% Effort	Sumr	% Effort	Requested Salary/Fringe	Acad	% Effort	Sumr	% Effort	Requested Salary/Fringe	Requested Salary/Fringe
<b>A. SENIOR PERSONNEL</b>												
PI ~ Duke, Edward F. Fringe @ 24.0%	\$98,163	8.50	10%	3.50	10%	\$9,816 \$2,356	8.50	16%	3.50	16%	\$15,706 \$3,769	\$31,647
2 Durkin, Thomas Fringe @ 24.0%	\$58,130	8.50	90%	3.50	90%	\$52,317 \$12,556					\$0 \$0	\$64,873
3 Price, Maribeth H. Fringe @ 24.0%	\$100,776					\$0 \$0	8.50	10%			\$7,138 \$1,713	\$8,851
4 Batchelder, Michael J. Fringe @ 24.0%	\$160,140					\$0 \$0	8.50	15%			\$17,015 \$4,084	\$21,099
5 Dolan, Daniel F. Fringe @ 24.0%	\$151,776					\$0 \$0	8.50	5%			\$5,375 \$1,290	\$6,665
6 Boysen, Alfred Fringe @ 24.0%	\$107,460	1.00	15%			\$0 \$0	8.50	10%			\$7,612 \$1,827	\$9,439
7 Tolle, Charles Fringe @ 24.0%	\$78,667					\$0 \$0	8.50	10%			\$5,572 \$1,337	\$6,909
<b>TOTAL SENIOR PERSONNEL</b>						<b>\$77,045</b>					<b>\$72,438</b>	<b>\$149,483</b>
<b>B. OTHER PERSONNEL</b>												
1 Nilson, Jeanette Fringe @ 24.0%	\$45,301					\$0 \$0	8.50	15%	3.50	15%	\$6,795 \$1,631	\$8,426
<b>TOTAL OTHER PERSONNEL</b>						<b>\$0</b>					<b>\$8,426</b>	<b>\$8,426</b>
<b>C. EQUIPMENT</b>												
<b>TOTAL EQUIPMENT</b>						<b>\$0</b>					<b>\$0</b>	<b>\$0</b>
<b>D. TRAVEL</b>												
<b>1. Domestic Travel</b>												
a. Travel to Regional Space Grant Meeting (2 people)												
Airfare	600 *			2		\$1,200						\$1,200
Meals @ \$36/day	36 *	4		* 2		\$288						\$288
Lodging @ \$120/night	120 *	3		* 2		\$720						\$720
Miscellaneous ground travel						\$156						\$156
b. Travel to Biannual Space Grant Director's Meeting (2 people * 2 trips each)												
Airfare	600 *			2	* 2	\$2,400						\$2,400
Meals @ \$36/day	36 *	5		* 2	* 2	\$720						\$720
Lodging @ \$120/night	120 *	4		* 2	* 2	\$1,920						\$1,920
Miscellaneous ground travel						\$200						\$200
c. Director Travel to Executive Committee Meetings						\$2,000						\$2,000
d. Travel to NES Schools and Outreach Events						\$1,000						\$1,000
e. Consortium Administrative Meeting at EDC and SDSM&T (2 people * 2 trips)												
Mileage - 770 miles	770 *	0.34		* 2		\$524						\$524
Meals @ \$26/day	26 *	2		* 2	* 2	\$208						\$208
Lodging @ \$50/night	50 *	1		* 2	* 2	\$200						\$200
<b>Subtotal Domestic Travel</b>						<b>\$11,536</b>					<b>\$0</b>	<b>\$11,536</b>
<b>TOTAL TRAVEL</b>						<b>\$11,536</b>					<b>\$0</b>	<b>\$11,536</b>
<b>E. PARTICIPANT/TRAINEE SUPPORT COSTS</b>												
<b>1. Tuition/Fees/Health Insurance</b>												
<b>2. Stipends</b>												
Fellowships/Scholarships Stipends						\$97,000						\$97,000
Fellowships/Scholarships to SDSU (Evaluator/Coordinator)						\$13,000						\$13,000
<b>3. Travel</b>												
<b>4. Subsistence</b>												
<b>5. Other</b>												
SDSM&T Space Camp - Registration fees, meals & lodging, supplies						\$0				\$0		\$0
Space Day - room rental, speaker stipend & travel						\$0				\$3,925		\$3,925
Kelly Lane Earth & Space Science Teacher Professional Development Grant						\$0				\$0		\$0
Journey Museum affiliate match for Space Grant projects and management						\$0				\$6,089		\$6,089
Robotics Award - Precollege						\$0				\$0		\$0
SDSM&T Robotics Team Award - Higher Ed						\$0				\$0		\$0
Robotics: Supplies & Awards for teachers						\$5,000				\$0		\$5,000
Robotics and other STEM Precollege Camps						\$0				\$0		\$0
<b>TOTAL PARTICIPANT/TRAINEE SUPPORT COSTS</b>						<b>\$115,000</b>				<b>\$10,014</b>		<b>\$125,014</b>
<b>F. OTHER DIRECT COSTS</b>												
<b>1. Materials &amp; Supplies</b>												
Postage, Photocopying, Printing						\$915						\$915
Outreach Educational Materials						\$0						\$0
Computer Software & SDSGC Office Supplies						\$0						\$0
<b>2. Publications</b>												
<b>3. Consultant Services</b>												

**OFFICE OF SPONSORED PROGRAMS**

**SDSM&T PROPOSAL BUDGET**

**NASA Space Grant Consortium - New Funding**

Year One: May 15, 2010 - May 14, 2011

	A. Grant Expenses	B. SDSM&T Match	All (A + B) Total
<b>4. ADP/Computer Services</b>			
<b>5. Subawards/Contractual</b>			
1 South Dakota State University (SDSU)	\$72,075	\$72,945	\$145,020
2 Augustana College	\$57,390	\$92,657	\$150,047
3 South Dakota Discovery Center( WIS, Emission, SFIS)	\$28,600	\$33,600	\$62,200
4 SDSGC Project Initiation Grants (PIG)	\$0	\$0	\$0
<b>6. Equipment/Facility Rental Fees</b>			
<b>7. Alterations/Renovations</b>			
<b>8. Other</b>			
a Telephone, long distance	\$800		\$800
b. Conference Registration Fees	\$0		\$0
c Badlands Observatory (DSBM) Telescope	\$0	\$0	\$0
d Longitudinal Tracking - NSGF	\$4,000		\$4,000
e Telescope Network	\$0	\$0	\$0
<b>TOTAL OTHER DIRECT COSTS</b>	<b>\$163,780</b>	<b>\$199,202</b>	<b>\$362,982</b>
<b>G. TOTAL ALL DIRECT COSTS (A. ~ F.)</b>	<b>\$367,361</b>	<b>\$290,080</b>	<b>\$657,441</b>
<b>H. INDIRECT COSTS</b>			
SDSM&T Facility & Administration Cost Base Calculations			
Total Direct Costs	\$367,361	\$290,080	\$657,441
Less Exclusions*	(\$198,065)	(\$209,216)	-\$407,281
Net SDSM&T Indirect Cost Base	\$169,296	\$80,864	\$250,160
SDSM&T Indirect @ 37.0% OF MODIFIED TOTAL DIRECT COSTS	\$62,639	\$29,920	\$92,559
<b>TOTAL ALL INDIRECT COSTS</b>	<b>\$62,639</b>	<b>\$29,920</b>	<b>\$92,559</b>
<b>I. TOTAL DIRECT + INDIRECT (G. + H.)</b>	<b>\$430,000</b>	<b>\$320,000</b>	<b>\$750,000</b>

\* Subcontract amounts above the \$25,000 allowable base; Tuition Remission

**SDSM&T 1st Year Budget Summary**

From May 15, 2010 to May 14, 2011

	A	NASA USE ONLY	
		B	C
1. Direct Labor (salaries, wages, and fringe benefits)	<u>157,909</u>		
2. Other Direct Costs:			
a. Subcontracts	<u>357,267</u>		
b. Consultants	<u>0</u>		
c. Equipment	<u>0</u>		
d. Supplies	<u>915</u>		
e. Travel	<u>11,536</u>		
f. Other	<u>129,814</u>		
3. Facilities and Administrative Costs	<u>92,559</u>		
4. Other Applicable Costs	<u>0</u>		
5. Subtotal--Estimated Costs	<u>750,000</u>		
6. Less Proposed Cost Sharing (if any)	<u>-320,000</u>		
7. Carryover Funds (if any)			
a. Anticipated amount	<u>0</u>		
b. Amount used to reduce budget			
8. Total Estimated Costs	<u>430,000</u>		XXXXXXXX
APPROVED BUDGET	XXXXXXXX	XXXXXXXX	

**Instructions**

1. Provide a complete budget summary sheet for year one and separate estimates for each subsequent year.
2. Recipient's estimated costs should be entered in Column A. Columns B and C are for NASA use only. Column C represents the approved grant budget.
3. Provide as attachments detailed computations of estimates in each cost category with narratives required to fully explain proposed costs.

**OFFICE OF SPONSORED PROGRAMS**  
 SDSM&T PROPOSAL BUDGET

NASA Space Grant Consortium - New Funding

5 YEAR DETAIL BUDGET - NASA FUNDS ONLY - May 15, 2010 - May 14, 2011

	Year One: May 15, 2010 - May 14, 2011	Year Two: May 15, 2011 - May 14, 2012	Year Three: May 15, 2012 - May 14, 2013	Year Four: May 15, 2013 - May 14, 2014	Year Five: May 15, 2014 - May 14, 2015	Total Proposal: May 15, 2010 - May 14, 2015
	Requested Salary/Fringe	Requested Salary/Fringe	Requested Salary/Fringe	Requested Salary/Fringe	Requested Salary/Fringe	Requested Salary/Fringe
<b>A. SENIOR PERSONNEL</b>						
PI ~ Duke, Edward F. Fringe @ 24.0%	\$9,816 \$2,356	\$9,816 \$2,356	\$9,816 \$2,356	\$9,816 \$2,356	\$9,816 \$2,356	\$49,080 \$11,780
2 Durkin, Thomas Fringe @ 24.0%	\$52,317 \$12,556	\$52,317 \$12,556	\$52,317 \$12,556	\$52,317 \$12,556	\$52,317 \$12,556	\$261,585 \$62,780
3 Price, Maribeth H. Fringe @ 24.0%	\$0 \$0	\$0 \$0	\$0 \$0	\$0 \$0	\$0 \$0	\$0 \$0
4 Batchelder, Michael J. Fringe @ 24.0%	\$0 \$0	\$0 \$0	\$0 \$0	\$0 \$0	\$0 \$0	\$0 \$0
5 Dolan, Daniel F. Fringe @ 24.0%	\$0 \$0	\$0 \$0	\$0 \$0	\$0 \$0	\$0 \$0	\$0 \$0
6 Boysen, Alfred Fringe @ 24.0%	\$0 \$0	\$0 \$0	\$0 \$0	\$0 \$0	\$0 \$0	\$0 \$0
7 Tolle, Charles Fringe @ 24.0%	\$0 \$0	\$0 \$0	\$0 \$0	\$0 \$0	\$0 \$0	\$0 \$0
<b>TOTAL SENIOR PERSONNEL</b>	<b>\$77,045</b>	<b>\$77,045</b>	<b>\$77,045</b>	<b>\$77,045</b>	<b>\$77,045</b>	<b>\$385,225</b>
<b>B. OTHER PERSONNEL</b>						
Nilson, Jeanette Fringe @ 24.0%	\$0 \$0	\$0 \$0	\$0 \$0	\$0 \$0	\$0 \$0	\$0 \$0
<b>TOTAL OTHER PERSONNEL</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
<b>C. EQUIPMENT</b>						
<b>TOTAL EQUIPMENT</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
<b>D. TRAVEL</b>						
<b>1. Domestic Travel</b>						
Travel to Regional Space Grant Meeting (2 people)	\$0	\$0	\$0	\$0	\$0	\$0
Airfare	\$1,200	\$1,200	\$1,200	\$1,200	\$1,200	\$6,000
Meals @ \$36/day	\$288	\$288	\$288	\$288	\$288	\$1,440
Lodging @ \$120/night	\$720	\$720	\$720	\$720	\$720	\$3,600
Miscellaneous ground travel	\$156	\$156	\$156	\$156	\$156	\$780
Travel to Biannual Space Grant Director's Meeting (2 people * 2 trips each)	\$0	\$0	\$0	\$0	\$0	\$0
Airfare	\$2,400	\$2,400	\$2,400	\$2,400	\$2,400	\$12,000
Meals @ \$36/day	\$720	\$720	\$720	\$720	\$720	\$3,600
Lodging @ \$120/night	\$1,920	\$1,920	\$1,920	\$1,920	\$1,920	\$9,600
Miscellaneous ground travel	\$200	\$200	\$200	\$200	\$200	\$1,000
Director Travel to Executive Committee Meetings	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$10,000
Travel to NES Schools and Outreach Events	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$5,000
Consortium Administrative Meeting at EDC and SDSM&T (2 people * 2 trips)	\$0	\$0	\$0	\$0	\$0	\$0
Mileage - 770 miles	\$524	\$524	\$524	\$524	\$524	\$2,618
Meals @ \$26/day	\$208	\$208	\$208	\$208	\$208	\$1,040
Lodging @ \$50/night	\$200	\$200	\$200	\$200	\$200	\$1,000
<b>TOTAL TRAVEL</b>	<b>\$11,536</b>	<b>\$11,536</b>	<b>\$11,536</b>	<b>\$11,536</b>	<b>\$11,536</b>	<b>\$57,680</b>
<b>E. PARTICIPANT/TRAINEE SUPPORT COSTS</b>						
<b>1. Tuition/Fees/Health Insurance</b>						
<b>2. Stipends</b>						
Fellowships/Scholarships Stipends	\$97,000	\$97,000	\$97,000	\$97,000	\$97,000	\$485,000
Fellowships/Scholarships to SDSU (Evaluator/Coordinator)	\$13,000	\$13,000	\$13,000	\$13,000	\$13,000	\$65,000
<b>3. Travel</b>						
<b>4. Subsistence</b>						
<b>5. Other</b>						
SDSM&T Space Camp - Registration fees, meals & lodging, supplies	\$0	\$0	\$0	\$0	\$0	\$0
Space Day - room rental, speaker stipend & travel	\$0	\$0	\$0	\$0	\$0	\$0
Kelly Lane Earth & Space Science Teacher Professional Development Grant	\$0	\$0	\$0	\$0	\$0	\$0
Journey Museum affiliate match for Space Grant projects and management	\$0	\$0	\$0	\$0	\$0	\$0
Robotics Award - Precollege	\$0	\$0	\$0	\$0	\$0	\$0
SDSM&T Robotics Team Award - Higher Ed	\$0	\$0	\$0	\$0	\$0	\$0
Robotics: Supplies & Awards for teachers	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$25,000
Robotics and other STEM Precollege Camps	\$0	\$0	\$0	\$0	\$0	\$0
<b>TOTAL PARTICIPANT/TRAINEE SUPPORT COSTS</b>	<b>\$115,000</b>	<b>\$115,000</b>	<b>\$115,000</b>	<b>\$115,000</b>	<b>\$115,000</b>	<b>\$575,000</b>
<b>F. OTHER DIRECT COSTS</b>						
<b>1. Materials &amp; Supplies</b>						
Postage, Photocopying, Printing	\$915	\$915	\$915	\$915	\$915	\$4,575



**OFFICE OF SPONSORED PROGRAMS**  
 SDSM&T PROPOSAL BUDGET

NASA Space Grant Consortium - New Funding

5 YEAR DETAIL BUDGET - NASA FUNDS ONLY - May 15, 2010 - May 14, 2011

	Year One: May 15, 2010 - May 14, 2011	Year Two: May 15, 2011 - May 14, 2012	Year Three: May 15, 2012 - May 14, 2013	Year Four: May 15, 2013 - May 14, 2014	Year Five: May 15, 2014 - May 14, 2015	Total Proposal: May 15, 2010 - May 14, 2015
Outreach Educational Materials	\$0	\$0	\$0	\$0	\$0	\$0
Computer Software & SDSGC Office Supplies	\$0	\$0	\$0	\$0	\$0	\$0
<b>2. Publications</b>						
<b>3. Consultant Services</b>						
<b>4. ADP/Computer Services</b>						
<b>5. Subawards/Contractual</b>						
South Dakota State University (SDSU)	\$72,075	\$72,075	\$72,075	\$72,075	\$72,075	\$360,375
Augustana College	\$57,390	\$57,390	\$57,390	\$57,390	\$57,390	\$286,950
South Dakota Discovery Center( WIS, Emission, SFIS)	\$28,600	\$28,600	\$28,600	\$28,600	\$28,600	\$143,000
SDSGC Project Initiation Grants (PIG)	\$0	\$0	\$0	\$0	\$0	\$0
<b>6. Equipment/Facility Rental Fees</b>						
<b>7. Alterations/Renovations</b>						
<b>8. Other</b>						
a.						
Telephone, long distance	\$800	\$800	\$800	\$800	\$800	\$4,000
Conference Registration Fees	\$0	\$0	\$0	\$0	\$0	\$0
Badlands Observatory (DSBM) Telescope	\$0	\$0	\$0	\$0	\$0	\$0
Longitudinal Tracking - NSGF	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$20,000
Telescope Network	\$0	\$0	\$0	\$0	\$0	\$0
<b>TOTAL OTHER DIRECT COSTS</b>	<b>\$163,780</b>	<b>\$163,780</b>	<b>\$163,780</b>	<b>\$163,780</b>	<b>\$163,780</b>	<b>\$818,900</b>
<b>G. TOTAL ALL DIRECT COSTS (A. ~ F.)</b>	<b>\$367,361</b>	<b>\$367,361</b>	<b>\$367,361</b>	<b>\$367,361</b>	<b>\$367,361</b>	<b>\$1,836,805</b>
<b>H. INDIRECT COSTS</b>						
SDSM&T Facility & Administration Cost Base Calculations						
Total Direct Costs	\$367,361	\$367,361	\$367,361	\$367,361	\$367,361	\$1,836,805
Less Exclusions*	-\$198,065	-\$198,065	-\$198,065	-\$198,065	-\$198,065	-\$990,325
Net SDSM&T Indirect Cost Base	\$169,296	\$169,296	\$169,296	\$169,296	\$169,296	\$846,480
SDSM&T Indirect @ 37.0%	\$62,639	\$62,639	\$62,639	\$62,639	\$62,639	\$313,195
<b>TOTAL ALL INDIRECT COSTS</b>	<b>\$62,639</b>	<b>\$62,639</b>	<b>\$62,639</b>	<b>\$62,639</b>	<b>\$62,639</b>	<b>\$313,195</b>
<b>I. TOTAL DIRECT + INDIRECT (G. + H.)</b>	<b>\$430,000</b>	<b>\$430,000</b>	<b>\$430,000</b>	<b>\$430,000</b>	<b>\$430,000</b>	<b>\$2,150,000</b>

\* Subcontract amounts above the \$25,000 allowable base; Tuition Remission



**SOUTH DAKOTA SCHOOL OF MINES & TECHNOLOGY**  
Office of Sponsored Programs  
**Proposal Summary**

NASA Space Grant Consortium - New Funding

FY 2010 - FY 2014 - SUMMARY NASA FUNDS AND MATCHING

Federal 424 A Category	Total Project Funds	Match Funds	Other Funds	Total All Funds
A. Personnel Costs	\$310,665	\$326,065	\$0	\$636,730
B. Fringe Benefits	\$74,560	\$78,255	\$0	\$152,815
C. Travel	\$57,680	\$0	\$0	\$57,680
D. Equipment	\$0	\$0	\$0	\$0
E. Supplies	\$4,575	\$0	\$0	\$4,575
F. Contractual	\$790,325	\$996,010	\$0	\$1,786,335
G. Construction	\$0	\$0	\$0	\$0
H. Other	\$599,000	\$50,070	\$0	\$649,070
I. Total Direct Charges	\$1,836,805	\$1,450,400	\$0	\$3,287,205
J. Indirect Costs	\$313,195	\$149,600	\$0	\$462,795
K. TOTAL ALL PROJECT COSTS (A - J)	\$2,150,000	\$1,600,000	\$0	\$3,750,000

\* Subcontract amounts above the \$25,000 allowable base; Tuition Remission

**SDSM&T Five Year Budget Summary**

From May 15, 2010 to May 14, 2015

	A	NASA USE ONLY	
		B	C
1. Direct Labor (salaries, wages, and fringe benefits)	<u>789,545</u>		
2. Other Direct Costs:			
a. Subcontracts	<u>1,786,335</u>		
b. Consultants	<u>0</u>		
c. Equipment	<u>0</u>		
d. Supplies	<u>4,575</u>		
e. Travel	<u>57,680</u>		
f. Other	<u>649,070</u>		
3. Facilities and Administrative Costs	<u>462,795</u>		
4. Other Applicable Costs	<u>0</u>		
5. Subtotal--Estimated Costs	<u>3,750,000</u>		
6. Less Proposed Cost Sharing (if any)	<u>-1,600,000</u>		
7. Carryover Funds (if any)			
a. Anticipated amount	<u>0</u>		
b. Amount used to reduce budget			
8. Total Estimated Costs	<u>2,150,000</u>		XXXXXXXX
APPROVED BUDGET	XXXXXXXX	XXXXXXXX	

**Instructions**

1. Provide a complete budget summary sheet for year one and separate estimates for each subsequent year.
2. Recipient's estimated costs should be entered in Column A. Columns B and C are for NASA use only. Column C represents the approved grant budget.
3. Provide as attachments detailed computations of estimates in each cost category with narratives required to fully explain proposed costs.

**SDSU Space Grant Budget (FY2010 - Period: 15 May 2010 - 14 May 2011)**

	Total Funds	SDSU Match	NASA	NASA %	SDSU % F	Total
<b>A. Personnel</b>						
1. Principal Investigator-Kevin Dalsted (3.1 PM)	20972	8380	12592	0.15	0.10	0.26
2. Research Associate-Mary O'Neill (1.9 PM)	10855	2869	7987	0.12	0.04	0.16
3. Coll. Of Eng. Diversity Coordinator (3.8 PM)	22001	22001	0	0.00	0.42	0.42
4. Staff support for SDSU/FIS Success Ac. (2.8 PM over school year)	5109	1577	3532	0.11	0.05	0.162
5. ACE Camp support (Student Labor)	2575	0	2575	0.38	0.62	1.00
<b>Total Salaries</b>	<b>61512</b>	<b>34826</b>	<b>26686</b>	Estimated annual salaries		
<b>B. Fringe Benefits</b>						
1. Staff Benefits	14818	8857	5961	\$ 81,639		
2. Students	52	0	52	\$ 69,014		
<u>Subtotal</u>	<b>14869</b>	<b>8857</b>	<b>6012</b>	\$ 52,254		
<b>C. Permanent Equipment</b>						
\$ 31,537						
<b>D. Materials and Supplies</b>						
1. Computer software and misc. supplies	110.00	0	110.00			
2. Printing and copying (Space Day, etc.)	131.56	0	131.56			
3. Undergraduate research activities	2400	0	2400	Sidenote1		
<u>Subtotal</u>	<b>2641.56</b>	<b>0</b>	<b>2641.56</b>			
<b>E. Services</b>						
FIS/SDSU univ. course	16000	8000	8000.00	Sidenote2		
<u>Subtotal</u>	<b>16000</b>	<b>8000</b>	<b>8000</b>			
<b>F. Domestic Travel</b>						
1. NASA Center, national or regional conf.'s	1400		1400			
2. Local	300	0	300.00			
3. Symposiums, short courses (faculty)	300	0	300.00			
<u>Subtotal</u>	<b>2000</b>	<b>0</b>	<b>2000</b>			
<b>G. Computer Services</b>						
	0	0	0			

<b>H. Publication Costs</b>	0	0	0	
<b>I. Fellowships, Scholarships, Visiting Prof.</b>				
1. Graduate research award- plant sci	2500	0	2500.00	Sidenote3
2. Summer faculty/visiting prof.	5500	0	5500.00	Sidenote4
3. Graduate Student (12 mo., 30% time) (SGC Evaluation/Assessment Coordinator)	0	0	0	Sidenote5
<u>Subtotal</u>	<b>8000</b>	<b>0</b>	<b>8,000</b>	
<b>J. Subcontracts</b>				
<u>Subtotal</u>	<b>4000</b>	<b>4000</b>	<b>0</b>	Sidenote6
<b>K. Other Direct Costs</b>				
Tuition Remission	2200		2200	
<u>Subtotal</u>	<b>2200</b>		<b>2200</b>	Sidenote7
<b>L. TOTAL DIRECT COSTS</b>	111223	55683	55540	
<b>M. Direct Costs on which Indirect Costs are applicable</b>		55683	53340	
<b>N. Indirect Costs (31% of Item M)</b>	33797	17262	16535	required match: 69875
<b>O. TOTAL COSTS</b>	<b>145020</b>	<b>72945</b>	<b>72075</b>	

**Sidenote1:** Robotics support for undergraduate research and/or senior design in EE & CS.  
May include supplies and/or travel.

**Sidenote2:** Tuition and other related support for two 3 credit courses for 10 Flandreau Indian School students.  
One Fall and one Spring semester course will be supported.

**Sidenote3:** Support for grad. stud. research project in Plant Sci- crop residues and spatial information man.

**Sidenote4:** Year 2 funding for teacher training in advanced material sciences as it related to STEM disciplines.

**Sidenote5:** Graduate Asshp for Eval Assessment \$13,000 via Headquarters. These dollars will come from Consortium wide fellowship funds, including fringe, if any. Amount will be added to SDSU subaward. Tuition remission is noted under other Direct Costs.

**Sidenote6:** ACE Camp tuition collected from participants and/or supporting nonfederal funds from DOT Aeronautics Division

**Sidenote7:** Tuition Remission for Graduate Assistantship



<b>F. Domestic Travel</b>										
1. NASA nat. or reg. conf.'s	1400		1400		1400		1400		1400	
2. Local	300		300		300		300		300	
3. Sympos, training (faculty)	300		300		300		300		300	
<b>G. Computer Services</b>										
<b>H. Publication Costs</b>										
<b>I. Fellowshps, Visit. Sci.</b>										
1. Grad res award- plant sci	2500		2500		2500		2500		2500	
2. Summer faculty/visiting prof.	5500		5500		5500		5500		5500	
3. Grad Stud (12 mo.,30% time) (SGC Eval/AssessCoord)										
<b>J. Subcontracts</b>		4000		4000		4000		4000		4000
<b>K. Other Direct Costs</b>										
Tuition Remission	2200		2200		2200		2200		2200	
<b>L. TOTAL DIRECT COSTS</b>	55540	55683	55540	55683	55540	55683	55540	55683	55540	55683
<b>M. Direct Costs on which Indirect Costs are applicable</b>	53340	55683	53340	55683	53340	55683	53340	55683	55540	55683
<b>N. Indir Costs (31% of Item M)</b>	16535	17262	16535	17262	16535	17262	16535	17262	16535	17262
<b>O. TOTAL COSTS</b>	72075	72945	72075	72945	72075	72945	72075	72945	72075	72945

TOTAL PROJECT COSTS by year

145020

145020

145020

145020

145020

## MEMORANDUM

TO: Dr. Ed Duke, Director, SGC  
Mr. Thomas Durkin, Deputy Director, SGC

FROM: Kevin Dalsted, Associate Director SGC

DATE: January 20, 2010

SUBJECT: SGC Work Plan and Budget

### **Research Infrastructure**

Our overall thrust with research activities supported by SGC has been remote sensing and precision agriculture among other areas. We also support numerous end users with technical assistance, as needed. We see both the SGC and the EPSCoR programs as being compatible with the goal of strengthening our research and outreach activities in South Dakota. In related activity, we have just finished our contributions to a USDOT-funded UAVs (unpiloted aerial vehicles) project to assess low-volume roads through Dr. M. Hansen, P.I., GIS Center of Excellence.

Our ongoing, interdisciplinary research is helping us to learn how detailed, repetitive multi-spectral remote sensing data can be used in monitoring agricultural field sites and developing decision models. The SD Corn Utilization Council project is into year four and includes remote sensing and GIS for corn management to evaluate the implications of removing corn stover for cellulosic ethanol production. The Upper Midwest Aerospace Consortium (UMAC) is also a funding source for the evaluation of remote sensing for precision agriculture. A UMAC project looking at improvement of software for (novice) end users is reaching the beta software stage; the goal is to remove the technical frustrations of using remote sensing data for near-real time decision-making. We have two publications in the review stage based upon the above research efforts.

We have helped financially support Dr. Robert McTaggart's efforts to enhance his involvement in the development of scientific research at the Deep Underground Science and Engineering Laboratory (scheduled to start on 2012) and its State adjunct, the SUSEL, which is in effect now. Dr. McTaggart attended a June 2009 conference to complete funding aspect of this activity.

Other activities encompass the ongoing, NASA-funded efforts through UMAC, which are related to the SGC by virtue of subject area. I will continue to be involved in the following projects: UMAC campus representation (another project proposal is anticipated within the next year), SDView (year 8), USDOT UAV project follow-on (if any) and UMAC support for various research and training activities over the next project year.



As proposal opportunities arise on campus, I will represent the SGC and attempt to leverage our funding. I have provided both technical and administrative support for various proposal endeavors. Dr. Matt Hansen, Co-Director of the GIS Center of Excellence, and Dr. Dave Clay, Director of the Drought Center, are both additional contacts. As other opportunities emerge I will continue to contribute to and help facilitate proposals when it makes sense.

I anticipate that Ms. O'Neill's time will be spent on primarily in two areas: 1) supporting the precision agriculture research in which she will contribute her expertise in digital image processing and GIS to the ongoing collaboration with the Plant Science team within the Corn Council and UMAC activity and 2) generating curriculum support materials for teaching technology in K-8 (plus build on contact with Camelot School in Brookings). She will also contribute to the development to our diversity program and science/math emphases in the K-12 area by integrating research results into the relevant components of the UMAC EDPARC. The SDView activity, while funded by AmericaView, Inc. through the USGS, involves increasing accessibility to Landsat and other satellite data by researchers and end-users across the state. An SDView consortium of users has been formed to facilitate this process.

I will continue to meet with SDSU faculty to help them establish contacts at NASA Centers, e.g. work with Dr. McTaggart in Physics, among others. Dr. Yi in EE & CS has been a valuable contributor to the software development in the area of remote sensing and precision agriculture.

### **Undergraduate/ Graduate Education**

We will continue to support and facilitate relevant research at the undergraduate and graduate levels. We funded an EE senior design robotics team and they won the Engineering Expo competition. We have put funding in place for another year of support for this activity; Prof. Stephen Hietpas is the advisor on this effort. We will provide some support for a phd candidate in Plant Science, who is working with Dr. David Clay in the area of crop residue mapping as tied to cellulosic ethanol production with a soil conservation perspective.

We will support a few ad hoc activities of the undergraduate researchers. We will continue to stay up to speed on relevant research projects at SDSU and help faculty/staff to make inroads/connections to NASA Centers to support their technology needs.

### **K-12 Outreach**

This activity has several thrusts in the upcoming project year. ACE Camp will be held in July 2009. Our goal is to have 26 high school students enrolled in the camp with 50%-50% male-female attendance goal.

Space Days will be organized by our colleagues in Pierre and held in October. We will collaborate in the planning/conducting of this event as well as participating in the planning for 2011 Space Days.

We will mentor and facilitate technical support for robotic teams, as it is requested. We will provide support as needed and as available to any of the elementary Lego Teams in the area. We

are staying abreast of the robotic developments in the Sioux Falls school system through communications with Dr. Dan Swets at Augustana.

I am actively working to connect with the new South Dakota Children's Museum; I have met with Dr. Ed Hogan, founding Board member, to begin the process. The museum is set to open during the summer of 2010 and will have over 30,000 square feet. Additional communication is anticipated as the museum begins more planning efforts beyond construction and initial static and dynamic exhibits.

Dr. MaryJo Lee will be continuing her efforts to recruit Native Americans to fields of science, technology, engineering and mathematics. She successfully coordinated the SDSU/Success Academy program last year and we expect it to continue. This program brings high school freshmen, sophomores, juniors and seniors to our campus for technical workshops with university professors, a meal, and a fun activity: all in an afternoon and early evening. A retention program continues to support Success Academy Scholars, i.e., FIS alumni who have enrolled at SDSU.

The major activity for selected FIS seniors is two 3-credit courses at SDSU for up to 10 FIS college-bound participants. The course work will better prepare these students for the rigor involved in transitioning from FIS to any university. The SGC will directly support the math class for these students.

Mary O'Neill will continue her remote sensing and GIS workshop activities with middle school and high school science teachers across South Dakota. The GEMS workshop (Girls: Engineering, Math and Science) had over 120 middle-school-aged participants in 2009 and will continue in 2010. Ms. O'Neill will likewise participate in the Ready Set Go program for high school girls and the YEA camps for engineering adventures. She will explore the development of curriculum materials to support technology in the classroom at Camelot Elementary School.

We will actively participate in the Regional Science and Engineering Fair held each March at SDSU. We are expecting over 300 exhibits with 400 plus participants in the spring 2010 event. I will judge the exhibitors in the Earth and Space Science area. I will also make two monetary awards to top exhibitors in this category (ERC Foundation Account).

A second year activity for the upcoming year will be a multi-day training course for teachers in material sciences as it relates to STEM objectives. State of the art techniques and CAD software will be employed in the training along with SLA Rapid Prototyping. Objectives for this training will emphasize composite manufacturing, material science, and methods of manufacturing. We will also try to engage a relevant manufacturing industry in this process to bring an aerospace experience to the activity.

### **Fellowships and Scholarships**

I will advertise and promote the various fellowships and scholarships offered by the SDSGC. I will also participate with the other management members in making the awards.

## **Travel**

The travel for the next budget year is anticipated as follows:

NASA Western Regional Meeting —\$1400, K. Dalsted,

Local travel – \$300, various staff members to Space Day, meetings with EROS staff, meetings with staff within state government, educational and business affiliates, and symposium and short course travel support for SDSU faculty and staff-- \$300, 2 trips.

## **Administration**

I will spend approximately 10-15% of my commitment to administration of this program. This will include selection of various awardees, planning and reporting (CMIS et al.), budget development and monitoring, attending meetings and teleconferences, and planning for diversity programs with Dr. Lee. In a related area, I will continue to help in the coordination the NASA EPSCoR project on the SDSU campus and help with the development of the follow-on proposals. I will also participate in the NASA EPSCoR Steering Committee.

Another related issue to the SGC is revitalizing our business affiliates and adding new, relevant industries as affiliates; this is an area that we'll continue to work on in 2010.

If more information is needed regarding our upcoming SGC year at SDSU, please let me know.

Daniel L. Swets, Associate Director  
 Augustana College  
 Space Grant Consortium Budget - FY2010 (and annually from FY2010-2014)

		2010 2011		Total Budget	
		Effort Months	NASA Year 1	Augustana	Notes
A.	Senior Personnel 1 P.I. Daniel L. Swets	1.5,1	\$ 10,726.17	\$ 7,150.78	1
<b>Senior personnel salary totals:</b>			<b>\$ 10,726.17</b>	<b>\$ 7,150.78</b>	
B.	Other personnel 1 Undergraduate Fellowships		\$ -	\$ 70,000.00	2
<b>Other personnel salary totals:</b>			<b>\$ -</b>	<b>\$ 70,000.00</b>	
C.	Fringe Benefits 10% of A, Summer		\$ 1,072.62	\$ -	3
	30% of A, AY		\$ -	\$ 2,145.23	4
	10% of B		\$ -	\$ -	
<b>Total salary, fringes (A-C):</b>			<b>\$ 11,798.78</b>	<b>\$ 79,296.01</b>	
D.	Travel		\$ 2,000.00	\$ -	5
<b>Total Travel:</b>			<b>\$ 2,000.00</b>	<b>\$ -</b>	
E.	Projects 1 K12 Innovative projects		\$ 2,500.00	\$ -	6
	2 Remote Sensing program		\$ 18,000.00	\$ -	7
	3 Robotics program		\$ 5,000.00	\$ -	8
	4 SD FLL Robotics Competition		\$ 10,000.00	\$ 10,000.00	9
<b>Total Projects:</b>			<b>\$ 35,500.00</b>	<b>\$ 10,000.00</b>	
F.	Other Direct Costs 1 Supplies		\$ 2,000.00	\$ -	10
	2 Hospitality		\$ 1,050.00	\$ -	11
<b>Total Other Direct Costs:</b>			<b>\$ 3,050.00</b>	<b>\$ -</b>	
<b>G.</b>	<b>Total Direct Costs (A-F):</b>		<b>\$ 52,348.78</b>	<b>\$ 89,296.01</b>	
H.	Indirect Costs 47% of A (salary)		\$ 5,041.30	\$ 3,360.87	12
<b>Total Direct and Indirect Costs:</b>			<b>\$ 57,390.08</b>	<b>\$ 92,656.88</b>	

Budget Notes:

- 1 Stipend for Associate Director activities. Match comes from one course release for grant activities for the grant year for the Associate Director.
- 2 7 Distinguished Scholar Competition scholarships from Augustana to STEM students
- 3 Fringes are calculated at 10% of summer faculty stipend
- 4 Fringes are calculated at 30% of academic year faculty salary
- 5 Travel for consortium-related activities and for conference travel to disseminate project results
- 6 Science Day activities for science education students teaching elementary school students
- 7 Remote sensing lab, intended to support a remote sensing pipeline program from Augustana to graduate school. Includes funds for supplies, lab administration, and awards for collaborative remote sensing research projects. \$4000 for each of 2 undergraduate research awards; \$4000 lab administration; \$6000 software and supplies.
- 8 Program to use robotics as the basis for teaching computer science concepts, for recruiting STEM students, and providing in-service for science teachers.
- 9 South Dakota First Lego League robotics competition. \$10k from NASA funds and \$10k from non-federal fundraising activities to support the program.
- 10 Supplies for Consortium activities
- 11 Hospitality for Consortium visitors
- 12 Federally agreed rate for indirect costs

**South Dakota Space Grant Consortium**  
**Daniel L. Swets, Associate Director, Augustana College**  
**Grant Year 2010-2011 (FY2010) Statement of Work**

1. Augustana College will fully participate in the management of the South Dakota Space Grant Consortium. The Associate Director will attend quarterly meetings, monthly teleconferences, and will help represent the Consortium at one or more national or regional meeting. Augustana College will support this activity by providing one month (1/9 salary) to the associate director in the form of a course release taken during the grant year. NASA will support this effort by supporting a 1½ month stipend to the associate director. These salary amounts will be fully loaded (10% fringe benefits for stipend outside the academic year; 30% fringe benefits for the Augustana College support taken during the academic year, 47% of salary taken as indirect costs using the federally agreed rate).

2. Augustana College will support the South Dakota Space Grant activities by providing seven Distinguished Scholars scholarships to outstanding students selected to pursue undergraduate studies in SMET disciplines.

3. NASA funds will be used to provide for travel expenses related to attending Space Grant activities, such as conference presentations, administrative gatherings, and regional or national meetings.

4. NASA funds will be used to sponsor a Teachers Innovative Grants program for the summer, 2010, and 2010-2011 academic year. Mini grants will be made available to elementary school teachers to enhance their regular curricular activities in the SMET educational areas. Priority will be given to projects involving a large number of students, and parent/community involvement is encouraged. This has proven successful, and has given science education students at Augustana College the opportunity to participate in science education of elementary school children.

5. NASA funds will be used to support a remote sensing pipeline program. SDSU and EROS have a Remote Sending Center of Excellence that is predominantly research in nature, and will be populated mostly with graduate students. As such, the program will need to draw quality undergraduate students from many institutions. Augustana College has taken steps to partner with EROS and SDSU to assist in filling this pipeline with quality undergraduate students who can participate in the Center of Excellence activities and enter graduate studies at SDSU. This project will include funds for supplies, lab administration, and awards for collaborative remote sensing research projects. The funding breakdown will be \$4000 for each of 2 undergraduate research awards; \$4000 for the remote sensing lab administration; \$6000 for software and supplies for the lab and the projects.

6. NASA funds will be used to enhance a startup program to provide a robotics basis for introductory computer science at the University level, and to provide both teacher and primary/middle school age children training in robotics. This project incorporates robotics into the computer science curriculum at Augustana College, but it also supports the First Lego League (FLL) program for the state of South Dakota, including the FLL state tournament and workshops, classes, and camps in support of the FLL program. The project will include teacher training workshops in robotics and both classes and camps for elementary aged children in simple machines, and for middle school aged children in the design, engineering, and programming of autonomous robots using the Lego Mindstorms platform.

7. NASA funds will be used to provide for supplies and for hospitality to visitors on Space Grant-related activities on the Augustana College campus.



SD Discovery Center  
2010 Statement of Work for SDSGC Funding

The SD Discovery Center will participate in the completion of the following tasks as related to the SD Space Grant Consortium Management Team:

- Participate in management team meetings
- Aid in the preparation/review of strategic plan, budget, evaluations.
- Maintain contact with affiliates as assigned.
- Represent the pre-college education, informal education community.
- Seek partnerships in the promotion and funding of space and earth science education and research opportunities.

The SD Discovery Center will participate in the completion of the following tasks as related to site funding provided by SDSGC:

- Manage the funds distribution and program reporting on the SD Women in Science Conferences.
- Aid conference locations in securing professional women who can speak on careers in space/earth science.
- Conduct teacher professional development opportunities for a minimum of 100 teachers and 50 pre-service teachers in space/earth science related topics.
- Provide science curriculum consultation for St. Francis Indian School.
- Provide evaluation information on the above-mentioned programs.
- Report match received for all above-mentioned programs.

Signature: Kristie Maher

Date: 1-20-10

**2010-11 Budget (FY2010: May 15, 2010 – May 14, 2011)  
SDSGC funding to South Dakota Discovery Center**

*(This annual budget is estimated to also apply for each year from FY2011-2014 (May 15, 2011 – May 14, 2014))*

Budget Item	SDSGC Funding	Non-Federal Matching Funds	Explanation
SD Women in Science Conferences <b>(Pre-College)</b>	\$9000	\$15,000	Funds will be distributed among the conference sites (Likely locations: Pierre, Sioux Falls, Aberdeen, Watertown; Rapid City). To gain access the funding, the each conference site must have at least one speaker on a career that meets SDSGC objectives and the entire group must provide \$15,000 match. 1100 participants expected, 25% from minority and/or at-risk populations.
Space/Earth Science Teacher Training <b>(Pre-College)</b>	\$10,000	\$9000	The SD Discovery Center will conduct professional development opportunities ( to include but not limited to: Starlab Astronomy, Lakota Star Knowledge, GEMS Space Science Series, GEMS Earth Science Series, robotics, rocketry, science fair training and/or inventing) for South Dakota teachers. SDSGC funding will be matched with local school district funding and/or state, private, corporate contributions. This funding will help provide a key speaker at the SD Science and Math Teachers conference.
Pre-service Teacher Space/Earth Science Training <b>(Higher Ed)</b>	\$3000	\$2000	SD Discovery Center staff will provide training in Great Explorations in Math and Science to pre-service teachers, likely from Sinte Gleska University and University of South Dakota. The University will provide in-kind services and some matching funds.
Science Curriculum Consultation/Services to Native American Schools <b>(Pre-College)</b>	\$4000	\$5000	Funds will be used to aid 1-3 native American schools School in achieving their goals in regards to improving science, math and technology achievement for their students. Such activities may include participation in science fair planning and preparation, conducting programs for students, training teachers to teach inquiry-based science and math activities, aiding in the design of science summer & afterschool programs. \$5000 in match expected from a combination of school district, Bankwest Foundation and 21 <sup>st</sup> Century grant money.
Science Education Internship <b>(Higher Ed)</b>	\$2600	\$2600	The SD Discovery Center will hire a pre-service teacher to plan and deliver hands-on science workshops to pre-school – 8 <sup>th</sup> grade youth. SD Discovery Center staff will provide training in high quality science curricula and methodology. Match is expected from the SD Governor's Office of Economic Development SEED program and the SD Discovery Center.
Total	\$28,600	\$33,600	

## Appendix G.1

### NASA South Dakota Space Grant Consortium

# Strategic Plan

*(Updated for 2010)*

*Reorganized in August 2008 and updated on May 15, 2009 and January 22, 2010 to align with the 2006 NASA Education Strategic Coordination Framework, National Space Grant Program Elements, and National Space Grant Program Emphases*



South Dakota Space Grant Consortium  
Headquarters Office  
501 E. Saint Joseph Street  
Rapid City, SD 57701  
<http://sd.spacegrant.org>  
(605) 394-1975

January 22, 2010



# NASA South Dakota Space Grant Program

## Vision

The vision of the South Dakota Space Grant Consortium (SDSGC) is to expand opportunities for all South Dakotans through education, research, and public service in the fields of aerospace, earth science, and supporting STEM disciplines.

## Mission

As the link between NASA and the citizens of South Dakota, SDSGC's mission is to instill the spirit of exploration and discovery in students and educators and in the general public, with a special focus on the fields of science, technology, engineering, and mathematics (STEM) that are essential for the development of the nation's workforce.

## Values

The NASA South Dakota Space Grant Consortium is committed to excellence in student and faculty research and to promoting STEM education and expanding projects across the state of South Dakota. We specifically seek to include women, Native Americans, and other underrepresented groups in all of the programs and activities supported by the SDSGC.

## Time Frame

The specific goals and objectives listed under each of the program areas are long-term and apply to the current five-year Space Grant cycle (2005-2009). The strategies and outcome indicators to achieve those goals apply to the current year, with the understanding that they will be evaluated quarterly and updated as needed at the Consortium's annual performance audit meeting described under the Management section.

## A. Consortium Management

**Goal:** *To ensure quality and fairness in all Consortium programs and alignment with the needs of NASA, the member and affiliate organizations, and the state of South Dakota.*

**Objective A.1:** (Reporting) The Management Team will provide timely reporting and responses to NASA Headquarters regarding Consortium operations and finances.

**Outcome indicator:** *All reports will be submitted on time and in accordance with NASA guidelines.*

**Objective A.2:** (National network) The Management Team will work to strengthen relationships with NASA Centers and the USGS Center for Earth Resource Observation and Science (EROS), the national Space Grant network, and the state's NASA EPSCoR Program.

**Strategy A.2.1:** Maintain and expand relationships with NASA Centers and EROS through faculty visits and student internships.

**Outcome indicator:** *At least two faculty will visit NASA Centers or EROS each year to promote collaborative research, and at least three students will participate in internship programs at NASA Centers. Through assistance from Space Grant, at least five student interns will be placed at EROS (SAIC), although the funding for those internships will not necessarily be provided solely through Space Grant.*

**Strategy A.2.2:** The Management Team and other representatives of the Consortium will continue to play an active role in the national Space Grant network.

**Outcome indicator:** *Representatives of the Management Team will be present at biannual national meetings and the Western Region Space Grant Meeting.*

**Strategy A.2.3:** Provide effective coordination between the state Space Grant and NASA EPSCoR programs.

**Outcome indicator:** *Members of the Management Team also hold positions on the Technical Advisory Committee [REACH Committee] and the Steering Committee of the state NASA EPSCoR Program. (See also B.2.3.1.)*

**Objective A.3:** (Consortium network) The Management Team will faithfully represent the diverse interests and resources of the Consortium member institutions and affiliates.

**Strategy A.3.1:** Establish two rotating positions on the Management Team, for a period of two years each, which will be filled by representatives of member institutions and affiliates.

**Outcome indicator:** *Announce one position (one of two rotating 2-year positions) on Management Team to all Consortium members and affiliates and select one member by the start of the program year (May 15, 2009).*

**Strategy A.3.2:** Maintain effective communication with Consortium member institutions and affiliates through electronic communication and affiliate surveys.

**Outcome indicator:** *Relevant electronic communication sent to all member institutions, affiliates, teachers, and interested parties, as appropriate, and an additional affiliate survey will be available on-line and conducted as part of NASA's 20<sup>th</sup> Year Evaluation in 2008.*

**Objective A.4:** (State government) The Management Team will ensure that Consortium programs are aligned with state priorities.

**Strategy A.4.1:** Provide annual briefing to representatives of state government on Consortium activities.

**Outcome indicator:** *Members of the Management Team meet once per year with representatives of state government to discuss alignment with state priorities, such as the Governor's 2010 Initiative.*

**Strategy A.4.2:** Maintain representatives of state government to participate on the Management Team.

**Outcome indicator:** *At least one representative of state government will serve as an ex-officio member of the Management Team.*

**Objective A.5:** (State industry) The Management Team will foster interaction between the Consortium and state industries involved in aerospace and related technologies.

**Strategy A.5.1:** Appoint additional industry representatives to advisory board.

**Outcome indicator:** *At least one representative of state industry will be maintained on the advisory board.*

**Objective A.6:** (Link to public) The Management Team will seek to maintain and improve the effectiveness of the Consortium as the link between the public and NASA in the state.

**Strategy A.6.1:** Develop and maintain electronic databases and mailing lists of contacts in formal and informal education, media, state and local government, non-profit organizations, clubs, and individual citizens.

**Outcome indicator:** *Electronic databases maintained and updated/reviewed as necessary.*

**Strategy A.6.2:** Maintain Consortium website at <http://sd.spacegrant.org> to provide effective dissemination of information about NASA, the state Consortium, and research and educational opportunities in STEM-related fields.

**Outcome indicator:** *Update Consortium website at least monthly.*

**Objective A.7:** (Increase resources) The Management Team will pursue opportunities to increase the resources available to the Consortium, to broaden participation within the state, to collaborate with other state Consortia in areas of mutual interest and capability, and to assure long-term sustainability.

**Strategy A.7.1:** Identify opportunities to increase funding, staffing, and matching funds for the state program.

**Outcome indicator:** *Consortium Management Team continually investigates and secures sources of outside funding and match as opportunities arise.*

**Strategy A.7.2:** Serve as a clearinghouse for information on funding opportunities from NASA and other agencies that support STEM-related research and education, especially in areas of aerospace and earth science.

**Outcome indicator:** *At least 20 targeted announcements of opportunity will be disseminated through electronic mailings and website each year.*

**Strategy A.7.3:** Coordinate submission of proposals to NASA and other agencies on projects in STEM research and education.

**Outcome indicator:** *Facilitate at least one multi-partner proposal each year to NASA or other agencies. (See also B.2.1.2.)*

**Objective A.8:** (Diversity) The Management Team will ensure diversity in all Consortium programs and activities by seeking to include women, underrepresented minorities, and persons with disabilities. (See also C.1.1, C.4.)

**Strategy A.8.1:** The Management Team will emphasize diversity in selection of participating organizations, programs, fellowships and scholarships, faculty awards, and Management Team members.

**Outcome indicator:** *Diversity will be modeled in all aspects of the Consortium and participation by underrepresented groups will meet the current diversity targets.*

**Strategy A.8.2:** The Management Team will conduct discussions with the Directors or staff of the Black Hills Workshop, ADVANCE in Brookings, the South Dakota School for the Deaf, and/or the South Dakota School for the Blind and Visually Impaired with the purpose of increasing NASA and STEM opportunities for the disabled and providing Space Grant funding to university students to work on engineering design projects that assist people with disabilities. (See also C.1.1.2)

**Outcome indicator:** *At least two Space Grant student stipends awarded for engineering projects that assist people with disabilities at Black Hills Workshop or ADVANCE, and/or SDSGC funds are used to support activities such as the National Federation of the Blind's summer Youth Slam.*

**Objective A.9:** (Evaluation) The Management Team will continually monitor and seek to improve the quality and effectiveness of the state program.

**Strategy A.9.1:** Maintain the services of an external Program Evaluator ~~during the 2005 program year~~ to provide assessment of the Consortium's strategic plan, activities, and outcomes, and to establish a long-term strategy for continuing evaluation.

**Outcome indicator:** *Program evaluator will participate in all monthly and quarterly meetings.*

**Strategy A.9.2:** Institute long-term evaluation procedures that are consistent with the recommendations of the Program Evaluator and with available resources.

**Outcome indicator:** *In consultation with the Program Evaluator, the Management Team will continue to determine appropriate data collection and evaluation procedures that are consistent with available resources.*

**Strategy A.9.3:** Consortium's Program Evaluator and SDSGC's NSGF Longitudinal Tracking system collect and compile data on Consortium programs through online and mailed surveys for analysis by the Management Team.

**Outcome indicator:** *Management Team annually reviews NSGF Longitudinal Tracking report and evaluation data provided by Program Evaluator to assess effectiveness of state programs.*

**Strategy A.9.4:** Perform quarterly reviews of the Strategic Plan and issue annual updates.

**Outcome indicator:** *Strategic Plan and Roles and Responsibilities document (appendix of Strategic Plan) updated at an annual performance audit meeting.*

**Strategy A.9.5:** In addition to the SDSGC Management Team, which will assess program quality on a continual basis, solicit input from an independent advisory board consisting of the South Dakota REACH Committee in order to promote better alignment with NASA, industry, and state priorities.

**Outcome indicator:** *The advisory board will be convened annually.*

## **B. NASA Education Outcome 1:**

**Higher Education – Employ and Educate:** Contribute to the development of the STEM (Science, Technology, Engineering, Mathematics) workforce in disciplines needed to achieve NASA's strategic goals, through a portfolio of investments.

### **B.1. Consortium Programs (Outcome 1): Fellowship/Scholarship**

**Goal:** *To administer a fellowship/scholarship program that offers educational and research opportunities to students from diverse backgrounds who are pursuing degrees in fields of science, technology, engineering, and mathematics (STEM) that align with NASA's mission and those of SDSGC members and affiliates.*

**Objective B.1.1:** (Competitiveness) Ensure the fair distribution of funds to member universities and educational affiliates.

**Strategy B.1.1.1:** A centralized, Consortium-wide annual Call for Fellowship/Scholarship Applications is made available to all of the Consortium's higher education members and affiliates via e-mail and SDSGC website.

**Outcome indicator:** Annual Call for Fellowship/Scholarship Applications at all higher education members and affiliates, competitive review, and selection of awardees.

**Strategy B.1.1.2:** Utilize the Consortium Management Team to ensure consensus on the distribution of fellowship/scholarship awards each year, with emphasis on increasing participation of Tribal Colleges.

**Outcome indicator:** Annually, awards will be made to students attending 50% of SDSGC's institutions of higher education including at least one Tribal-college affiliate.

**Objective B.1.2:** (NASA and EROS ties) Offer hands-on, tangible research experiences to student research fellowship awardees at NASA Centers and EROS.

**Strategy B.1.2.1:** Offer internships that integrate training with interdisciplinary research at NASA Centers and EROS-SAIC.

**Outcome indicator:** At least three interns will be placed at NASA Centers and at least five student interns will be placed at EROS-SAIC.

**Outcome indicator:** Augustana College will provide opportunities for three students for research projects at EROS.

**Strategy B.1.2.2:** Support student research opportunities through SD NASA EPSCoR collaborative research projects.

**Outcome indicator:** At least two SD Space Grant Fellows will participate in SD NASA EPSCoR research projects annually.

**Strategy B.1.2.3:** Offer research fellowships that support SDSGC initiatives (Badlands Observatory astronomical research or "Dark Skies, Bright Minds" Program, robotics, NASA's "Microgravity University" Reduced Gravity Student Flight Opportunity Program, SDSM&T Aero Team, SDSU ACE Camp, etc.).

**Outcome indicator:** At least three fellowships offered each year in these or related areas.

**Objective B.1.3:** (Industry ties) Offer hands-on, tangible research experiences to student research fellowship awardees at aerospace and related science and technology industries.

**Strategy B.1.3.1:** Support internships that provide students with hands-on experience in the aerospace and related industries. (See also B.1.2.1.)

**Outcome indicator:** At least five interns will be placed in aerospace industry which can include placement at EROS.

**Strategy B.1.3.2:** Collaborate with the state's Director of Commercialization (SD Department of Tourism and State Development) to place students in internship positions with state industries if their business interests are aligned with NASA and SDSGC. (See also B.3.3.2.)

**Outcome indicator:** At least two students are placed in state industry internships as a result of SDSGC collaboration with the SD Department of Tourism and State Development.

**Objective B.1.4:** (Mentoring and professional development) Provide mentoring and professional development experiences to student researchers, which will develop skills that contribute to the future workforce.

**Strategy B.1.4.2:** Professional development training will be provided by faculty in the field of technical communication to SDSGC student fellows to better equip them to present themselves and their work to future employers.

*Outcome indicator: Opportunities will be offered to 100% of SDSGC student fellows to take advantage of professional development training.*

**Objective B.1.5:** (Diversity) Ensure funding for fellowships and scholarships to women, underrepresented minorities, and persons with disabilities. (See also C.1.2.)

**Strategy B.1.5.1:** Utilize intensive marketing techniques (personal visits, direct faculty contacts, email) to encourage women and minority students to apply to the Fellowship/Scholarship program.

*Outcome indicator: Awards to women and minorities equal or exceed 10% to minorities and 40% to females.*

**Strategy B.1.5.2:** Offer fellowships to qualified Native American students at Tribal College affiliates.

*Outcome indicator: At least three fellowships awarded annually to students at Tribal Colleges or to Tribal College students seeking to transfer to another SDSGC university.*

**Objective B.1.6:** (Longitudinal tracking) All students who have received significant fellowship or scholarship assistance from SDSGC will be longitudinally tracked through first employment or beginning of advanced degrees. (See also C.3.1.)

**Strategy B.1.6.1:** Continue to participate in the National Space Grant Foundation's longitudinal tracking system so that all students provided with "significant support" from SDSGC (defined as over \$1,000 in a single award) will be tracked in accordance with NASA's longitudinal tracking requirements.

*Outcome indicator: Annually, 75% of funded students will reply to longitudinal tracking survey.*

**Objective B.1.7:** (Evaluation) The Consortium will develop methods to document, measure, and assess the impact of the fellowship and scholarship programs in conjunction with its implementation of an overall evaluation strategy. (See also A.9.)

**Strategy B.1.7.1:** Develop and administer simple follow-up surveys of students' knowledge and attitudes about the Consortium, NASA, and STEM careers.

*Outcome indicator: Annually, 75% of funded students will reply to evaluative survey which is part of the longitudinal tracking survey.*

## **B.2. Consortium Programs (Outcome 1): Research Infrastructure**

**Goal:** *To promote the improvement of research programs and capabilities of members with an emphasis on the fields of aerospace, earth science, and supporting STEM disciplines.*

**Objective B.2.1:** (Research proposals) Increase the number of research proposals submitted by SDSGC institutions in fields aligned with NASA's mission.

**Strategy B.2.1.1:** Distribute announcements of research opportunities in NASA related fields to faculty at member institutions.

*Outcome indicator: At least ten research announcements are distributed among appropriate SDSGC institutions each year.*

**Strategy B.2.1.2:** Coordinate the development of research proposals among faculty at member institutions, especially proposals that involve multiple disciplines and institutions.

**Outcome indicator:** *At least one NASA-related research proposal is submitted each year as a result of SDSGC coordination. (See also A.7.3.)*

**Objective B.2.2:** (Research support) Support new and developing research, especially multidisciplinary and collaborative projects, in fields aligned with NASA's mission.

**Strategy B.2.2.1:** Support new research initiatives through competitively awarded seed grants.

**Outcome indicator:** *At least five Program Initiation Grants are supported each year from SDSGC and/or state NASA EPSCoR funds.*

**Strategy B.2.2.2:** Support faculty and student travel to NASA Centers, EROS, and other institutions or events for the purpose of developing new research projects.

**Outcome indicator:** *At least five travel grants for research development are awarded each year from SDSGC and/or state NASA EPSCoR funds. (See also B.2.3.2.)*

**Strategy B.2.2.3:** Support graduate and undergraduate student research that is aligned with NASA's mission.

**Outcome indicator:** *At least two SDSGC fellowships or scholarships are awarded each year for students to work on NASA EPSCoR or other NASA-related research projects.*

**Objective B.2.3:** (Collaborations) Build research collaborations both within and outside the state.

**Strategy B.2.3.1:** Coordinate SDSGC research programs with the state's NASA EPSCoR program and other NASA research programs having similar objectives.

**Outcome indicator:** *Members of the Management Team also hold positions on the Technical Advisory Committee [REACH Committee] and the Steering Committee of the state NASA EPSCoR Program. (See also A.2.3.)*

**Strategy B.2.3.2:** Develop mutually beneficial research collaborations with NASA Centers and EROS.

**Outcome indicator:** *At least five planning trips to NASA Centers or EROS are supported each year from SDSGC and/or state NASA EPSCoR funds. (See also B.2.2.2.)*

**Strategy B.2.3.3:** Promote research collaboration among the state's academic institutions with an emphasis on programs that link faculty at research-intensive institutions with faculty at institutions with limited research infrastructure, especially Tribal Colleges.

**Outcome indicator:** *An initial research needs and capabilities assessment of SDSGC academic institutions is completed during first Tribal College Research and Education Roundtable in 2008 resulting in a Consortium Development Grant proposal with SDSGC Minority Serving Institution. (See also C.4.3.3.)*

**Strategy B.2.3.4:** Encourage research partnerships between the state's academic institutions and private industry.

**Outcome indicator:** *At least one state industry will participate in a research collaboration with SDSGC annually through Program Initiation Grants, SD NASA EPSCoR, or similar initiatives.*

**Strategy B.2.3.5:** Facilitate research partnerships between the state's academic institutions and state and federal government agencies.

*Outcome indicator: At least five announcements of research opportunities at state and federal agencies are distributed annually to faculty at SDSGC academic institutions.*

**Objective B.2.4:** (Facilities) Promote acquisition of new facilities and shared use of existing resources.

**Strategy B.2.4.1:** In conjunction with SD NASA EPSCoR, provide funding for new equipment and facilities that support NASA-related research, especially if the equipment can be shared among SDSGC institutions.

*Outcome indicator: Full or partial funding for new equipment and facilities is awarded to SDSGC institutions through SD NASA EPSCoR or SDSGC.*

**Strategy B.2.4.2:** Develop and maintain remote-sensing test sites that promote long-term interdisciplinary research and training collaborations among SDSGC institutions and attract collaborations from external partners. (See also C.4.3.2.)

*Outcome indicator: SDSGC institutions acquire new remote sensing data or collaborate on use of existing data.*

**Strategy B.2.4.3:** Promote access to existing research facilities and resources in the state by SDSGC institutions.

*Outcome indicator: A physical or electronic catalog of the remote sensing library holdings at EROS is maintained for distribution to SDSGC institutions and other interested parties.*

*Outcome indicator: SDSGC members receive information on satellite imagery available through SDView.*

**Objective B.2.5:** (Integrate research and education) Foster research groups and engineering design teams that integrate education, research, and development.

**Strategy B.2.5.1:** Provide funding to college and pre-college research and design teams.

*Outcome indicator: At least two college or pre-college research or design teams receive SDSGC funds each year.*

**Strategy B.2.5.2:** Encourage public and private partnerships to sponsor pre-college engineering design teams such as robotics teams.

*Outcome indicator: SDSGC industrial and state government affiliates will be contacted regarding the needs and benefits of pre-college engineering design programs.*

**Objective B.2.6:** (Diversity) Increase the participation of women and underrepresented groups in statewide research programs and facilitate their subsequent entry into STEM careers. (See also C.1.3.)

**Strategy B.2.6.1:** Work with admissions officers at SDSGC academic affiliates and with SDSGC's network of K-12 and informal education contacts to improve recruitment of qualified female students and students from underrepresented groups.

*Outcome indicator: SDSGC will sponsor activities that encourage women and students from underrepresented groups to enter STEM careers, including Women in Science Conferences, Flandreau Indian School Success Academy, NASA Explorer Schools, and Space Day.*

**Strategy B.2.6.2:** Assist in the placement of students from underrepresented groups in projects that provide hands-on research or design experience.



***Outcome indicator:** SDSGC fellowship/scholarship funds for research or design experiences at SDSGC academic institutions, EROS, and NASA Centers will equal or exceed 10% to minorities and 40% to females.*

**Strategy B.2.6.3:** Longitudinally track progress of students from underrepresented groups in academic performance and research activities through first employment.

***Outcome indicator:** Annually use NSGF longitudinal tracking system to track SDSGC scholars and fellows. (See also C.3.1.)*

**Objective B.2.7:** (Evaluation) The Consortium will develop methods to document, measure, and assess the impact of the research infrastructure programs in conjunction with its implementation of an overall evaluation strategy. (See also A.9.)

**Strategy B.2.7.1:** Develop and administer simple before-and-after surveys of faculty and students involved in research infrastructure activities to assess their knowledge and attitudes about the Consortium, NASA, and STEM careers.

***Outcome indicator:** Adjustments are made to the research infrastructure program to strengthen activities that are working and drop or improve activities that are not having the intended impact.*

### **B.3. Consortium Programs (Outcome 1): Higher Education**

**Goal:** *To build interdisciplinary programs related to NASA's Education Outcome 1 at the state's institutions of higher education and to support related programs that serve to strengthen STEM education in South Dakota.*

**Objective B.3.1:** (Curriculum and NASA content) Contribute aerospace and earth science materials to the higher education community in South Dakota.

**Strategy B.3.1.1:** SDSGC webpage provides links to SDSGC student funding opportunities, NASA educational resources and successful education programs, as well as links to data, imagery, and general curriculum development guidance.

***Outcome indicator:** The "Educational Opportunities (Higher Education)" section of SDSGC website is kept current and maintained as a user friendly webpage.*

**Strategy B.3.1.2:** Distribute announcements of opportunities for education and curriculum enhancement in NASA-related fields to faculty at member institutions.

***Outcome indicator:** At least 10 NASA education announcements are distributed among appropriate SDSGC institutions each year.*

**Objective B.3.2:** (NASA and EROS ties) Enhance faculty and undergraduate/graduate student development through planning visits, internships, and fellowships at NASA Centers and EROS.

**Strategy B.3.2.1:** SDSGC higher education affiliates will continue to promote NASA leadership and educational opportunities made available through NASA Academy, USRP, GSRP, Microgravity University, and other NASA programs that integrate training with interdisciplinary research.

***Outcome indicators:** At least two faculty or students from SDSGC affiliates will participate in NASA educational programs each year.*

**Objective B.3.3:** (State government) Establish and maintain linkages between SDSGC and higher education and state government.

**Strategy B.3.3.1:** Develop strong collaborations with State 2010 Research Centers and new Ph.D. programs (in areas related to NASA's mission).

**Outcome indicators:** *Directors of new research centers and new Ph.D. programs are informed of SDSGC fellowship/scholarship and other programs.*

**Strategy B.3.3.2:** Collaborate with the state's Director of Commercialization (SD Department of Tourism and State Development) to place students in internship positions with state industries if their research and training interests are aligned with NASA and SDSGC. (See also B.1.3.2.)

**Outcome indicator:** *At least two students are placed in state industry internships as a result of SDSGC collaboration with the SD Department of Tourism and State Development.*

**Objective B.3.4:** (Industry involvement) Establish and maintain linkages between SDSGC and higher education and industry in South Dakota.

**Strategy B.3.4.1:** Encourage educational partnerships between the state's academic institutions and private industry through "Dakota Seeds" internships.

**Outcome indicator:** *At least two SDSGC fellows are placed in internships through the "Dakota Seeds" program each year. (See also C.2.4.2.)*

**Strategy B.3.4.2:** Participate in the state's annual GIS user's conference.

**Outcome indicator:** *At least one representative of SDSGC will attend the conference and promote partnerships between industry and academic affiliates.*

**Objective B.3.5:** (Diversity) Increase the participation of women and underrepresented groups in all aspects of SDSGC's higher education program and facilitate their subsequent entry into STEM careers. (See also C.1.4.)

**Strategy B.3.5.1:** Engage women and members of underrepresented groups in all aspects of the SDSGC higher education programs; advertise that fellowships encourage minority and women applicants.

**Outcome indicator:** *Participation by women and minorities will equal or exceed 10% to minorities and 40% to females. (See also C.1.4.1.)*

**Objective B.3.6:** (Evaluation) The Consortium will develop methods to document, measure, and assess the impact of the higher education programs in conjunction with its implementation of an overall evaluation strategy. (See also A.9.)

**Strategy B.3.6.1:** Develop and administer simple before-and-after surveys for faculty and students to assess their knowledge and attitudes about the Consortium, NASA, and STEM careers.

**Outcome indicator:** *Adjustments are made to the higher education program to strengthen activities that are working and drop or improve activities that are not having the intended impact.*

## **C.1. National Program Emphases (Outcome 1): Diversity of Participants**

**Goal:** *To model diversity in all Consortium programs and activities, with an emphasis on Native Americans, which make up the state's largest minority group.*

**Objective C.1.1:** (Diversity in Management) The Management Team will ensure diversity in all Consortium programs and activities by seeking to include women, underrepresented minorities, and persons with disabilities. (See also A.8.)

**Strategy C.1.1.1:** The Management Team will emphasize diversity in selection of participating organizations, programs, fellowships and scholarships, faculty awards, and future Management Team members.

**Outcome indicator:** *Diversity will be modeled in all aspects of the Consortium and participation by underrepresented groups will meet or exceed the current diversity targets for women and minorities.*

**Strategy C.1.1.2:** The Management Team will conduct discussions with the Directors or staff of the Black Hills Workshop, ADVANCE in Brookings, the South Dakota School for the Deaf, and/or the South Dakota School for the Blind and Visually Impaired with the purpose of increasing NASA and STEM opportunities for the disabled and providing Space Grant funding to university students to work on engineering design projects that assist people with disabilities. (See also A.8.2)

**Outcome indicator:** *At least two Space Grant student stipends awarded for engineering projects that assist people with disabilities at Black Hills Workshop or ADVANCE, and/or SDSGC funds are used to support activities such as the National Federation of the Blind's summer Youth Slam.*

**Objective C.1.2:** (Diversity in Fellowships and Scholarships) Ensure funding for fellowships and scholarships to women, underrepresented minorities, and persons with disabilities. (See also B.1.5.)

**Strategy C.1.2.1:** Utilize intensive marketing techniques (personal visits, direct faculty contacts, email) to encourage women and minority students to apply for funding.

**Outcome indicator:** *Awards to women and minorities equal or exceed 10% to minorities and 40% to females.*

**Strategy C.1.2.2:** Offer fellowships to qualified Native American students at Tribal College affiliates.

**Outcome indicator:** *At least three fellowships awarded annually to students at Tribal Colleges or to Tribal College students seeking to transfer to another SDSGC university.*

**Objective C.1.3:** (Diversity in Research Infrastructure) Increase the participation of women and underrepresented groups in statewide research programs and facilitate their subsequent entry into STEM careers. (See also B.2.6.)

**Strategy C.1.3.1:** Work with admissions officers at SDSGC academic affiliates and with SDSGC's network of K-12 and informal education contacts to improve recruitment of qualified female students and students from underrepresented groups.

**Outcome indicator:** *SDSGC will sponsor at least 10 activities annually that encourage women and students from underrepresented groups to enter STEM careers, such as five*

*Women in Science Conferences, Flandreau Indian School Success Academy, NASA Explorer Schools, and Space Day.*

**Strategy C.1.3.2:** Assist in the placement of students from underrepresented groups in projects that provide hands-on research or design experience.

**Outcome indicator:** *SDSGC fellowship/scholarship funds for research or design experiences at SDSGC academic institutions, EROS, and NASA Centers will equal or exceed 10% to minorities and 40% to females.*

**Strategy C.1.3.3:** Longitudinally track progress of students from underrepresented groups in academic performance and research activities through first employment.

**Outcome indicator:** *Annually use NSGF longitudinal tracking system to track 100% of SDSGC scholars and fellows. (See also C.3.1.1.)*

**Objective C.1.4:** (Diversity in Higher Education) Increase the participation of women and underrepresented groups in all aspects of SDSGC's higher education program and facilitate their subsequent entry into STEM careers. (See also B.3.5.)

**Strategy C.1.4.1:** Engage women and members of underrepresented groups in all aspects of the SDSGC higher education programs; advertise that fellowships encourage minority and women applicants.

**Outcome indicator:** *Participation by women and minorities will equal or exceed 10% to minorities and 40% to females. (See also B.3.5.1.)*

**Strategy C.1.4.2:** Expand participation and support of geospatial and geoscience workshops, training, and related projects at Tribal Colleges.

**Outcome indicator:** *Co-sponsor at least one Tribal College geospatial and geoscience initiative annually.*

## **C.2. National Program Emphases (Outcome 1): Workforce Development**

**Goal:** *To use the Consortium's statewide network of scientists, engineers, and educators to provide talented students a pathway to careers that will contribute to a highly-trained and diverse workforce for NASA and expand the nation's research and development capacity.*

**Objective C.2.1:** (Recruitment) Increase participation in SDSGC and the STEM workforce.

**Strategy C.2.1.1:** Support NASA and SDSGC educational outreach programs and workshops across the state.

**Outcome indicator:** *Co-sponsor at least five precollege programs that encourage entry into the STEM workforce and participation in NASA and SDSGC.*

**Strategy C.2.1.2:** Promote participation in the STEM workforce through existing programs that target Native American college and precollege students such as the South Dakota GEAR UP Program, Flandreau Indian School Success Academy, and NASA Explorer Schools on Indian Reservations. (See also C.4.4.1.)

**Outcome indicator:** *At least 200 Native American college and precollege students each year are informed of STEM workforce opportunities in NASA and SDSGC.*

**Objective C.2.2:** (Fellowships and Scholarships) Encourage students to enter the NASA pipeline and the STEM workforce through the SDSGC Fellowships/Scholarships Program.

**Strategy C.2.2.1:** Award fellowships and scholarships, in part, based on students' demonstrated interest in entering a NASA career or the STEM workforce.

**Outcome indicator:** *One hundred percent (100%) of fellowship and scholarship awardees will be students planning to enter the STEM workforce or STEM education.*

**Objective C.2.3:** (NASA placement) Offer hands-on, tangible research experiences at NASA Centers to SDSGC student fellows.

**Strategy C.2.3.1:** Provide all SDSGC student fellowship applicants with information on NASA internships and coop programs and provide NASA Center Personnel Officers and University Affairs Officers with information on SDSGC student fellows.

**Outcome indicator:** *At least two SDSGC student fellows will be placed in internships at NASA Centers each year.*

**Objective C.2.4:** (Industry placement) Increase industry participation in the SDSGC student programs and increase internships and job placement.

**Strategy C.2.4.1:** Provide SDSGC industry affiliates (including EROS-SAIC) and other aerospace industry contacts with information on SDSGC student fellows to promote internships or job placement.

**Outcome indicator:** *At least two SDSGC student fellows will be placed in industry internships or jobs each year.*

**Strategy C.2.4.2:** Coordinate with the Governor's Office of Economic Development to place SDSGC student fellows in state industry internships through "Dakota Seeds" program. (B.1.3.2, B.3.3.2, B.3.4.1)

**Outcome indicator:** *At least two SDSGC student fellows will be placed in industry internships or jobs each year through "Dakota Seeds." (See also B.3.4.1.)*

### **C.3. National Program Emphases (Outcome 1): Longitudinal Tracking**

**Goal:** *To acquire and maintain accurate longitudinal data on all students and faculty who have received significant support from SDSGC in order to assess the impact of the support on the their education, career, and professional development.*

**Objective C.3.1:** (Longitudinal tracking – students) All students who have received significant fellowship or scholarship assistance from SDSGC will be longitudinally tracked through first employment or beginning of advanced degrees. (See also B.1.6, C.1.3.3.)

**Strategy C.3.1.1:** Continue to participate in the National Space Grant Foundation's longitudinal tracking system so that all students provided with "significant support" from SDSGC (defined as over \$1,000 in a single award) will be tracked in accordance with NASA's longitudinal tracking requirements.

**Outcome indicator:** *Use of a web-based system will improve SDSGC's ability to assess the impact of its student programs and to maintain better contact with graduates of the program.*

**Objective C.3.2:** (Longitudinal tracking – faculty) All faculty who have received significant research, curriculum development, or travel assistance from SDSGC will be required to

submit reports on the impact of the award on research capacity, education, economic development, and professional development.

**Strategy C.3.2.1:** Develop and implement a simple, electronic reporting tool for gathering consistent data from faculty on funded activities and the impact of the activities.

**Outcome indicator:** *Use of a consistent reporting tool for faculty awards will facilitate compilation of participant data, scientific and educational products, new collaborations, and new funding that result from the program.*

#### **C.4. National Program Emphases (Outcome 1): Minority Serving Institutions**

**Goal:** *To ensure that Minority-Serving Institutions in South Dakota, which are exclusively Tribal Colleges and Universities, are represented in the planning and implementation of all Consortium programs.*

**Objective C.4.1:** (Management) Tribal College needs and priorities will be more effectively served by SDSGC programs.

**Strategy C.4.1.1:** SDSGC will actively seek representation from Tribal College faculty and staff on the Management Team. (See also A.8.)

**Outcome indicator:** *At least one permanent or rotating member of the Management Team will be a representative of a Tribal College.*

**Objective C.4.2:** (Fellowships and Scholarships) The Management Team will ensure a broad distribution of fellowship and scholarship awards, with an emphasis on awards to qualified students at Tribal Colleges. (See also B.1.5.)

**Strategy C.4.2.1.:** Members of the Management Team will provide assistance to Tribal College students and advisors to help them develop competitive proposals for fellowships and scholarships.

**Outcome indicator:** *Management Team staff will present fellowship/scholarship funding opportunities in the fall of each year to 100% of the STEM degree seeking students at Oglala Lakota College and Sinte Gleska University.*

**Objective C.4.3:** (Research Infrastructure) SDSGC will promote research opportunities and collaborations targeting Tribal College affiliates. (See also B.2.6.)

**Strategy C.4.3.1:** Distribute NASA, SDSGC, and SD NASA EPSCoR research and education opportunities to SDSGC contacts at Tribal Colleges.

**Outcome indicator:** *At least one research and education proposal submitted by Tribal College affiliates or in collaboration with Tribal College affiliates.*

**Strategy C.4.3.2:** Develop and maintain remote-sensing test sites that promote long-term interdisciplinary research and training collaborations among SDSGC institutions, Tribal College affiliates, and external partners. (See also B.2.4.2.)

**Outcome indicator:** *SDSGC institutions acquire new remote sensing data or collaborate on use of existing data.*

**Strategy C.4.3.3:** Convene an annual Tribal College Research and Education Roundtable in cooperation with the state NASA EPSCoR Program and similar statewide programs. (See also B.2.3.3.)

**Outcome indicator:** *A Tribal College Research and Education Roundtable is held each year, and the recommendations are disseminated to state academic, government, and industry representatives through the state REACH Committee.*

**Objective C.4.4:** (Higher Education) Support Higher Education programs that strengthen STEM education at Tribal College affiliates. (See also B.3.5.)

**Strategy C.4.4.1:** Support programs that help prepare Native American students for Tribal College (or other post-secondary education) and programs that help students at Tribal Colleges to make a successful transition to advanced undergraduate and graduate STEM programs at other SDSGC affiliates. (See also C.2.1.2.)

**Outcome indicator:** *Annually, SDSGC provides support for STEM programs in at least three Tribal College affiliates and tribal K-12 schools that provide college preparatory programs (e.g., St. Francis Indian School, SDSU/Flandreau Indian School Success Academy, SD GEAR UP, Consortium Development Grant with Minority Institutions, etc.).*

**Strategy C.4.4.2:** Promote NASA and industry student opportunities, such as internships, to students and advisors at Tribal College affiliates.

**Outcome indicator:** *At least one Tribal College student is placed in a STEM internship or similar program each year.*

**Strategy C.4.4.3:** Support SDSGC's 2007 Consortium Development Competition project with Oglala Lakota College, which focuses on a "Badlands Rover" robotics project and preparing Tribal College students for entry into STEM master's-degree programs.

**Outcome indicator:** *Six Tribal College undergraduates will participate in hands-on STEM projects and two Tribal College students will enter STEM master's programs by the end of the project in May 2010.*

## **D. NASA Education Outcome 2:**

**Elementary and Secondary Education – Educate and Engage:** Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers and faculty.

### **D.1. Precollege Education**

**Goal:** *To increase student awareness and access to educational and career opportunities in aerospace, earth science, and supporting STEM disciplines.*

**Objective D.1.1:** (NASA dissemination) Disseminate information on NASA and SDSGC precollege activities and opportunities to teachers and students statewide.

**Strategy D.1.1.1:** Develop and maintain electronic databases and mailing lists of contacts in precollege educators in STEM fields. (See also A.6.1.)

**Outcome indicator:** *Electronic databases of pre-college contacts updated as necessary.*

**Objective D.1.2:** (Partnerships) Facilitate partnerships for grant applications that aim to strengthen precollege STEM education.

**Strategy D.1.2.1:** Participate in preparation of proposals to NASA or other organizations that support precollege STEM education.

**Outcome indicator:** *Annually, SDSGC members will participate in at least one precollege education proposal.*

**Objective D.1.3:** (In-service teacher training) Increase teacher capacity to effectively incorporate aerospace and earth science into the curriculum.

**Strategy D.1.3.1:** Provide professional development workshops for educators on topics related to aerospace and earth science.

**Outcome indicator:** *At least 100 teachers will participate in workshops facilitated by SDSGC such as NASA AESP training, GIS/GPS training, E-missions, GEMS, StarLab Planetarium astronomy training, UMAC's Earth Science Tools for Educators workshop, and NASA Speaker's Bureau.*

**Strategy D.1.3.2:** Maintain "K-12 Educational Opportunities" section of the SDSGC website as a teacher resource directory.

**Outcome indicator:** *Website is updated at least monthly. (See also A.6.1)*

**Strategy D.1.3.3:** Participate in NASA Explorer Schools Program.

**Outcome indicator:** *Annually, at least one South Dakota school (preferably a Tribal school) applies for the NASA Explorer Schools Program.*

**Objective D.1.4:** (Science and education events) Support programs that expose K-12 students to hands-on experiences and to educational and career opportunities in the fields of aerospace, earth science and technology.

**Strategy D.1.4.1:** Present annual South Dakota Space Days event. (See also E.1.2.2.)

**Outcome indicator:** *At least 2,000 people will attend "NASA South Dakota Space Days".*

**Strategy D.1.4.2:** Support organizations that provide K-12 students with educational and career opportunities in the fields of aerospace, earth science, and technology.

**Outcome indicator:** *Over 3,000 students each year participate through Women in Science Conferences, K-12 science fairs, Aerospace Career and Education Camp, Flandreau Indian School Success Academy, Badlands Observatory's "Dark Skies, Bright Minds" educational program, and related programs.*

**Objective D.1.5:** (State standards) SDSGC will promote and support programs that align with state and national education standards.

**Strategy D.1.5.1:** Provide support for the "E-missions" Program, GEMS (Great Explorations in Math & Science) Program, and similar curriculum enhancement projects.

**Outcome indicator:** *These teacher-training programs embrace state education standards in math, science, and language arts and will introduce at least 50 teachers to NASA and space science curricula annually.*

**Objective D.1.6:** (Diversity) Inspire and motivate women, underrepresented minorities, and persons with disabilities into STEM careers.

**Strategy D.1.6.1:** Support programs that inform, inspire, and motivate students from underrepresented groups about educational and career opportunities in the fields of aerospace, earth science, and supporting STEM disciplines.



**Outcome indicator:** Over 1,000 females and students from underrepresented groups participate each year through Women in Science Conferences, K-12 science fairs, Aerospace Career and Education Camp, Flandreau Indian School Success Academy, Badlands Observatory's "Dark Skies, Bright Minds" educational program, SD GEAR UP, and related programs.

**Objective D.1.7:** (Evaluation) The Consortium will develop methods to document, measure, and assess the impact of the precollege education programs in conjunction with its implementation of an overall evaluation strategy. (See also A.9.)

**Strategy D.1.7.1:** Develop and administer simple before-and-after surveys of participants' knowledge and attitudes about the Consortium, NASA, and STEM careers.

**Outcome indicator:** Adjustments are made to the precollege education program to strengthen activities that are working and drop or improve activities that are not having the intended impact.

### **E. NASA Education Outcome 3:**

**Informal Education – Engage and Inspire:** Build strategic linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA's mission.

#### **E.1. Public Service: General Public & External Relations**

**Goal:** To enhance public scientific literacy in aerospace and earth science; to complement community efforts in STEM education; and to inspire citizens of diverse backgrounds through the excitement of scientific exploration and discovery.

**Objective E.1.1:** (NASA dissemination) The SDSGC will increase public awareness of the Space Grant program and its activities and engage the public in the excitement of NASA missions.

**Strategy E.1.1.1:** Maintain SDSGC webpage to provide the public easier access to the latest information about NASA and SDSGC activities.

**Outcome indicator:** Website is updated at least monthly.

**Strategy E.1.1.2:** SDSGC will sponsor *StarDate* on South Dakota Public Radio with non-NASA funds.

**Outcome indicator:** NASA and SDSGC will be featured twice daily during the work week in space/science education broadcasts.

**Objective E.1.2:** (Science and education events) The SDSGC will support activities of scientific discovery across the state.

**Strategy E.1.2.1:** SDSGC will support NASA's commitment to renewing a spirit of exploration and discovery and will use the excitement of space exploration to promote this policy to the general public.

**Outcome indicator:** Annually, SDSGC staff will produce and give at least five presentations to various public groups, and will generate press releases about Consortium activities.

**Strategy E.1.2.2:** Present annual South Dakota Space Days event. (See also D.1.4.1.)

**Outcome indicator:** At least 2,000 people will attend "NASA South Dakota Space Days".

**Objective E.1.3:** (Diversity) SDSGC will seek to inspire and motivate women, underrepresented minorities, and persons with disabilities through the excitement of NASA missions.

**Strategy E.1.3.1:** Support programs that inform, inspire, and motivate members of underrepresented groups about the excitement of NASA missions.

**Outcome indicator:** *Participants in South Dakota Space Days and science fairs will include at least 10% Native Americans and 40% females.*

**Objective E.1.4:** (Evaluation) The Consortium will develop methods to document, measure, and assess the impact of the public service program in conjunction with its implementation of an overall evaluation strategy. (See also A.9.)

**Strategy E.1.4.1:** Develop and administer simple before-and-after surveys of participants' knowledge and attitudes about the Consortium, NASA, and STEM careers.

**Outcome indicator:** *Adjustments are made to the public service program to strengthen activities that are working and drop or improve activities that are not having the intended impact.*

## **Appendix G.1.a**

### **South Dakota Space Grant Consortium Roles and Responsibilities of Members**

July 22, 2005

The South Dakota Space Grant Consortium (SDSGC, or the Consortium) was established March 1, 1991, under funding from the National Aeronautics and Space Administration's (NASA's) National Space Grant College and Fellowship Program.

As the link between NASA and the citizens of South Dakota, the mission of the SDSGC is to instill the spirit of exploration and discovery in students and educators and in the general public, with a special focus on the fields of science, technology, engineering, and mathematics (STEM) that are essential for the development of the nation's workforce.

This document outlines the organizational structure and governance of the Consortium and defines membership categories and the roles and responsibilities of members. Policies for adding and removing member organizations or official designees are addressed in Appendix I and II.

#### **I. Membership**

Membership in the Consortium is open to all institutions of higher education in the state and to other organizations with an interest in NASA-related research and education topics. At present, there are 35 institutional and affiliate members, including representatives from K-12 and informal education, industry, business, and state and federal government.

#### **II. Director**

The SDSGC Director serves at the lead institution and will exercise the following responsibilities:

1. Implement the goals and objectives of the Consortium;
2. Develop and administer the annual budget according to the Cooperative Agreement with NASA;
3. Administer the statewide programs of the SDSGC, including SD NASA Experimental Program to Stimulate Competitive Research (EPSCoR);
4. Hire, direct, and supervise Consortium staff at the SDSGC Headquarters Office;
5. Call meetings/teleconferences of the SDSGC Management Team in addition to Consortium-wide quarterly meetings;
6. Serve as the Consortium's chief spokesperson and public relations officer;
7. Appoint committees as needed to assist Consortium programs;
8. Fulfill reporting requirements to NASA on behalf of the Consortium;
9. Develop new SDSGC proposals and renewal of agreements;
10. Represent SDSGC at national and regional meetings of the National Council of Space Grant Directors.

### **III. Lead Institution and Consortium Office**

The lead institution hosts the SDSGC Director and the SDSGC Headquarters Office. The lead institution provides adequate physical space and communications infrastructure to conduct consortium business; this includes a SDSGC Office and space for the Director, Deputy Director, and Manager of Special Projects. The SDSGC Office responds to requests from Consortium members, affiliates, NASA, and the public, and oversees the maintenance of a Space Grant website. The lead institution and Consortium Office are responsible for management of the Cooperative Agreement with NASA, including submission of the annual budget requests and work plan, submission of annual financial and technical reports, and submission of Consortium Management Information System (CMIS) database information.

### **IV. Institutional Members**

Institutional members include the lead institution (South Dakota School of Mines and Technology), South Dakota State University, Augustana College, and the U.S. Geological Survey's National Center for Earth Resource Observation and Science (EROS). Institutional members, other than the lead institution, have a designated SDSGC Associate Director. All institutional members have permanent representation on the Management Team. With the exception of EROS, institutional members are eligible to receive annual operating funds from the Consortium budget to support the Associate Director's position and related costs.

Primary responsibilities of the Associate Directors include:

1. Serve on the Consortium Management Team;
2. Develop and administer the annual budget for the institutional member, including the provision of 1:1 non-federal cost-sharing funds;
3. Assist with implementation of Consortium programs in their institutions and local communities;
4. Act as the primary point of contact for the dissemination of NASA and SDSGC information about funding opportunities for faculty and students at their institutions and to educators and the general public in their area;
5. Advertise Consortium fellowship/scholarship and research opportunities and encourage students and faculty members on their campuses to apply for these grants and scholarships;
6. Help recruit members from underrepresented groups to apply for support under Consortium programs;
7. Submit annual work plan, financial and technical reports, and CMIS database information to the Consortium office;
8. If possible, attend national and regional Space Grant meetings.

## **V. Management Team**

The SDSGC Management Team supervises the planning and conduct of the SDSGC.

### Membership:

The Management Team consists of the Director and Deputy Director from the lead institution, the Associate Directors from each of the institutional members, and two rotating members appointed from the Consortium's affiliate organizations. Currently, the Management Team also includes the Manager of Special Projects for Workforce Development.

### Rotating Members:

Representatives of any affiliate member organization may apply to fill one of the two rotating positions on the Management Team. Rotating members serve for two years and the appointments are staggered so that one position becomes open each year. New rotating members are selected from the applicants by majority vote of the existing Management Team. Rotating members may not be re-elected for consecutive terms unless there are no other applicants in that year.

### Meetings:

The Management Team will meet a minimum of four times per year during consortium-wide quarterly meetings and will conduct monthly Management Team teleconferences.

### Quorum:

A quorum exists when 50% of the Management Team is in attendance at a meeting or teleconference.

### Voting:

Each Management Team member has one vote. All matters requiring the Management Team's approval will be agreed upon by a simple majority vote of those present and voting, unless otherwise noted (2/3 vote). Each team member can designate a surrogate member if he or she is unable to attend a meeting where a vote will be taken.

### Responsibilities:

1. Develop short and long-term planning and goals and conduct an annual review and update of SDSGC's Strategic Plan;
2. Adopt the annual budget;
3. Approve program expenditures for fellowship/scholarship and Program Initiation Grant awards;

4. Approve guidelines for all fellowship/scholarship and grant applications, review submitted applications, and recommend awards;
5. Review other requests to the Consortium for financial or technical support;
6. Serve, as required, on the Technical Advisory Committee and/or Steering Committee of the South Dakota NASA EPSCoR Program and, thereby, ensure coordination between the Space Grant and NASA EPSCoR programs in the state;
7. Vote on applications for the rotating two-year positions on the Management Team;
8. Vote on changes in the Consortium, including addition or removal of member/affiliate organizations, changing the Director (2/3 vote), or changing the lead institution (2/3 vote).

## **VI. Affiliate Members**

Affiliate members make up the statewide network that enables the Consortium to implement relevant NASA's research and education programs and to assist in addressing the needs of the state in the areas of science and technology education, workforce development, and economic growth. Affiliate members include institutions of higher education, Tribal Colleges, vocational and technical colleges, industry, K-12 education groups, informal education and science organizations, state and federal government agencies, and other organizations with interests in science, technology, and education that align with NASA's mission. Each affiliate member maintains contact with the Consortium Management Team through a designated Space Grant representative. Affiliate member representatives are also eligible to apply for a rotating two-year position on the Management Team. Affiliate members receive no regular Consortium funds, but they are eligible to apply for a variety of special programs, many of which provide funding to the organization or to individuals.

### Benefits of membership:

1. Affiliate members provide input into the design and implementation of the programs of the SDSGC, its Strategic Plan, and relations between the Consortium, NASA Headquarters, and the national Space Grant network;
2. Affiliate member representatives are encouraged to participate in SDSGC quarterly meetings;
3. Affiliate member representatives are eligible to apply for one of two rotating, two-year positions on the Management Team;
4. Affiliate members may be selected to serve on the Technical Advisory Committee of the South Dakota NASA EPSCoR Program and, thereby, provide guidance on the state's research initiatives and ensure coordination between the Space Grant and NASA EPSCoR programs in the state;
5. Affiliate members are encouraged to participate in and support SDSGC's annual South Dakota Space Days and other events or activities, as relevant;
6. Representatives receive electronic updates from SDSGC on Consortium programs and science, technology, engineering, and mathematics (STEM) education and research opportunities from NASA and other organizations;

7. Affiliate member organizations are listed on the SDSGC website ([www.sdsmt.edu/space](http://www.sdsmt.edu/space)) along with links to each member's website and the name and contact information for the Space Grant representative at the organization;
8. Higher education affiliates are eligible for participation in Consortium programs including:
  - a. SDSGC's fellowship and scholarship programs;
  - b. Support for student and faculty internships and other summer programs at NASA Centers, EROS, industry affiliates, and related science and technology programs;
  - c. Faculty and student participation in the South Dakota NASA EPSCoR Program;
  - d. Collaboration with institutional members in areas of student programs, curriculum development, interdisciplinary research and education, mentoring of precollege groups, and faculty mentoring;
  - e. Faculty are eligible to submit proposals for SDSGC Program Initiation Grants or for support of research and travel relevant to the SDSGC mission;
9. Industrial affiliates receive benefits including:
  - a. Access to a diverse group of science and technology undergraduate and graduate students to conduct research and design projects and to fill internships and employment opportunities;
  - b. Participation in and support of SDSGC's annual South Dakota Space Days and other activities;
  - c. Electronic updates on state or federal initiatives promoting university-industry partnerships and technology-based economic development.

Responsibilities:

1. Each affiliate member maintains contact with the Consortium through a designated Space Grant representative. Expectations of the Space Grant representative include:
  - a. Assist with implementation of Consortium programs in their organizations and local communities;
  - b. Act as the primary point of contact for the dissemination of information about NASA and SDSGC programs in their organizations;
  - c. Promote interest in STEM disciplines and enhance public understanding of NASA mission, programs, and research and education opportunities through the dissemination of materials and information;
  - d. Help recruit members from underrepresented groups to participate in Consortium programs and to pursue careers in science and technology fields;
  - e. Seek to leverage Consortium funds by identifying potential cash or in-kind matching funds in their organizations or communities;
2. Affiliate members are encouraged, but not required, to provide cash or in-kind support of Consortium activities;
3. All affiliates members must respond to a short annual survey in which they provide data for program evaluation and improvement, report activities for the project year, indicate changes in the SDSGC contact, indicate changes in organizational status or interest with respect to Consortium participation, and report and document estimates of cost-sharing.

## **VII. Amendment**

These Roles and Responsibilities of Members may be amended by a 2/3 vote of the SDSGC Management Team at any meeting at which a quorum is present. To insure proper consideration, all proposed amendments must be submitted to the Consortium Director at least two weeks prior to a quarterly meeting or monthly teleconference.



## Appendix I

### Policies for Adding and Removing Members

#### Change of Director and Lead Institution

If the SDSGC Director retires, moves, or resigns, or it becomes necessary to change the lead institution, the SDSGC Management Team will follow NASA's guidelines for such changes included here as Appendix II. A 2/3 vote of the Management Team is required on matters related to changes in the Director and lead institution.

#### Change of Associate Director

If an Associate Director retires, moves, or resigns, the institution must submit a letter to the Consortium Director designating a new Associate Director. The letter must be signed by the chief executive officer, college president, or equivalent officeholder and must include the following information:

- a) Name, title, and mailing address (including e-mail) of proposed Space Grant Associate Director
- b) Curriculum vitae of proposed Associate Director
- c) Statement describing designee's interests in NASA-related research and education and the potential contribution of the designee to Consortium management
- d) Statement of compliance with the roles and responsibilities of institutional members as outlined in sections IV and V of this document, including commitment of appropriate release time for the Associate Director to participate in Consortium meetings, travel, and other activities; agreement to provide non-federal matching funds to meet the NASA requirement of 1:1 cost-sharing; and agreement to meet annual technical and financial reporting requirements

#### Addition and Removal of Institutional Members

##### Addition:

Organizations may be considered for institutional membership by addressing a letter to the Consortium Director. The letter must be signed by the chief executive officer, college president, or equivalent officeholder and must include the following information:

- a) Name of organization
- b) Type of organization
- c) Name, title, and mailing address (including e-mail) of chief executive officer or president of the organization
- d) Name, title, and mailing address (including e-mail) of proposed Space Grant representative (Associate Director)
- e) Statement of organizational mission and description of the organization's involvement in NASA-related research and education topics

- f) Statement describing the potential contribution of the organization to the Consortium
- g) Statement of compliance with the roles and responsibilities of institutional members as outlined in sections IV and V of this document, including designation of an Associate Director and commitment of appropriate release time for Consortium activities, agreement to provide non-federal matching funds to meet the NASA requirement of 1:1 cost-sharing, and agreement to meet annual technical and financial reporting requirements

The Management Team may consider applications for institutional membership at any meeting at which a quorum is present. Applications that receive a 2/3 vote will be admitted to the Consortium as institutional members.

#### Removal:

An institutional member can be removed from the Consortium by a 2/3 vote of the SDSGC Management Team. The Management Team may recommend removal of an institutional member under the following circumstances: 1) the organization requests to withdraw; 2) the organization reneges on its contractual agreement with the Consortium or fails to fulfill its annual technical and financial reporting requirements; 3) the Management Team determines that for two consecutive years the annual activity of the member no longer justifies status as an institutional member; or 4) the organization is found in violation of these Roles and Responsibilities or is engaging in conduct detrimental to the best interests of the Consortium. Such removal may occur only after the member has been given adequate written notice of the pending action and an opportunity to respond to the Management Team in a written or oral defense.

#### **Addition and Removal of Affiliate Members**

##### Addition:

Organizations may be considered for affiliate membership by addressing a letter to the Consortium Director. The letter must be signed by the chief executive officer, college president, or equivalent officeholder and must include the following information:

- a) Name of organization
- b) Type of organization
- c) Name, title, and mailing address (including e-mail) of chief executive officer of the organization
- d) Name, title, and mailing address (including e-mail) of proposed Space Grant representative
- e) Statement of organizational mission and description of the organization's involvement in NASA-related research and education topics
- f) Statement describing the potential contribution of the organization to the Consortium

- g) Statement of compliance with the roles and responsibilities of affiliate members as outlined in section VI of this document, including the annual member survey and reporting requirements

The Management Team may consider applications for affiliate membership at any meeting at which a quorum is present. Applications that receive a majority vote will be admitted to the Consortium as affiliate members.

Removal:

An affiliate member can be removed from the Consortium by a 2/3 vote of the SDSGC Management Team. The Management Team may recommend removal of an affiliate member under the following circumstances: 1) the organization requests to withdraw; 2) the organization fails to respond to the annual affiliate survey for two consecutive years; 3) the Management Team determines that for two consecutive years the annual activity of the affiliate no longer justifies membership; or 4) the organization is found in violation of these Roles and Responsibilities or is engaging in conduct prejudicial to the best interests of the Consortium. Such removal may occur only after the member has been given adequate written notice of the pending action and an opportunity to respond to the Management Team in a written or oral defense.

## Appendix II

### **Guidelines for Space Grant Director/Lead Institution Changes**

(as provided by NASA Headquarters in April 2004)

Inevitably, Space Grant directors retire, move, or resign. In addition, lead institutions may need to be changed. The purpose of this communication is to establish guidelines for orderly program change that is in the best interests of the program and its participants. Among the most critical factors of consortium success are the choice of program director and the degree of support the consortium has from the lead institution.

#### **Appointment of an Interim Director**

If a consortium director leaves his/her position, or proposes to do so, the National Space Grant program manager should be notified as soon as possible. The chief academic officer of the lead institution will recommend to NASA, for approval, the appointment of an interim director. The interim director should be appointed for a period not to exceed 6 months. The permanent appointment of a director is subject to the conditions described below.

#### **Consortium-wide Meeting**

Within six months after giving notice of the proposed change, the interim director or lead governing body of the consortium must convene a consortium-wide meeting to discuss proposed changes. This meeting shall include the governing bodies of the consortium (including but not limited to affiliate representatives, campus representatives, advisory councils, board of directors, operating committees, etc.). Representatives from non-affiliate institutions that have expressed interest in joining the consortium may also be invited. The National Space Grant staff at NASA Headquarters should also be invited.

The purpose of this meeting is to discuss consortium changes, including changes of the director and lead institution, reach a consensus on those proposed changes, and agree upon the contents of the formal request to NASA Headquarters.

#### **Request for Consortium Changes**

The formal request to the National Space Grant staff for changes in the consortium must include the following elements:

- Vita of recommended consortium director.
- If the consortium-wide meeting results in recommendations for changes to the current program plan (including, but not limited to, budget distribution or allocation, FTE of consortium director, program assistants and/or CMIS point of contact), a new program plan must be submitted.
- Statement from the lead institution, even if the lead site is not changing, describing matching funds, institutional resources, and general support for program leadership, including office space for management and other consortium activities.
- Minutes from the consortium consensus meeting, including minority reports, if any.

Final approval of the changes resides with the National Space Grant staff. Even if multi-year awards have been promised, approval will be delayed if the above conditions are not met.

**Elements to Consider**

The following items should be considered by lead and affiliate personnel in contemplating change of leadership:

- It is imperative that members of underrepresented groups –women, minorities, and persons with disabilities—be sought and considered for the position of consortium director, advisory council membership, and other leadership positions.
- If the proposed director holds an academic appointment, it is preferable that he/she be tenured. This breadth of experience and knowledge greatly benefits a consortium.
- Adequate space should be available to conduct consortium business, including director’s office space and space for student activities.
- If the home institution is academic, office space should be centrally located on the campus.

### G.3. Summarized Table of Consortium Goals and SMART Objectives

<b>Major Programmatic Goals, Selected Objectives, and Annual Metrics<sup>1</sup> (from SDSGC Strategic Plan 2010)</b>
<p><b>B.1. Fellowship/Scholarship:</b> <i>Administer a Fellowship/Scholarship program that offers educational and research opportunities to students from diverse backgrounds who are pursuing degrees in fields of STEM that align with NASA's mission and those of SDSGC members and affiliates.</i></p> <ul style="list-style-type: none"> <li>– Statewide competition offered at all 10 higher education affiliates including three Tribal Colleges; emphasis on internships with NASA, aerospace industry, DUSEL, and EROS. [At least 55 awards (\$1,000-\$12,000); all awardees enter longitudinal tracking system; at least 10% minority and 40% female; at least three NASA interns and five EROS interns]</li> </ul>
<p><b>B.2. Research Infrastructure:</b> <i>Promote the improvement of research programs and capabilities of members with an emphasis on the fields of aerospace, earth science, and supporting STEM disciplines.</i></p> <ul style="list-style-type: none"> <li>– Statewide competition for Program Initiation Grants for research development offered at all 10 higher education affiliates including three Tribal Colleges; emphasis on interdisciplinary research focused on NASA, DUSEL, or EROS priorities. [At least two awards for research (\$5,000-\$20,000)]</li> <li>– Support collaborative research proposals in NASA areas. [At least one collaborative proposal submitted]</li> <li>– Support Tribal College research roundtable in conjunction with NASA EPSCoR. [At least one Tribal College research roundtable]</li> </ul>
<p><b>B.3. Higher Education:</b> <i>Build interdisciplinary programs related to NASA's Education Outcome 1 at the state's institutions of higher education and support related programs that serve to strengthen STEM education in South Dakota.</i></p> <ul style="list-style-type: none"> <li>– Statewide competition for Program Initiation Grants for course development offered at all 10 higher education affiliates including three Tribal Colleges; emphasis on NASA disciplines. [At least one award for course development (\$5,000-\$20,000)]</li> <li>– Support interdisciplinary student engineering design teams in NASA priority areas. [At least three engineering design teams]</li> <li>– Support summer STEM programs for precollege students on college campuses with emphasis on Native American students. [At least four summer STEM precollege programs] (Participant numbers and demographics collected for all student programs, and student surveys administered)</li> </ul>
<p><b>D.1. Precollege:</b> <i>Increase student awareness and access to educational and career opportunities in aerospace, earth science, and supporting STEM disciplines.</i></p> <ul style="list-style-type: none"> <li>– Sponsor statewide competition for precollege STEM teacher grant. [At least one precollege teacher grant (\$5,000)]</li> <li>– Support teacher training workshops in NASA priority areas. [At least eight teacher workshops (200 teachers)]</li> <li>– Support collaborative proposals for innovations in precollege STEM education. [At least one collaborative proposal]</li> <li>– Support summer STEM programs for precollege students on college campuses with emphasis on Native American students. [At least four summer STEM precollege programs (450 students)]</li> <li>– Support statewide precollege robotics programs, including resources, teacher training workshops, and state competition. [At least 30 teams participate in SD FLL robotics state competition (400 students)]</li> <li>– Share NASA educational resources (StarLabs, robotic kits, Uniview Exploradome mobile planetarium, telescopes). [At least 180 teachers and 250 students utilize NASA educational resources] (Participant numbers and demographics collected for all student programs, and student surveys administered)</li> </ul>
<p><b>E.1. Informal Education:</b> <i>Enhance public scientific literacy in aerospace and earth science; complement community efforts in STEM education; and inspire citizens of diverse backgrounds through the excitement of scientific exploration and discovery.</i></p> <ul style="list-style-type: none"> <li>– Partner with informal education affiliates to disseminate NASA content, share NASA educational resources, and host major NASA science education events. [15 informal education providers and 500 students share NASA resources; 150 teachers and 2,200 students participate in NASA science education events such as SD Space Days]</li> </ul>

<sup>1</sup> Note: The above student/teacher numbers do not total the full amount mentioned in the text of the proposal because this table includes only selected precollege metrics.

Appendix G.4  
SD Space Grant Consortium

<b>PART Measures - 2010</b>	<b><u>[XX] Consortium Target[1]</u></b>
<b><u>Higher Education Measures</u></b>	
Percentage of NASA higher education program student participants employed by NASA, aerospace contractors, universities, & other educational institutions. (NASA Target = 60%) ( <i>Longitudinally tracked students only</i> )	50%
Percentage of undergraduate students who move on to advanced education in NASA-related disciplines. (NASA Target = 45%) ( <i>Longitudinally tracked students only</i> )	38%
Number of underrepresented and underserved students participating in NASA higher education programs. (NASA Target = 8,500) ( <i>Applies to all categories of higher education students.</i> )	495
Number of [ <i>higher education</i> ] institutions served in designated EPSCoR states. (NASA Target = 200) ( <i>For EPSCoR States only</i> )	10
Number of new or revised courses targeted at the STEM skills needed by NASA that are developed with NASA support. (NASA Target = 60)	1
<b><u>Elementary/Secondary Measures</u></b>	
Percentage of elementary and secondary educators who participate in NASA training programs and use NASA resources in their classroom instruction. ( $\geq 2$ days of training) (NASA Target = 75%)	75%
Percentage of elementary and secondary educators who either obtain NASA content-based education resources or participate in short-duration NASA education activities and use NASA resources in their classroom instruction. (NASA Target = 60%)	60%
Percentage of students expressing interest in science, technology, engineering, and math (STEM) careers following their involvement in NASA elementary and secondary education programs. (NASA Target $\geq 50\%$ )	60%

Appendix G.4  
SD Space Grant Consortium

Number of elementary and secondary student participants in NASA instructional and enrichment activities. (NASA Target = 470,000)	3,470
<i>Details on NASA Education PART Measures can be found at ExpectMore.gov</i> <i><a href="http://www.whitehouse.gov/omb/expectmore/summary/10002310.2008.html">http://www.whitehouse.gov/omb/expectmore/summary/10002310.2008.html</a></i>	

[1] Measure(s) are applicable if the proposal contains projects that involve course development or the target audience.



# Appendix G.5 – SDSGC 2010 BUDGET FORM

NASA Space Grant Base Budget:	\$430000		
Other Federal Funds:	\$		
<i>NOTE: "Total" cells above DO NOT automatically compute</i>			
<b>Non-Federal Matching Funds</b>			
	<b>Cash</b>	<b>Other</b>	<b>Total</b>
Lead Institution:	\$	\$110784	\$110784
Academic Affiliates:	\$	\$209216	\$209216
State/Local Gov't:	\$	\$	\$
Industry:	\$	\$	\$
Nonprofit Org's:	\$	\$	\$
Other (describe below):	\$	\$	\$
<div style="border: 1px solid black; padding: 5px;"> <div style="display: flex; justify-content: space-between; align-items: center;"> <span style="font-size: 10px;">▲</span> <span style="font-size: 10px;">▼</span> </div> </div>			
	<b>Cash</b>	<b>Other</b>	<b>Total</b>
<b>Total Nonfederal:</b>	\$	\$320000	\$320000
<b>Total Budget:</b>			\$750000
<div style="border: 1px solid black; padding: 5px;"> <div style="display: flex; justify-content: space-between; align-items: center;"> <span style="font-size: 10px;">▲</span> <span style="font-size: 10px;">▼</span> </div> </div>			

***NOTE: "Total" cells above DO NOT automatically compute***

# Appendix G.5 – SDSGC 2010 BUDGET FORM

## Proposed Expenditures

	NASA S.G	Other Federal	Non-Federal	Total
Direct Labor:	\$121542	\$ <input type="text"/>	\$133843	\$255385
Estimated Travel:	\$15536	\$ <input type="text"/>	\$ <input type="text"/>	\$15536
Supplies/Services:	\$5557	\$ <input type="text"/>	\$ <input type="text"/>	\$5557
Describe Supplies/Services:				
	NASA S.G	Other Federal	Non-Federal	Total
Other Direct Costs:	\$93150	\$ <input type="text"/>	\$61614	\$154764
Indirect Costs:	\$84215	\$ <input type="text"/>	\$50543	\$134758
Fellowships:	\$110000	\$ <input type="text"/>	\$74000	\$184000
<b>Total Estimated Costs:</b>	<b>\$430000</b>	<b>\$ <input type="text"/></b>	<b>\$320000</b>	<b>\$750000</b>

***NOTE: "Total" cells above DO NOT automatically compute***

## Summary of Proposed Expenditures by Program

	NASA S.G	Other Federal	Non-Federal	Total
Research Infrastructure:	\$43189	\$ <input type="text"/>	\$24308	\$67497
Higher Education:	\$84909	\$ <input type="text"/>	\$105634	\$190543
Precollege:	\$46967	\$ <input type="text"/>	\$47958	\$94925
Informal Education:	\$3852	\$ <input type="text"/>	\$4899	\$8751
Consortium Admin. Costs:	\$78444	\$ <input type="text"/>	\$37281	\$115725
Indirect Costs:	\$62639	\$ <input type="text"/>	\$29920	\$92559
Fellowships	\$110000	\$ <input type="text"/>	\$70000	\$180000
	NASA S.G	Other Federal	Non-Federal	Total
<b>TOTAL:</b>	<b>\$430000</b>	<b>\$ <input type="text"/></b>	<b>\$320000</b>	<b>\$750000</b>

***NOTE: "Total" cells above DO NOT automatically compute***

## **G.6. Consortium Director Biographical Sketch**

### **Edward F. Duke**

Director, South Dakota Space Grant Consortium and South Dakota NASA EPSCoR Program  
Professor, Department of Geology and Geological Engineering  
Director, Engineering and Mining Experiment Station  
South Dakota School of Mines and Technology  
Rapid City, South Dakota 57701-3995

Tel: 605-394-2388; Fax: 605-394-5360

E-mail: [Edward.Duke@sdsmt.edu](mailto:Edward.Duke@sdsmt.edu)

### **A. Professional Preparation**

Dr. Duke holds a B.S. degree from Beloit College and M.A. and Ph.D. degrees from Dartmouth.

### **B. Teaching and Research Interests**

Dr. Duke teaches courses in mineralogy, crystallography, and electron microscopy. His research interests include the Precambrian geology and tectonics of South Dakota and applications of remote sensing in geology. His research has been funded by NASA, NSF, DOE and other organizations. He is author or coauthor of 90 publications and presentations.

### **C. Synergistic Activities**

1. Collaboration with Oglala Lakota College under NSF Tribal Colleges and Universities Program, "Sustained Economic Growth of the Oglala Lakota Nation through Development of the Technological Infrastructure."
2. Mentor in NASA Honors Program (2003-04), a six-week, precollege summer residential program at SDSM&T that aims to increase the participation and success of American Indians in science, math, and technology.
3. Participant in Geoscience working groups for Deep Underground Science and Engineering Laboratory at Homestake, 2001-present.
4. Proposal organizer and collaborator, NSF Opportunities for Enhancing Diversity in the Geosciences multi-institution grant ("He Sapa Oyate: Geoscience Community at the Heart of Everything that Is").
5. Proposal organizer and collaborator, NSF EarthScope Proposal: Structure of the Northern Great Plains and Implications for Continental Assembly and Evolution.

### **D. NASA Technical and Project Management Experience**

Since 2004, Dr. Duke has served as director of the South Dakota Space Grant Consortium (SDSGC) and the South Dakota NASA EPSCoR Program. In addition to the internal advisory boards of the SDSGC and the SD NASA EPSCoR, Dr. Duke reports to the state's REACH Committee, which is composed of 29 representatives from higher education, state government, and industry; the REACH Committee is charged with developing the state's Science and Technology Strategic Plan and with coordination of the federal research capability initiatives of NSF, NASA, DoD, DOE, EPA, and NIH.