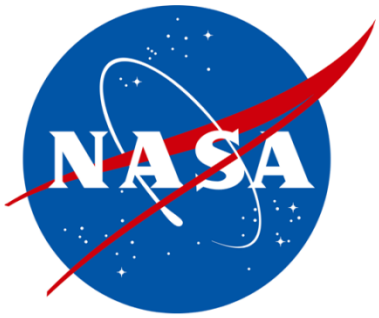

NASA's Support of Women and Girls

Pursuant to
Executive Order 13506, Establishing the White House Council on Women and Girls

July 31, 2009

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Agency Overview

A. Executive Summary

This report describes past, present, and future NASA efforts to further the progress and advancement of women and girls. The report has been prepared for the White House Council on Women and Girls in accordance with Presidential Executive Order 13506. The specific requirements of this report are outlined below:

> *Sec. 5. Federal Interagency Plan. The Council shall, within 150 days of the date of this order, develop and submit to the President a Federal interagency plan with recommendations for interagency action consistent with the goals of this order. The Federal interagency plan shall include an assessment by each member executive department, agency, or office of the status and scope of its efforts to further the progress and advancement of women and girls. Such an assessment shall include a report on the status of any offices or programs that have been created to develop, implement, or monitor targeted initiatives concerning women or girls. The Federal interagency plan shall also include recommendations for issues, programs, or initiatives that should be further evaluated or studied by the Council. The Council shall review and update the Federal interagency plan periodically, as appropriate, and shall present to the President any updated recommendations or findings.*

NASA celebrated its 50th Anniversary in 2008, which provided the opportunity to review its history, progress, and future. Throughout that history, NASA has consistently increased mission and leadership opportunities for women. The ten Centers and four Mission Directorates (Aeronautics, Exploration Systems, Space Operations, and Science) have utilized and benefited from women in administration, engineering (aeronautical, aerospace, biomedical, design, electrical, materials, mechanical, systems, and network), astrobiology, astronautics, astronomy, astrophysics, biology, chemistry, computer systems, computer science and programming, education, electronics, geology, life sciences, management, and other careers.

A few of the many examples of significant contributions of women to the success and impact of NASA and human spaceflight include:

- **Ms. Lynn Cline** currently serves as the Deputy Associate Administrator for the Space Operations Mission Directorate (SOMD), leading human spaceflight and operations activities related to the Space Shuttle, International Space Station (ISS), launch services and communications.

- **Colonel Eileen Collins**, a colonel in the U.S. Air Force, was the first woman to pilot the space shuttle in 1995 and, in 1999, became the first woman commander of a Space Shuttle mission.

- **Dr. France A. Cordova,** a Hispanic female and renowned astrophysicist, was the first female NASA Chief Scientist (1993-1996).

- **The Honorable Shana Dale** became the first female Deputy Administrator of NASA, serving from 2005 through 2008.

- **The Honorable Lori Garver**, confirmed as Deputy Administrator of NASA in 2009, formerly served as NASA Associate Administrator for Policy and Plans.

- **Dr. Carolyn Huntoon** became NASA's first female Center Director at the Johnson Space Center (JSC) in 1994.

- **Dr. Mae Jemison**, a medical doctor, was the first African-American woman in space.

- **Dr. Shannon Lucid**, a biochemist, made her first space flight in 1985. Dr. Lucid would later serve as NASA's Chief Scientist from 2002-2003. Until 2007, Dr. Lucid held the world record for the most flight time in orbit by a woman (223 days).

- **Dr. Ellen Ochoa**, a physicist and engineer, became the first Hispanic female astronaut in 1991. She currently serves as the Deputy Center Director at JSC.

- **Dr. Sally Ride**, a physicist, was the first American woman to orbit Earth on June 18, 1983.

- **Ms. Lesa Roe** became Director of the Langley Research Center (LaRC), NASA's second female Center Director and first since the mid 1990s. Ms. Roe continues to serve in this position.

- **Dr. Nancy Roman** became the first female Chief Astronomer for NASA in 1960. She was responsible for many astronomical satellites, culminating in the Cosmic Background Explorer and the Hubble Space Telescope.

- **Dr. Kathryn Sullivan**, a geologist, flew in 1984 and was the first woman to successfully conduct a spacewalk.

- **Dr. Peggy Whitson**, a biochemist, has accumulated 377 days in space, the most for any U.S. astronaut. Dr. Whitson has also performed a total of six career spacewalks, adding up to 39 hours 46 minutes, more than any other female astronaut.

NASA has benefited from the service of these talented women and many others. These women began their careers in the 1960s and 1970s when women made up only a very small part of the NASA workforce. In 1964, only 1 percent of personnel paid at a GS-12 (equivalent) or higher grade were women; today, that figure is 31 percent. In the 1970s, women comprised 17 percent of the overall Agency workforce, 3 percent of workers in science and engineering disciplines, and less than 1 percent in the Senior Executive Service (SES). Currently, women represent 25 percent of the SES, and at the highest levels of the General Schedule (GS) pay system, women represent 23 percent of the GS-15s and 29 percent of the GS-14s. Women currently represent 35 percent of the overall NASA workforce and 22 percent of the workforce subset that represents science and technology (which comprises 61 percent of the total NASA workforce). These are substantial increases, but these numbers could be higher, particularly as graduation rates of women in science, technology, engineering, and mathematics (STEM) increase. The NASA Offices of Human Capital Management (OHCM), Diversity and Equal Opportunity (ODEO), and Education (OE) employ several strategies that attract women to and help retain them in NASA careers.

Each year, NASA awards millions of dollars to small businesses, through Section 8(a) Business Development Programs, Small Business Set Asides, Small Business Innovation Research (SBIR), and Small Business Technology Transfer (STTR). In FY 2008, woman-owned small businesses received $368.5 million dollars in direct funding and another $650 million in subcontracts from larger NASA

awards. Several strategies implemented by the Office of Small Business Programs (OSBP) contribute to NASA's success in building the competiveness of woman-owned firms.

NASA's management philosophies, employee programs, education projects, and small business contracts are improving working conditions, careers, and academic achievement of female civil servants and the Nation's women and girls. NASA scientific, engineering, and technical advances are also impacting lives. Through "spinoffs," NASA helps protect human health through improved diagnostic imaging and testing, treatment for cancer and injuries, and technologies that take proactive and preventative safety measures.

B. Programs Which Improve the Lives of the Federal Workforce

1. *Program Descriptions*

Human Capital Management and
Diversity and Equal Opportunity

In 2008, NASA hired 930 non-student, new civil service personnel from sources outside of the Agency. Women comprised 35.9 percent of the total new hires and 25.2 percent of the new hires into science and engineering (S&E) positions. This (25.2 percent) is an improvement from the 2006 and 2007 hiring of women in the technical fields (20.2 percent and 19.1 percent, respectively). In 2008, of all the employees who left NASA (for retirement or to other employment opportunities), 35.3 percent were female. In S&E fields, women represented 17.2 percent of this (35.3 percent) loss. The data indicate a positive trend in the participation of women in NASA's S&E workforce. Recruitment strategies and a commitment to EO practices are essential to ensuring this trend continues.

Recruitment

The OHCM and the ODEO cooperatively plan Agency-level participation in new employee recruitment efforts. NASA conducts workforce planning and analysis to align human resources with the Agency's mission, goals, and objectives. This systematic process identifies and addresses the gaps between the current workforce and the human capital needs of the future. This enables NASA to determine the skill sets NASA needs and identify which positions will require additional sourcing.

Each year, NASA Centers prepare a Federal Equal Opportunity Recruitment Program Report and Plan that describes practices to help improve the recruitment, career development, and retention of a diverse workforce. Centers identify planned recruitment activity, occupations, and grade levels they will target to fill through external recruitment. NASA recruits new employees from traditionally underserved audiences by presenting at scientific and technical conferences, at seminars sponsored by minority and female national organizations, and by participation in activities at colleges with substantial minority and female enrollment in STEM fields, conferences, and career fairs for individuals with disabilities, and others. NASA participates in recruitment activities both locally and regionally. Examples of recruiting events targeting underserved and underrepresented students include:

- American Indian Science and Engineering Society (AISES).
- Career Expo for People With Disabilities.
- Federal Asian Pacific American Council (FAPAC).
- Hispanic Association of Colleges and Universities (HACU).

- Hispanic Engineering National Annual Awards Conference (HENAAC).
- Minority Serving Institutions Research Partnership Conference (MSIRP).
- National Society of Black Engineers (NSBE).
- Society of Hispanic Professional Engineers (SHPE).
- Society of Mexican American Engineers and Scientists (MAES).
- Society of Women Engineers (SWE).

For many years, NASA focused on hiring senior- and mid-career employees and focused less on succession planning through entry-level hiring. Consequently, the Agency faces a skills imbalance with gaps in many skill categories necessary for mission success. The Agency also has surpluses in other skills categories, despite incentives and extensive workforce reshaping efforts. In order for the Agency to be prepared for future mission requirements, it is imperative that NASA develop and maintain a diverse workforce with the right balance of skills and talents.

To address skill imbalances and aging demographics within the NASA workforce, NASA is sponsoring the Early Career Hiring Initiative, underway through September 30, 2009. This special effort is reinvigorating the NASA workforce by increasing the hiring of employees who are early in their careers. The goals of this hiring initiative are to eliminate critical skill mismatches, enable succession management, and sustain STEM capability in NASA and the Nation. An assessment of the initiative will determine its continuation after September 2009.

NASA leverages the student development pipeline to facilitate entry-level hires. The Cooperative Education Program (CO-OP), a component of the Student Career Experience Program (SCEP), continues to serve as a major contributor to the new workforce and receives a high degree of management attention and support. The program attracts students preparing for careers in STEM occupations, facilitates employee selection on the basis of proven performance, and supports equal opportunity hiring of minorities and females. Currently, the NASA co-op workforce is 470, of which 40 percent are female.

Model EEO Agency

To achieve mission successes, NASA requires that every employee be valued and motivated and perform as a highly functioning team member. ODEO plays a critical role in ensuring that this happens by working to eliminate equal employment opportunity (EEO) barriers and workplace conflicts that can diminish trust, impair teamwork, compromise safety, and ultimately undermine excellence. NASA strives to become a model workplace for EEO.

Goals and requirements of a Model EEO Agency include nondiscrimination and equal opportunity, regardless of gender, for both the active NASA workforce and applicants for employment. One of the tools used in this effort is the Agency's Model EEO Agency Plan, issued annually to the U.S. Equal Employment Opportunity Commission (EEOC). This plan and its related efforts assist the Agency in stepping back and assessing EEO within NASA. For example, under the Model EEO Agency Plan, NASA conducts an annual self-assessment based on statistical workforce analyses using the Relevant Civilian Labor Force as a comparator. Also, consistent with the EEOC's regulatory mandate to conduct periodic reviews of EEO programs, ODEO conducts functional reviews of EEO operations at NASA Centers to assess the effectiveness of EEO programs and processes. Consistent with EEOC regulation and Model EEO Plan policy, the Agency conducts special emphasis programs, including the Federal Women's Program, that focus on recruitment and retention. The Model EEO Plan self-assessment also includes an annual accomplishment report that details progress made and goals reached. Ultimately, the Model EEO Plan encompasses a careful look at the Agency's policies, programs,

practices, and workforce profile to determine whether there are either deficiencies within the EEO programs and/or barriers or potential barriers to the advancement of EEO for any demographic group at NASA.

Career Development and Leadership Training

NASA's executives, managers, and supervisors understand and value education, knowledge sharing, and improvement. As a Federal agency with a scientific and R&D mission, learning is a way of life within NASA. The Agency supports "best in class" leadership development and spends a significant amount of resources to this end. This forward thinking ensures that NASA has the appropriate leadership to pursue its long-range objectives.

NASA supports career development in a variety of important and effective ways. The Agency Training and Development Program (ATDP) helps employees gain the necessary knowledge and skills to fulfill NASA's mission through formal education, training, and on-the-job developmental experiences. The means may be university coursework, traditional classroom training, online learning, satellite broadcast, blended models, or Agency-sponsored training programs. Corporate leadership development training serves all NASA Centers, Mission Directorates, and Mission Support organizations.

NASA offers a variety of programs aimed at leadership development for both men and women. These Agency-wide programs enable managers to better align their organizations with NASA's vision, mission, and strategic goals and provide "real-time" training for NASA employees, supervisors, and managers. Examples of Agency training programs are:

- *NASA Senior Executive Service (SES) Candidate Development Program (CDP)* is a structured development program designed to prepare individuals for future service in NASA's SES. NASA's SESCDP fulfills the Office of Personnel Management (OPM) merit principles and requirements, as well as NASA's projected needs for individuals who have high potential for assuming executive responsibilities.
- *NASA Foundations of Influence, Relationships, Success, and Teamwork (FIRST)* is an Agency-wide leadership development program for GS-11 and GS-12s that provides "individual contributors" and "influence leaders" the opportunity to develop foundational leadership skills in the areas of Personal Effectiveness, Business Acumen, and Leading and Managing Others.
- *Mentoring* develops efficiency, creativity, and capabilities of NASA employees through relationships that foster collaboration, knowledge sharing, and ideas exchange.

Data from 2008 indicate that 91 NASA employees (from all pay levels) participated in formal Agency/NASA-sponsored career development programs including SESCDP, Leadership Development Program, and NASA FIRST. Of this number, 53 percent were men and 47 percent were women. In 2008, 908 NASA employees participated in Government-wide career development programs, of which 58 percent were women. Examples of Government-wide career development programs include: Carnegie Mellon Master in Software Engineering; Harvard General Management Program; Harvard Senior Managers in Government; Massachusetts Institute of Technology Advanced Study Program; Stanford University, Stanford Sloan Program; Syracuse University Certificate in Public Administration; and the Federal Executive Institute.

As part of their career development and personal growth, many NASA women participate in networking associations, including the Women in Aerospace (WIA). WIA is dedicated to expanding women's opportunities for leadership and increasing their visibility in the aerospace

community. Members discuss aerospace issues, including human spaceflight, aviation, remote sensing, satellite communications, robotic space exploration, and the policy issues surrounding these fields. Featured speakers at events include senior representatives of the President's Administration, Congress, and industry, as well as leading scientists, educators, and international aerospace experts.

Work/Life Balance

Employee Scheduling and Resources

NASA strives to foster an environment to assist employees to achieve work/life balance. NASA offers programs, designed for the entire workforce, aimed at improving work/life conditions and balance. Support programs are able to offer women (and men) flexibility in scheduling, allowing employees to be effective in the workplace and in a family environment. Services available to NASA employees vary at different locations, and policies and personnel practices differ between NASA Centers. Examples of these programs include:

- *Telework:* NASA's telework program was designed to provide employees with flexible work arrangements. This benefits an employee with family responsibilities, disabilities, and temporary or continuing health conditions. It also reduces transportation-related stress and costs.
- *Flexible work schedules:* NASA offers a number of work schedule flexibilities that allow employees to adjust their work schedules to accommodate changing family and/or personal needs. This includes flexible work schedules and compressed work schedules. NASA continues to explore and evaluate other work schedule options that could further support the Agency's mission, while assisting employees with balancing both work and personal responsibilities.
- *Part-Time Employment and Job Sharing:* Each NASA Center has a Part-Time Career Employment Program Coordinator to assist management in reviewing vacancies as they occur and proposing positions to determine the feasibility of the duties of the position being performed on a part-time basis.
- *Employee Assistance Program (EAP):* Each NASA Center is staffed to help employees with personal or work problems before these problems interfere with productivity and affect attitudes. Several EAP seminars are designed specifically for women audiences (e.g. stress management, assertiveness, eldercare, domestic violence assistance, and financial planning). One NASA Center conducts two women-only workshops each year: "*Empowered Women"* and "*Unconscious Mistakes Women Make that Sabotage Their Careers*." Of the 18 NASA EAP providers, 13 of the counselors are women.
- *On/Near-Site Federal Child Care Centers:* All NASA Centers, except Headquarters, have child care centers available for employees' use.

Health and Wellness

NASA's Office of the Chief Health and Medical Officer (OCHMO), which has roots going back to the late 1970s when NASA distinguished itself as a leader in cardiovascular risk prevention and health promotion, conducts numerous initiatives and programs to assist in improving the health of the Agency's workforce. All Centers are encouraged to implement health and wellness initiatives for their employees, especially for specific groups, such as women, where unique circumstances dictate a different approach than one used for the overall employee population. Most NASA Centers conduct gender-specific workshops and seminars based on demographics

and the level of attendance at past sessions on certain topics. The Agency also provides unique facilities and resources to meet the needs of its female employees.

- *NASA Occupational Health Clinics:* These facilities offer dedicated examination rooms and other support for women who have returned to work and want to continue breast-feeding their infants.
- *Health Examinations:* NASA's female personnel are offered physical examinations based on the recommendations of the U.S. Preventative Services Task Force and NASA policy. As part of the examination, women are offered clinical breast exams, mammograms, and education that includes performing breast self-examinations. Some Centers conduct annual mammography screening events.
- *Awareness:* NASA Centers participate in "Breast Cancer Awareness Day" and "Race for the Cure," sponsored by the American Cancer Society. NASA also supports the American Health Association's "Go Red for Women Day." At NASA Centers' Annual Health and Safety Days, breast cancer awareness and educational resources are showcased.
- *Nutrition and weight management:* NASA offers a work environment supportive of sound nutrition practices essential to employee health and productivity. Nutrition education and awareness activities, and support groups, such as those for weight loss, are offered.
- *Fitness:* Fitness Centers provide equipment and group classes including women-only fitness boot camps and post-pregnancy fitness programs. Other programs, such as after-work and lunch walking activities, aerobics, step, yoga, and Pilates classes are offered to both men and women, but are predominantly attended by women. Many NASA fitness centers feature group or league sports, such as softball and basketball. However, it has been found that organized sports leagues are better attended by women when they are co-ed in composition.
- *Resources:* NASA provided information on health and wellness through communication services, such as the Mayo Clinic "*EmbodyHealth*" Web portal for the workforce and family and the "*Healthier You"* calendar of tips for a healthier lifestyle. Most users are women.

2. *Future Efforts, Federal Workforce*

Human Capital and Equal Opportunity Strategies Impacting Federal Women

Model EEO Agency Plan Updates: Review and Analyze Existing Data

- Goal: Eliminate barriers that may adversely impact hiring, promotion, or retention of women at NASA.
- Actions: 1) Analyze existing workforce data and engage NASA Senior Leadership in a discussion of improvements that may be needed to improve opportunities for women; 2) analyze gender equity at NASA and, if required, develop Model EEO Plan actions and strategies to remove barriers.

The ODEO and OHCM continuously collect employee data on topics related to NASA's workforce, women, and minorities. These data are developed into "workforce cubes" for analysis, and information is made available across the Agency. As part of the Model EEO Agency Plan efforts, ODEO has initiated an in-depth analysis of existing data concerning women and follow-on discussions with NASA Senior Leadership to identify weaknesses or challenges and to discuss and plan improvements and mitigation strategies for future efforts.

In light of the mandate of Executive Order 13506, in the fall of 2009, NASA will utilize the Model EEO Agency Plan as a vehicle to more closely examine issues of gender in the NASA workforce and applicant pipeline. This will help the Agency determine if there is any evidence of barriers or workplace challenges negatively impacting women at NASA or adversely affecting the entry of women into NASA. If the Agency's barrier analysis determines that there are EEO barriers impacting the advancement of women, consistent with the requirements of EEOC Management Directive 715, NASA will develop strategies, planned actions, and timetables for completion to remove the barriers identified.

Supporting the Workforce Through Professional Development Opportunities

- Goal: Ensure equal access to NASA professional development and career advancement opportunities.
- Action: NASA's Human Resource Development Representatives (HRDRs) network will convene a special telecon to discuss the role and advancement of women in NASA employment.

Networks of training officers meet regularly to discuss Agency-wide and Center-specific initiatives. This interchange enables information sharing between supervisors and managers at the Headquarter and Center levels. NASA's HRDRs play a critical role in organizational and individual development and career planning. These representatives are assigned to each organization, serving as a bridge to connect employee development goals and objectives with organization needs.

Supporting the Astronomy Workforce

- Goal: Ensure that women have equal access to NASA and NASA science grantee employment and advancement opportunities.
- Action: NASA Goddard Space Flight Center (GSFC) will host a special summit on "Women in Astronomy."

From October 21-23, 2009, NASA will host the "Women in Astronomy: Meeting the Challenges of an Increasingly Diverse Scientific Workforce" summit at the University of Maryland. This conference will establish the statistics of the current scientific community and explore strategies for the success of this diverse workforce. Topics will be discussed both from the point of view of the individual and that of managers in today's scientific workforce. Some of the topics include: management best practices, work environment factors, early career needs, work/life balance, and managing expectations. The program is expected to have a serious emphasis on minorities and also on generational issues. Participants will discuss best practices for success, both from the point of view of the individual scientist and from the point of view of the managers and mentors of the new scientific workforce. A handbook of best practices will be developed from the outcomes of the meeting. The summit will be led by GSFC, with participation from all NASA Centers, the National Science Foundation, and professional astronomy associations. (http://wia2009.gsfc.nasa.gov/)

Work/Life Balance

- Goal: Improve physical and mental well-being of all employees, including women.
- Action: Offer women-specific EAP, education, and health seminars.

The NASA Center-based EAP programs are planning their curriculum for the upcoming year. Initiatives will include more women-targeted work groups and seminars. Sessions that focus on topics such as challenges of women as single parents, coping with being the new breadwinner of the family after a spouse's layoff, cancer survivor assistance, and returning to work after pregnancy are all being considered.

C. Programs Which Improve the Lives of America's Women and Girls

1. *Program Descriptions*

Education

NASA has long recognized the potential contributions of women as a largely untapped resource to support the STEM workforce. NASA's education programs build a pipeline of qualified future workers necessary for achieving the Agency's strategic goals.

Activities Designed for Women and Girls

Activities hosted by the NASA Centers address the needs of local communities and are targeted specifically to women and girls. Many are conducted in conjunction with national, state, and local partners, including the Sally Ride Science Festivals, the Society of Women Engineers (SWE), the Virginia Space Grant Consortium (VSGC), and local science centers. Several engage women and girls directly in NASA science missions and experiments, such as the Coupled Ion Neutral Dynamic Investigation (CINDI) funded by the Science Mission Directorate (SMD). See Appendix A for examples of NASA opportunities targeting women and girls.

NASA's Elementary, Secondary, and e-Education and Informal Education Programs equitably serve male and female students in the Nation's classrooms, after-school programs, clubs, museums, and science centers. Some projects in these areas are designed to attract girls, many through the Girl Scouts of the USA (GSUSA). The structure provided by GSUSA allows programs to reach a large number of girls: there are currently 2.9 million girls and 986,000 adult members of GSUSA. NASA and GSUSA have developed a Memorandum of Understanding through which the two organizations work together to achieve common goals: motivating and encouraging girls to do their best. NASA's recent presence at the GSUSA convention provided an opportunity for 17,000 leaders and girls to experience fun, hands-on NASA STEM activities and inspire them to pursue careers in STEM disciplines.

Improving Participation of Women and Girls in Education Programs

Involvement of women and girls in robotics competitions, rocket launches, and other hands-on research and engineering activities is increasing. Gender-mixed teams in NASA competitions are on the rise, and "all-girl" teams regularly compete in such activities as the Great Moonbuggy Race and the FIRST (For Inspiration and Recognition of Science and Technology) Robotics competitions. NASA fosters the inclusion of females in these projects and provides mentors and engineering guidance whenever possible.

NASA's Higher Education program conducts numerous projects to develop a future STEM workforce for aerospace and the Nation. The Minority University Research and Education Program (MUREP) specifically targets recruitment and retention of women, minorities, and disabled persons into NASA STEM education programs. Many of these efforts have notable success in attracting women. The MUREP project Curriculum Improvement Partnership Award for the Integration of Research into the Undergraduate Curriculum (CIPAIR) reported that 58 percent of participants in Fiscal Year (FY) 2007 were female. In addition, 69 percent of participants in MUREP Small Projects and 71 percent of participants in the NASA Science and Technology Institute for Minority Institutions (NSTI-MI) were women.

Although not specifically targeting female participants, other NASA Higher Education programs have been successful in targeting women. The Jenkins Pre-Doctoral Fellowship Program, the Tribal College and University Project, and the University Research Centers attracted slightly more females than males in FY 2007. Though more men than women were served by the National Space Grant College and Fellowship Program (Space Grant) (59 percent and 41 percent respectively), these numbers fare well when compared to 2004 national averages for female representation in physical sciences (42.1 percent), for mathematics and computer sciences (29.1 percent), biology and agricultural sciences (60.1 percent) and engineering (20.5 percent)[1]. In addition, Space Grant reported that 40 percent of all significant individual awards[2] were made to females.

In NASA's Elementary, Secondary, and e-Education Program, projects are also achieving successes in attracting girls to STEM study and potentially, careers. The Science, Engineering, Mathematics, and Aerospace Academy (SEMAA) operates sites in high minority, high poverty areas. In 2007, 49 percent of the SEMAA participants were female. The Interdisciplinary Science Program Incorporating Research and Education Experience (INSPIRE) is a high school to undergraduate transition program that builds awareness of STEM careers, while offering students hands-on opportunities. Participation of young women in the INSPIRE project was 51 percent in 2008.

Examples of these NASA education investments with noteworthy involvement of women and girls are provided in Appendix B.

Competitive Contracts, Grants, and Other Procurements

NASA strives for diversity and parity in competitive solicitations. The Agency seeks to increase opportunities and award contracts to woman-owned small businesses (WOSB) through an increase in overall awards to small businesses. Programs for small businesses are conducted in cooperation with the Small Business Administration (SBA) and are designed to attract firms owned by women, veterans, disabled, and other underrepresented minorities. The NASA Office of Small Business Programs (OSBP) manages national outreach efforts to improve the diversity of companies doing business with NASA. In addition, each Field Center conducts regional workshops designed to inform small businesses about NASA opportunities and how to gain assistance in competing for work.

There are impediments to increasing the number of WOSBs engaged in NASA contracts. Set-aside authorities exist for small businesses in general, HUBZone businesses, Service-Disabled

[1] From the National Science Foundation S&E Report, January 2007. Table 11. Women as a percentage of all bachelors recipients, by major field group: 1966-2004

[2] Significant award is $5,000 or more in support or more than160 hours of participation in an activity

Veteran-Owned Businesses, and 8(a) companies, but there is no set-aside authority for WOSBs. Additionally, a trend toward consolidating contracts (Agency-wide contracts instead of individual Center-specific contracts) works against small businesses. Consolidated contracts are larger in scope and thus are more difficult for small businesses to win. As a mitigating strategy, OSBP ensures that these types of contracts contain reasonable subcontracting goals. Since FY 2004, NASA has averaged over 10 percent of its subcontracting dollars being awarded to WOSBs.

OSBP and the NASA Office of Procurement have recently issued revised procurement guidance regarding evaluation of small business utilization in high-dollar full and open procurements. Such procurements are solicited with recommended subcontracting goals for WOSBs.

Fostering Small and Disadvantaged Businesses

Several programs specifically foster the inclusion of small and disadvantaged businesses, including WOSBs in NASA contracting.

- *Section 8(a) Business Development Program Awards:* NASA awards contracts under the SBA 8(a) program to eligible firms (typically small disadvantaged businesses, including WOSBs). Awards are made on either a competitive or sole source basis. In FY 2008, 8(a) awards totaled $581.5 million.
- *Small Business Set-Asides:* Small business set-asides are defined as competitive awards that are limited only to small business. The small business set-aside program continues to exert a strong influence on the capability of small business firms to participate in the space program. In FY 2008, these set-asides amounted to $898.1 million.
- *Small Business Innovation Research (SBIR):* The Small Business Innovation Development Act requires that Federal agencies whose extramural budgets for research or research and development exceed $100 million establish an SBIR Program. During FY 2008, NASA awarded 380 new SBIR contracts totaling $36.9 million. Of this amount, 278 were Phase I awards totaling $27.6 million and 102 were Phase II awards totaling $9.3 million. Also in FY 2008, NASA funded on-going Phase II contracts for a total of $47.3 million. Included in the total SBIR awards of $84.4 million, 55 contracts, or $4 million, were to small disadvantaged business firms and 90 contracts, or $6.7 million, were to woman-owned firms.
- *Small Business Technology Transfer (STTR):* The Small Business Technology Transfer Act authorizes Federal agencies whose extramural budgets are in excess of $1 billion to establish a Small Business Technology Transfer Program. During FY 2008, NASA awarded 43 new STTR contracts totaling $6.3 million. Of this amount, 28 were Phase I awards totaling $2.8 million, and 15 were Phase II awards totaling $3.5 million. One hundred and two ongoing Phase II STTR contracts were also funded for a total of $8.6 million. Included in the total STTR awards of $15.3 million are 11 contracts for $1.6 million to small disadvantaged business firms and 39 contracts amounting to $3.5 million to woman-owned firms.

Woman-Owned Small Businesses

In accordance with Executive Order 12138, Women's Business Enterprise, NASA extends a particular effort to ensure that business firms owned and controlled by women have an equitable opportunity to participate in NASA's procurement program. In FY 2008, WOSB firms received prime contract awards totaling $368.5 million, an increase of $76.4 million from FY 2007. In addition to direct awards, NASA large prime contractors subcontracted another $650 million to

WOSB companies in FY 2008

A WOSB Advocate is located at NASA Headquarters, and each Field Centers employs a Small Business Specialist. The advocate/specialist is dedicated to providing information, guidance, and support to woman-owned businesses seeking to do business with the Agency. Advocates conduct one-on-one counseling with leaders of WOSBs, providing them with the tools to effectively market NASA. On a regular basis, the specialists promote NASA opportunities for women at speaking engagements and conferences.

In Texas, the JSC Small Business Specialist serves as a member of the statewide Women's Business Enterprise Alliance (WBEA) Certification Team. The specialist attends weekly certification meetings for the purpose of reviewing the applications and recertifications of woman-owned businesses.

In 2008, the OSBP conducted a workshop that focused on WOSB programs. The event recognized the achievements of WOSBs in supporting NASA and provided a forum for women business owners to identify best practices, share concerns, network, and discuss future opportunities. A second event is scheduled for November 2009.

NASA Mentor-Protégé Program

The NASA Mentor-Protégé Program is designed to encourage NASA prime contractors to assist eligible protégés in enhancing their capabilities to perform NASA contracts and subcontracts, foster the establishment of long-term business relationships between these entities and NASA prime contractors, and increase the overall number of these entities that receive NASA contract and subcontract awards. A diverse pool of subcontractors is necessary for quality support of NASA activities. Business experience as a subcontractor will also enable many smaller firms to ultimately compete independently for work as prime contractors. Since being reactivated in 2007, the program has resulted in four partnering agreements between NASA prime contractors and their small business protégés. Of these protégés, two are WOSBs.

Small Business Outreach

OSBP and Small Business Specialists at NASA Centers attend numerous outreach events hosted by NASA, other government agencies, and nonprofit industry groups. At these events, NASA attempts to increase awareness of opportunities at the subcontracting level. Recent examples include:

- Office of Small and Disadvantaged Businesses Utilization (OSDBU) Procurement Conference, which reached 3,200 participants (April 2009).
- Jet Propulsion Laboratory High-Tech Conference, which reached 282 small businesses, 153 of which were WOSBs (March 2009).
- NASA Small Business Symposium, which reached 120 small businesses, 38 of which were WOSBs (November 2008).

Equal Opportunity Among NASA Grant Recipients: NASA's Title IX Compliance Program

NASA ODEO works to realize the goals of equal opportunity requirements at universities, institutions, and programs receiving NASA financial assistance. ODEO has the Agency responsibility for conducting Title IX compliance and enforcement activities to ensure that programs funded by the Agency afford equal opportunities to their beneficiaries, regardless of

gender, and are free of gender discrimination and/or harassment. NASA currently provides approximately $1 billion in financial assistance to some 400 recipient institutions, many of them university and college STEM programs.

In recent years, the issue of gender has become the focal point of a great deal of attention in the STEM fields, where the numbers of women remain low (particularly in such fields as physics, aerospace and electrical engineering, and computer science). In July 2004, the Government Accountability Office (GAO) issued a report, *Gender Issues: Women's Participation in Sciences has Increased, but Agencies Need to Do More to Ensure Compliance with Title IX*. The report recommended that the Administrator of NASA "take actions to ensure that compliance reviews of grantees are conducted as required by the Title IX regulations." In support, Congress mandated in the NASA Authorization Act of 2005 that NASA conduct at least two Title IX reviews of its grant recipients annually.

Compliance Reviews

NASA has developed and implemented a rigorous Title IX compliance program[3] by conducting Title IX compliance reviews at universities whose STEM programs receive NASA funding. NASA's Title IX compliance reviews are designed to determine whether the recipient's policies, procedures, and practices are consistent with the requirements of Title IX, the NASA Title IX regulations, and relevant U.S. Department of Justice (DOJ) and U.S. Department of Education (ED) guidelines. Also, in an effort to fully promote voluntary compliance and to acknowledge innovative efforts on the part of educational institutions, ODEO's compliance review reports provide technical assistance to strengthen existing compliance, as well as to identify promising practices. NASA has received no Title IX complaints to date, and no compliance reviews were conducted in response to a complaint of discrimination. NASA selects recipients for compliance reviews based on neutral selection criteria specified in its regulations.

These compliance reviews include in-depth examinations of a host of areas where gender may be impacted, including admissions, outreach, recruitment, high-stakes testing, classroom and laboratory environment, and physical safety of the program environment. Over the past three years, ODEO has conducted seven such compliance reviews, completing six, and issuing detailed compliance review reports, including specific recommendations for strengthening Title IX compliance efforts and identifying promising practices at each of these educational institutions.

Findings

ODEO has identified many promising practices undertaken by university STEM programs to improve the participation of women. Successes may be modeled or developed into best practices. Examples include:

- Ensuring that outreach efforts to K-12 include STEM faculty, graduate, and undergraduate students of both genders interact with younger students.
- Creating an image of the department as welcoming and inclusive, regardless of gender, by showing the program's gender diversity in the visual images shown in communications materials and publications (e.g. program Web sites).

[3] NASA Policy Directive 2081.1*, Subject: Nondiscrimination in Federally Assisted and Federally Conducted Programs of NASA - Delegation of Authority.*

- Considering curriculum adjustments to early undergraduate STEM courses that emphasize the "real-world" and societal applications of professional work in STEM fields.
- Supporting students through family-friendly policies and practices, such as flexible parental leave policies and access to childcare opportunities.
- Providing clear definitions of discrimination and harassment prohibited by university policy, as well as where and how to report concerns. Information can be communicated clearly and easily accessed through the Web site of the university's Title IX coordinator.

Although NASA compliance reviews have indicated general alignment of university practices with Title IX regulations, many areas can be improved. ODEO has provided recommendations and guidance to the university programs, including:

- Updating and improving grievance procedures.
- Providing EEO and diversity training for faculty and students, particularly students with teaching responsibilities.
- Targeting recruitment to increase the number of female applicants.
- Improving self-evaluation on key issues (e.g. identify reasons why women are not applying for or are declining graduate offers).
- Institutionalizing support networks such as Women in Science and Engineering,
- Increasing the number of female faculty in STEM (e.g. through National Science Foundation (NSF) ADVANCE grants).
- Improving safety on campus (e.g. better lighting in parking lots, email alerts).
- Reconsidering the weight given to admissions criteria, particularly the General Record Examination.

The DOJ Coordination and Review Section has authority for coordinating Title IX compliance and enforcement efforts across the government. It has provided NASA very positive feedback for the substantive and detailed nature of its compliance reports for the NASA's Title IX review program. The program has also received praise from stakeholders, including the remarks of the Title IX lead for the Society of Women Engineers published in the Conference Proceedings of the American Society of Engineering Education[4]. The heads of the Massachusetts Institute of Technology Physics Department[5] and the University of Maryland College of Engineering[6] have also expressed support.

In 2008, NASA ODEO conducted briefings at the request of members of Congress and the White House Office of Science and Technology Policy. ODEO also participated as a sponsoring agency in the first Federal interagency Title IX symposium, *Gender Equity in Science, Technology, Engineering, and Mathematics (STEM)*, a one-day event in Washington, DC in July 2008. The sponsoring agencies included the member agencies of the Interagency Title IX Working Group (DOJ, Department of Energy, NSF, and NASA). The symposium was designed to provide Federal employees with Title IX enforcement responsibilities an opportunity to share with and learn from leaders in the field of postsecondary education Title IX compliance, including Federal officials, academic experts, universities, and nonprofits. The symposium included interactive sessions addressing issues relevant to gender in STEM. To this end, participants heard

[4] Available at www.asee.org
[5] Edmund Bertschinger, "Opinion: Physics Appreciates 'Thoughtful' Title IX Review," *The Tech*, Oct. 7, 2008.
[6] Darryll J. Pines, Ph.D., "Strategies for Women in Science and Engineering in the Context of Title IX," Remarks at the Congressional briefing on "The Dearth of Women in Academic Science and Engineering: Proactive Strategies for Improvement," jointly sponsored by the Society of Women Engineers and the U.S. House of Representatives Diversity and Innovation Caucus, Feb. 24, 2009.

presentations on and engaged in interactive learning sessions on such topics as the climate for women in physics programs, strategies for evaluating recipient grievance procedures, and specific steps academic institutions have taken to address gender bias and barriers. Participants received remarks from NASA's Assistant Administrator for Diversity and Equal Opportunity and NASA's Johnson Space Center's Deputy Center Director, Dr. Ellen Ochoa, who served as the keynote speaker for the event.

NASA-Developed Technologies Improve Lives Through Spinoffs

To understand our home planet and to enable future exploration of space, NASA is constantly developing new technologies and making scientific advances. Research in the areas of remote sensing, safeguarding health, food safety and nutrition, improving efficiency of processes or materials, and other topics are necessary for NASA to complete its missions. However, these advances often have commercial, or "spinoff" potential, many of which impact the health, safety, and lifestyle of women and families. Spinoff technologies and applications are typically developed through SBIR or STTR awards or through licensing agreements with NASA.

Several companies have developed NASA technologies into techniques and tools that are improving detection of and treatment for breast cancer.

- Scientific Imaging Technologies, Inc. was contracted by NASA to develop an advanced charge coupled device (CCD) suitable for the Hubble Space Telescope. Many of the NASA-driven enhancements to the manufacture of CCDs now support digital mammography. These improved devices image breast tissue more clearly and efficiently. The LORAD Stereo Guide Breast Biopsy system incorporates this CCD as part of a digital camera system that is replacing surgical biopsy in many cases. Known as stereotactic needle biopsy, it is performed under local anesthesia with a needle and saves women time, pain, scarring, radiation exposure, and money.
- Boulder Imaging, Inc. used NASA-based imaging systems to develop an image capture and processing software product, AcquireNow. AcquireNow allows users to obtain and manipulate images from any camera, using any frame grabber board, without having to write any hardware-specific software. In 2002, Advanced Imaging Technologies, Inc. licensed AcquireNow and embedded it in its AveraT Breast Imaging System, which permits rapid assessment of breast tissue in real time, without the discomfort of compression or the risk of harmful radiation.
- The BioScan System was developed by OmniCorder Technologies, Inc. at JPL. The system is able to locate cancerous lesions by detecting the cancer's ability to recruit a new blood supply. A digital sensor detects infrared energy emitted from the body and identifies the minute differences accompanying the blood flow changes associated with cancerous cells. It also has potential use as a monitoring device during cancer treatment.
- The same solar cells used to convert sunlight into electricity on space satellites can make a single exposure of an x-ray sufficient for physicians to detect breast cancer or other anomalies. Usually, physicians make more than one exposure to arrive at an x-ray film of acceptable density. Huntington Memorial Hospital in California discovered that when a solar cell sensor is positioned directly beneath x-ray film, it can determine exactly when the film has received sufficient radiation and has been exposed to optimum density. At that point, associated electronic equipment sends a signal to cut off x-ray source. Reduction of mammography to single exposures has reduced the x-ray hazard significantly and doubled the number of patient examinations handled by one machine.

Several other spinoffs have been used in other health care applications.

- Based on red light-emitting diode (LED) technology that supports plant growth in space, Warfighter Accelerated Recovery by Photobiomodulation (WARP 10) is a high-intensity, hand-held, portable LED unit intended for the temporary relief of minor muscle and joint pain, arthritis, stiffness, and muscle spasms. It also promotes relaxation of muscle tissue and increases local blood circulation. It was designed to aid armed forces personnel on the front lines with immediate first aid care for minor injuries and pain, thereby improving endurance in combat. The U.S. Department of Defense and the U.S. Navy are currently issuing WARP 10 to crews on submarines and Special Forces operations. The developer, Quantum Devices, Inc., has introduced a Food and Drug Administration-(FDA) approved consumer version as an alternative to non-steroidal anti-inflammatory drugs for relief of persistent pain.
- Quantum Devices was also granted a NASA SBIR contract to develop an LED light source for use in a surgical environment. The High Emissivity Aluminiferous Light-emitting Substrate system has been successfully applied in cases of pediatric brain tumors and the prevention of oral mucositis in pediatric bone marrow transplant patients.
- Techshot and a spinoff company, IKOTech, are marketing the Magsort, a Quadruple Magnetic Sorter, which collects specific biological cells from a liquid suspension by running it through a magnet assembly. Its applications include the detection of rare cancer cells in circulating blood and the removal of undesired cells from bone marrow transplants.
- Westminster Supra Scanner, Inc. commercialized a product that uses ultrasound technology (originally developed as a means of detecting microscopic flaws in spacebound materials) for immediate assessment of burn depth. Effective treatment of serious burns is dependent on early recognition of the extent of dead tissue and its removal to minimize the risk of infection and hasten healing. The tool was approved by the FDA in 1990. The technology may also be of use in the diagnosis of lymphatic disorders.
- An experiment from the Controlled Ecological Life Support Systems program resulted in a method for manufacturing an algae-based food supplement that provides the nutrients previously only available in breast milk. Martek Biosciences Corporation now manufactures this supplement that can be found in over 90 percent of the infant formulas sold in the United States and more than 65 other countries. The company estimates that over 24 million babies worldwide have consumed its nutritional additives.
- Sentry Products, Inc. commercialized a personal security system based on NASA space telemetry. The principal unit is an ultrasonic pen-sized transmitter that can be used by prison guards, teachers, and others such as the handicapped and elderly. When a problem arises, (threat of violence, medical crisis), the unit transmits a silent signal to a nearby receiver. The receiver may be one of many wired to a central console that will alert others and display the exact location of the emergency.
- NASA's need to eliminate disease-producing bacteria and toxins in space-bound food led the Pillsbury Company to develop the Hazard Analysis and Critical Control Point (HACCP) concept. Pillsbury determined that it was necessary to establish control over the entire process, the raw materials, the processing environment, and the people involved in food preparation and packaging. The HACCP is designed to prevent food safety problems (proactive) rather than to sample and detect them after they have occurred (reactive). HACCP has since become a worldwide standard in processing food, pharmaceuticals, cosmetics, and other commercial products.

These are only a few examples of the thousands of NASA-based spinoffs that improve the life of people everywhere. Additional information about NASA technologies and commercial applications are described in the NASA Spinoff database at http://www.sti.nasa.gov/spinoff/.

2. *Future Programs, America's Women and Girls*

Education Strategies Impacting Women and Girls

- Goal: Attract and retain women and girls in STEM education disciplines and careers.
- Actions: 1) Provide hands-on opportunities for girls to participate in engineering and technology activities; 2) provide female engineer role models and STEM career awareness; 3) support activities that improve instruction of and learning by girls in STEM education disciplines.

NASA is uniquely positioned to contribute to the Nation's STEM education programs and to further the progress and advancement of women and girls in STEM education disciplines and careers. NASA may be the most publicly recognizable Federal agency and has enormous public access through print, television, and Web-based media. This means that NASA has the capability to inspire students, women, and girls in a way that other education-supporting agencies cannot. NASA has a particular role to play in inspiring female achievement in the areas of engineering and technology.

Strategic partnerships have traditionally had, and continue to have, a crucial role in NASA's educational strategies. NASA OE will engage female audiences in new ways, through current and new types of partnerships (e.g. a Joint Sponsored Research Program between Federal agencies, industry and academia). Modern technologies allow for audience-specific distribution and delivery of, and engagement in NASA missions. NASA will expand its use of current tools (e.g. blogs, YouTube, Second Life, and other telepresence technologies) to more effectively disseminate NASA content that inspire women and girls.

OE has initiated several new activities that help build a pipeline of future STEM women employees for NASA and the Nation.

- *Leverage the excitement of a woman Educator Astronaut:* In May 2010, NASA will launch the Space Shuttle flight STS-131, one of the last construction missions to the ISS. Dottie Metcalf-Lindenberger, a NASA Educator Astronaut will fly on the Shuttle as a mission specialist operating the ISS and Shuttle robotic arms. A former high school Earth sciences and astronomy teacher, the mission offers a national opportunity to highlight the work of an accomplished woman scientist and educator. The educational themes of the mission include encouraging girls to pursue careers in STEM, pre-service and in-service teacher training, and lessons on robotics.
- *Girls and robotics:* NASA has a long tradition of strongly encouraging and supporting robotics activities, like FIRST and Botball robotics teams. Center-based education offices are being encouraged to support all-girls and girl-led teams. In June 2009, girls from a Virginia-based FIRST Robotics team joined the Assistant Administrator for Education at a White House event celebrating Title IX.
- *Work with career counselors:* NASA is working with national networks of high school career counselors to better inform students and parents of STEM career opportunities. Efforts include tools to assist counselors in guiding girls, sharing resources for women, and using research to identify best practices to attract and retain girls in STEM fields.

OE is also considering additional activities that would improve conditions for women and girls across the Nation. Several ideas are under discussion, including:

- *Innovation grants with theses that support women and girls:* In FY 2010, NASA has requested funding for an "Innovation in STEM Education" grant program. A grant theme could be incorporated that encourages proposals that pilot or replicate activities with a demonstrated record of success in encouraging girls to pursue studies in STEM or for supporting undergraduate/graduate/postdoctoral studies in STEM.
- *Forum for NASA woman Principal Investigators (PIs) from our grant community:* In advance of each shuttle launch, NASA conducts a pre-launch education forum, typically a two-day discussion with leaders from academia, industry, and non-profit partners. NASA Centers also support forums focused on specific scientific, technical, or educational topics. Forums could be convened that invite women PIs (grantees) to discuss further supporting and increasing interest in STEM careers among women researchers.
- *Forum for NASA women in engineering:* A pre-launch conference will be convened of women Deans of Education, Engineering, and Science from universities across the Nation to discuss ideas for further increasing interest in STEM careers among women students and early-career professionals.
- *Speaker series for Museum Alliance partners:* NASA supports the Museum Alliance, a network of 350 museums and science centers across the Nation. These institutions conduct activities, exhibits, workshops, and public programs based on NASA content throughout the year. Most institutions offer lecture series or other special events for their members and the community. NASA could work across all ten Centers to encourage women scientists and engineers to visit museum alliance partners to talk about careers in STEM and to encourage interest in pursuing STEM careers.
- *Replicate a Title IX Celebration:* The White House Council on Women and Girls and the U.S. Department of Education recently conducted Title IX 37th anniversary celebration and awareness event. The event included a panel discussion on women and girls in STEM education and athletics, positive impact of Title IX, and necessary next steps. NASA Field Centers, in coordination with ODEO and OE, could replicate this type of event in their region to highlight successful female scientists, engineers, and educators to build awareness of the rights of women and girls under Title IX, and to promote female achievement in STEM fields and careers.
- *Women@NASA tour to NASA Explorer Schools and university partners:* NASA could work across all ten Centers to encourage women scientists and engineers to visit NASA Explorer Schools and other university partners to talk about their careers in STEM and to encourage pursuit of STEM careers. NASA could develop a special series of Digital Learning Network (DLN) events highlighting Women@NASA. The DLN allows Centers to connect NASA experts to schools to support workshops and educator professional development.
- *Podcasts series on NASA women:* NASA produces a series of podcasts highlighting NASA interns, scientists, engineers, and technical professionals. This year, NASA might develop a series of podcasts focused on women professionals throughout the NASA Centers. Additional tools could be added to the educator "do-it-yourself" podcasts resource, which allows students to use NASA imagery and information to develop their own podcasts. NASA could encourage students to create podcasts in which they talk about their future career interests. NASA could then create a special section on the education pages of the NASA Web site that features career interests of girls.
- *Develop/refresh Education resources:* In FY 2010, new or updated posters, materials, case studies, and information could be developed that focus on women and the diversity of careers at NASA.

Contracting Strategies Impacting Women and Girls

- Goal: Increase the competitiveness of woman-owned businesses.
- Actions: 1) Host WOSB workshop for networking, sharing strategies, recognizing WOSB achievements; 2) use established continuous improvement processes to identify and enact initiatives for target audiences; 3) encourage large primary contractors to subcontract to WOSBs.

NASA is planning the second annual NASA Small Business Symposium to be held this fall. The first-ever "NASA Day," sponsored by the U.S. Women's Chamber of Commerce, will follow immediately after the conference. Representatives from all NASA Centers and OSBP leadership will participate. While a specific agenda is still being developed, the goal of NASA Day is to increase awareness of NASA procurement opportunities for WOSBs, to provide information regarding how to pursue those opportunities, and to provide a networking environment. The event will be held on November 18, 2009, in Bethesda, Maryland.

Each year, OSBP collaborates with small business, procurement, and technical representatives from NASA Headquarters and Field Centers to develop the Small Business Improvement Plan. The objective is to identify three initiatives on which to focus for the upcoming year. These initiatives include actions to improve NASA's performance on its small business goals. At this time, improving opportunities for WOSBs is a proposed initiative for discussion.

The OSBP and the Office of Procurement recently updated procurement guidance for the Agency with respect to evaluation of small business subcontracting plans. Such guidance is discussed at quarterly Small Business Council meetings by all NASA Small Business personnel and is presented at a new training course sponsored by OSBP. This course is entitled "Small Business Training for the Acquisition Professional" and is being offered to all NASA Centers.

Title IX Compliance Strategies Impacting NASA Grantees

- Goal: Ensure recipients of Federal funding are offering equal access and opportunity to women and girls.
- Actions: 1) Conduct audits/compliance reviews annually of NASA educational institutions receiving NASA funding; 2) recommend EO improvement strategies to institutions; 3) continue to publish best practices and other guidance for widespread distribution.

In July 2009, published, *Title IX and STEM: Promising Practices for Science, Technology, Engineering, and Mathematics*, a compilation of all of the positive efforts NASA has seen regarding gender and STEM at the universities reviewed through the compliance policy (described above). ODEO has already provided the NASA Title IX regulations to approximately 250 NASA educational grant recipients and distributed brochures and posters regarding the law to major STEM education programs.

D. Overarching Recommendations

Supporting Women in STEM Education and Careers

NASA believes the limited number of women in STEM education programs and employment fields should be included (and emphasized) in the work of the White House Council on Women

and Girls. The need for more women in STEM is nothing less than a national imperative and should be recognized as such. In today's world, our Nation's prosperity and national security depend on our ability to lead the world in innovation. Yet, women are significantly underrepresented in the STEM workforce, especially in leadership positions in research and academia.

In its Title IX compliance reviews, NASA found it common for female students to still comprise less than 20 percent of a graduate program in physics or aerospace engineering. Even more disheartening, the ODEO compliance review team found one physics program with no female faculty and frequently talked with students who had not had any graduate classes taught by female professors. Many students and faculty members lamented the absence of female role models. This is particularly discouraging for female students considering a career in STEM academia, but is also a negative for male students who are not exposed to successful female scientists and engineers.

President Obama notes this problem in his Agenda, as outlined on http://whitehouse.gov, which includes the following paragraph:

> *Promoting Women in Math and Science: Women constitute 45 percent of the workforce in the U.S., but hold just 12 percent of science and engineering jobs in business and industry. Women also make up just 9 percent of the recipients of engineering-related bachelor's degrees. President Obama and Vice President Biden believe that every student should have equal access to education in math, science, and technology in order to compete on a global scale.*

Recruitment and Retention of Women in STEM Education

The Council should look at factors that specifically impact the employment and retention of women in Federal agencies and the STEM workforce, in particular.

According to a 2000 national survey, women scientists reported significantly fewer interactions with faculty, access to fewer resources, and heavier teaching loads than their male colleagues[7]. The same report indicated that many minority faculty consider the academic racial climate at their universities to be poor. In addition, women on tenure track indicated that childbearing is an impediment to achieving tenure and sustaining an academic career. Studies indicate a lack of women faculty in STEM disciplines and fewer women role models in faculty leadership roles. Women in these positions are generally less well compensated than their male counterparts. The Council should consider studying whether progress has been made in these other related issues since 2000, as these factors can ultimately contribute to a woman's career decision.

Opportunities for training, advanced education, project management, and promotions are other key issues to career satisfaction and retention.

[7] *Land of Plenty, Diversity as America's Competitive Edge in Science, Engineering and Technology*, Report of the Congressional Commission on the Advancement of Women and Minorities in Science, Engineering and Technology Development, September 2000.

Improving STEM Education and Career Awareness for Girls

An important topic for the Council to consider is how STEM education achievement and career information is provided to girls and women. Information should reflect current and anticipated supply and demand data for careers in STEM fields, including salary and education requirements.

Girls need appropriate role models and networking and support systems, especially as they pursue non-traditional and emerging career paths. The achievements of these women must make them feel they can achieve their personal and professional goals. Women who have overcome enormous obstacles, achieved world-class goals, or been the first female to accomplish a task are obvious examples of success. However, in addition to these "superheroes," girls need exposure and appreciation of women in everyday situations. These role models should be women that girls can emulate, on whom they can base career expectations, and those to whom they can relate on a practical level--women who run a department, lead a business unit, manage a facility, gain advanced degrees, or work full time while raising a family.

It is important to research what professional development is available for educators to eliminate subtle and not-so subtle discrimination, gender bias, and adverse messages that are communicated in the K-12 and college classroom. The academic environment must be one that fosters an attitude that girls will achieve in STEM, gain employment in STEM, and be treated as an equal in the workforce. Vigorous Title IX compliance efforts, including onsite compliance reviews, provide an excellent tool to assist education programs receiving Federal funding to examine their efforts in this regard. In addition, professional marketers may assist educators and advocates in understanding cultural differences stemming from gender and then developing effective communications and eliminating well-meaning but counterproductive messages.

The Council may also consider analyzing engagement of girls and women in STEM fields, not only as a part of the general population, but also by demographic. The involvement of women and girls will differ by ethnic, racial, rural/urban, and socio-economic status. Analysis of data and insights from subject matter experts for each population may result in improvements in reaching and attracting these female participants.

APPENDIX A: NASA EDUCATION ACTIVITIES DESIGNED FOR WOMEN AND GIRLS

Abbreviations for project management sites

Headquarters (HQ) and the ten NASA Centers and Mission Directorates –
Ames Research Center (ARC) in California
Dryden Flight Research Center (DFRC) in California
Glenn Flight Center (GRC) in Ohio
Goddard Space Research Center (GSFC) in Maryland
Jet Propulsion Lab (JPL) in California
Johnson Space Center (JSC) in Texas
Kennedy Space Center (KSC) in Florida
Langley Research Center (LaRC) in Virginia
Marshall Space Flight Center (MSFC) in Alabama
Stennis Space Center (SSC) in Mississippi
Aeronautics Research Mission Directorate (ARMD)
Exploration Systems Mission Directorate (ESMD)
Science Mission Directorate (SMD)
Space Operations Mission Directorate

Engineering Early Advantage Program for Women	VSGC	This is a "head start" summer program for entering female freshmen engineering students at Old Dominion University (ODU). Students' experience includes hands-on projects, industry tours, faculty lectures, and socialization activities with other female students and faculty. The bonding experience among the students and follow-on activities, such as access to tutoring during the academic year, have led to increased retention rates. Over 60 students have participated.
Girl Scouts of America (GSUSA) Support (multiple)	ALL	All NASA Field Centers collaborate with national, state, regional, and local girl scout organizations to provide activities for girls. Activities include support for acquiring badges, camp outs/camp ins, and other hands on activities. Professional development for leaders has included NASA content in engineering, astronomy, space operations, earth science, rocketry, and other STEM disciplines. Most hands-on activities for girls and leaders are derived directly from NASA missions.
Girls, Inc.	MSFC	On March 5, 2009, 30 girls participated in a NASA hands-on education workshop at Girls, Inc. of Huntsville, AL.
Girls' Night Out Experiences: NASA STEM Activities	KSC	The KSC Educator Resource Center (ERC)/Exploration Station Specialist conducted multiple hand-on activities during Girls' Night Out for 25 third and fourth graders at Ocean Breeze Elementary school. "Girls' Night Out" is a night dedicated to encouraging females to be interested in STEM subjects. Activities included building and launching stomp rockets, as well as learning about the Constellation Program.
HESTEC Latinas Day	JSC	Latinas Day is an event dedicated to celebrating and promoting women in STEM fields. Hundreds of mother/daughter teams from throughout South Texas are brought together to hear the inspiring stories of prominent women of all colors and to learn about succeeding in careers and job tracks once exclusive to men. NASA provides speakers and activities to support Latinas Day during the HESTEC program.

Introducing Girls to Engineering	KSC	The KSC ERC/Exploration Station Specialist conducted student hands-on activities for 3rd – 6th grade girls at the Brevard Space Coast SWE workshop. Working in conjunction with the SWE, the theme of the activities was "Girls can become engineers too!" The workshop provided girls with opportunities to do fun hands-on activities related to several different engineering career fields. Eighty girls attended the workshop.
NASA Administrator's Fellowship Program (NAFP) Women's Consortium	HQ	The NAFP Women's Consortium is a component of the NAFP, which is jointly managed by NASA and the UNCFSP. It seeks to increase the representation and advancement of women in STEM fields to have a diverse workforce that includes minority groups and individuals with disabilities. The consortium's approaches and activities include conducting outreach, teaching, networking, mentoring, developing/maintaining strategic partnerships, promoting diversity, serving as role models, providing proposal writing support, and providing curriculum development support.
NASA GRC/ Hathaway Brown Collaboration	GRC	Hathaway Brown is Ohio's oldest independent K-12 day school for girls. Students can enroll in the Science and Engineering Research Program (SERP). The SERP pairs students with researchers in the Cleveland area to conduct research, including scientists at GRC. Over the past 10 years, 20 students have been part of the team.
Sally Ride Science Festival for Girls (multiple)	MSFC SMD	--The festival is held annually at the University of Alabama, Huntsville. NASA provides an education booth and hands-on workshops. Hundreds of girls age 7 to 11 participate in the festival. --Gravity Recovery and Interior Laboratory (GRAIL) and Lunar Orbital Photography for Students (LunarOPS) workshops will be given at 8-12 Sally Ride Science Festivals at select locations nationwide. These workshops will introduce lunar science through hands-on activities and ignite interest in lunar exploration, i.e. the upcoming GRAIL mission.
Summer Institute in Science, Technology, Engineering and Research (SISTER)	GSFC	SISTER is a STEM career exploration project for female middle school students. The project increases awareness of and provides an opportunity for girls to be exposed to and explore nontraditional career fields with NASA GSFC women engineers, mathematicians, scientists, technicians, and researchers. The project teaches participants about education programs and internships available during high school, undergraduate and graduate study, and it provides observations and experiences with real hands-on projects research and developed by women at GSFC.
Spelman College Women in Science and Engineering (WISE) Scholars	MSFC	Spelman College sponsors the WISE Scholars project through a grant from NASA. The program provides scientifically talented students from underrepresented groups the opportunity to pursue undergraduate studies in the science and engineering fields. These students also experience summer research training with professional staff at NASA Centers. The program's goal is to increase the number of minorities with Ph.D.s in science and engineering careers. MSFC will host eight scholars during the summer of 2009.
Tech Trek Day at DFRC	DFRC	DFRC annually hosts 25 seventh-grade girls from several area middle schools to get up close and personal with some unique aircraft and high technology in a "Tech Trek" tour, sponsored by the California branch of the American Association of University Women (AAUW). The program develops interest and excitement about math and science and self-confidence among middle-school girls. The girls and their adult

		chaperones experience a variety of activities during their trip, including tours of DFRC's main aircraft hangar and several specialized research and support aircraft. The students interact with several DFRC women engineers and co-operative education college interns.
Women of NASA Web site	ARC	The Women of NASA resource was developed to encourage more young women to pursue careers in STEM. Throughout history, women have made valuable contributions to these fields. Although these disciplines are still dominated by men, and these women are seen as exceptions, there is a growing appreciation of cultural and gender diversity in the workplace. The Women of NASA interactive project showcases outstanding women who are enjoying successful careers and demonstrates how these women balance personal and professional responsibilities.
Your NASA Dream Experience	JSC, KSC	This three-day science and engineering job shadowing opportunity pairs an educator and two students selected via a contest run in conjunction with Seventeen Magazine. The students experienced unique facility tours, career exploration interviews and shadowing with female engineers, scientists, flight controllers, and astronauts; and posted their daily experience on the NASA Blogs Web site.

APPENDIX B: NASA EDUCATION PROJECTS AND ACTIVITIES WITH SUCCESS IN ATTRACTING WOMEN AND GIRLS

Note: See Appendix A for NASA Center and Mission Directorate abbreviations.

21st Century Explorer Project (21C)	ESMD/ JSC	NASA's 21C project includes a set of materials that inspire and educate young people in their primary school years (grades 3-5). Additionally, 21C serves as a valuable mechanism to prepare girls for expanding their science knowledge as they progress into middle and high school. 21C is a set of inquiry based, hands-on educational experiences provided in both English and Spanish that addresses an array of space exploration topics. To determine if the 21st Century Explorer educational content is in fact helpful in inspiring and educating our young girls about STEM, the project will be tested with a limited number of Girl Scout troops and girls attending STEM programs. GSUSA staff, adult volunteers and leaders, and older girls will receive comprehensive 21C training to enhance learning and ease implementation for their STEM program "pathways" and troop activities.
Aeronautics Scholarship Program	ARMD	The Aeronautics Scholarship Program focuses on aeronautical research and related degree programs at both the undergraduate and graduate levels. The program's purpose is twofold: to provide opportunities to attract highly motivated undergraduate and graduate students to aeronautics and related fields and to help advance the Nation's aeronautics enterprise by investing in the educational development of the future aeronautics work force. It is expected that 20 two-year undergraduate and five three-year graduate scholarships will be awarded annually. All scholarships include an internship at a NASA Center.
Boosting Engineering, Science, & Technology (BEST) Robotics	JSC	BEST is a non-profit volunteer organization whose mission is to inspire students in grades 6-8 to pursue careers in engineering, science, and technology through participation in a sports-like, science- and engineering-based robotics competition. It allows students to experience "design-to-market" product development and prepares students to be technically proficient in tomorrow's workforce. Teams of young women are encouraged. Teams design, build, and test a small radio controlled robot within a six-week time frame. Girl Scouts are involved in this competition as well as all-girl teams from public schools.
CINDI: Informal Education Support	SMD	The purpose of informal education support is to leverage NASA's Coupled Ion Neutral Dynamic Investigation (CINDI) activities to reach a broader audience of students, teachers, and the general public. CINDI informal education support includes incorporating CINDI activities in school science nights, the University of Texas, Dallas Women in Physics Camp for middle school girls, celebrations for the International Year of Astronomy, and opportunities for interactive informal displays based on CINDI materials at facilities such as the Museum of Nature and Science in Dallas. The project involves members of the CINDI science and/or education and public outreach (E/PO) team working directly with informal education events or facilities drawing upon CINDI E/PO activities and resources.
Curriculum Improvement Partnership Award for the Integration of	JPL	CIPAIR is a nationwide competitive grant project that offers awards for curriculum improvement at two-year and four-year MSIs). These grants strengthen curriculum and infrastructure and provide student research opportunities so that the graduates of the institutions will be competitive when applying for admission to graduate school or for employment at NASA

Research into the Undergraduate Curriculum (CIPAIR)		Centers or within the aerospace industry.
Engineering and Robotics Learned Young (EARLY)	JSC	EARLY exposes 7-12 year olds to robotics through an EARLY Neighborhood Competition. Students design and construct robots from LEGO kits. Young girls are encouraged to participate to allow them to become familiar with skills needed by engineers at an early age. They learn teamwork, how to research and solve real-world problems, and gain an appreciation for the challenges a career in engineering offers.
Family Science Night	GSFC	Family Science Night is held once per month and is designed for middle school students and their families. Family members of all ages are welcome to come participate, including special activities for the much younger visitors. Participants learn about the wide variety of science and engineering being performed at GSFC. Families work with NASA volunteers to explore various themes through two hours of hands-on activities and take home a bag full of materials so they can perform experiments at home.
FIRST LEGO League (FLL)	JSC	FLL is the result of an alliance between FIRST and the LEGO Group. Guided by adult mentors and their own imaginations, FLL teams solve real-world engineering challenges, develop important life skills, and learn to make positive contributions to society. This international robotics program ignites an enthusiasm for discovery, science, and technology in students age 9-14. Girl teams are encouraged and Girl Scouts from around the world participate.
FIRST Robotics	JSC	FIRST inspires young people, young ladies in particular, to pursue a career in STEM. It builds self-confidence, knowledge of engineering skills, and life skills. Teams from around the world have a six-week time frame to design and build a robot to solve a common problem and then compete in local, regional, and national contests. Women who are part of this competition have the opportunity to work alongside female and male engineers. Many of these young women go on to pursue careers in engineering.
Great Moonbuggy Race	MSFC	The NASA Great Moonbuggy Race is an annual competition that challenges high school and college students to design, construct, and race a vehicle modeled after the original Lunar Rover Vehicle. The race, held annually in April, gives students from around the world an opportunity to apply engineering skills and develop their teambuilding skills in an activity that will enhance their awareness about human exploration and the development of space. The two-person student crew, one male and one female, assemble their collapsible vehicles, receive a safety inspection, and then power their vehicles along a simulated lunar terrain obstacle course.
INSPIRE	KSC	INSPIRE is a STEM career exploration project for high school students in 9th grade through their freshman year of college. Through INSPIRE's extensive online community (OLC) students and their parents have access to activities and resources and interact with peers, NASA experts, and education specialists. INSPIRE's OLC students are also eligible to compete for enriching summer hands-on experiences including a Center workshop and tour, a two-week collegiate experience, and internships designed to maximize student involvement in STEM education.

Jenkins Pre-Doctoral Fellowship Program (JPFP)	ARC	JPFP is a national project providing graduate-level student support and is jointly managed by NASA and the United Negro College Fund Special Programs Corporation (UNCFSP). The project increases the U.S. talent pool of women, minority, and disabled persons with masters and doctoral degrees in the fields of STEM and attracts these individuals to the NASA workforce pipeline. The project provides three-year fellowship opportunities for research, mentoring, and networking; increasing the number of graduate degrees awarded to underrepresented persons.
Model Rocket Launches	GSFC	Model Rocket Launches occur at the NASA GSFC Visitor Center the first Sunday of every month. Launches are supported by the National Association of Rocketry (NARHAMS) Model Rocket Club. Rockets, motors, and supplies are available at the nearby GSFC Gift Shop and you can get rocket construction and launch tips from on-site experts.
NASA Science and Technology Institute for Minority Institutions NSTI-MI	ARC	NSTI-MI is a national research opportunity project for faculty and an internship project for undergraduate and graduate students at U.S. minority serving institutions. The purpose of the project is to increase research opportunities in NASA-related research; stimulate cross-disciplinary research; improve the transfer of information, ideas and technology; foster R&D management strategies and expertise; and establish educational frameworks and networks that will continue to expand the Nation's science and technology talent base. The Institute is located at the NASA Research Park at the ARC and is jointly managed by NASA and the UNCFSP.
SEMAA	GRC	SEMAA is a K-12 curriculum supplement project that increases the participation and retention of K-12 youth underserved and underrepresented in STEM. SEMAA delivers three core components: a set of hands-on, minds-on K-12 STEM curriculum enhancement activities, a state-of-the-art Aerospace Education Laboratory, and an innovative Family Café. Site locations include community colleges, four-year colleges/universities, Historically Black Colleges and Universities Hispanic Serving Institutions, Tribal Colleges and Universities, schools, science centers, and museums.
Space Grant	HQ	Space Grant is a national network of 52 individual state-based consortia that fund aerospace-related research, education, and public service projects. Space Grant also funds fellowships and scholarships for students pursuing careers in STEM, as well as curriculum enhancement and faculty development programs. Member colleges and universities also administer pre-college and public service education programs in their states. Space Grant expands opportunities for Americans to understand and participate in NASA's aeronautics and space programs.
Student Launch Initiative (SLI)	MSFC	The SLI is a systems engineering challenge for middle and high school students. Participants design, build, and launch a reusable rocket that carries a science payload to an altitude of 1 mile above ground level. The challenge is an 8-month commitment for formal education teams or informal teams (such as scouting groups) to engage in a hands-on systems engineering project that models NASA's technical review processes. Teams placing in the top of the Team America Rocketry Challenge (TARC) and the Rockets for Schools competitions are invited to send one teacher or mentor to a 4-day Advanced Rocketry Workshop where participants are immersed in developing an SLI team, understanding high-powered rocketry, and using NASA's education resources for their classroom. Workshop participants must submit a competitive proposal to be considered for advancement in SLI.

The Sunday Experiment	GSFC	The Sunday Experiment features activities showcasing GSFC's world-renowned science and engineering research and technological developments. Families participate in hands-on activities, interact with scientists and engineers, and learn about Goddard's revolutionary research and technology. The Sunday Experiment celebrates major science missions that are managed by GSFC and set to launch in the coming months. Girls are especially encouraged to participate.
Take Your Child to Work Day	All	NASA Centers and HQ support a "Take Your Child to Work Day" each year. Girls and boys participate in short educational sessions about NASA science, engineering, and upcoming missions. Opportunities are grade appropriate and include hands-on activities and demonstrations.
Tribal Colleges and Universities Project (TCUP)	GSFC	TCUP is a STEM educational grant and mentoring project that specifically targets Tribal Colleges and Universities (TCU) nationwide. The project expands opportunities for the Nation's STEM workforce through capacity building, infrastructure development, research experience, outreach, and information exchange. There are three primary elements: 1) The TCUP Summer Research Experience, which provides NASA Center research, engineering, and education opportunities to TCU faculty and students; 2) The TCUP Enrichment Grant Project, providing funding for the improvement of education, research, and learning infrastructures; and 3) TCUP STEM planning, coordination, and information exchange activities.
Undergraduate Student Researchers Project (USRP)	JSC	USRP is an annual internship that provides "hands-on" career-related work experiences to a diverse group of university sophomores, juniors, and seniors from more than 100 schools across the United States. Students are placed in mentor-directed research positions at all NASA Centers and other Federal partner facilities during 10-week summer or 15-week fall or spring sessions. As the Agency's largest co-op or internship effort, USRP is critical to NASA efforts to expand and improve the pipeline of STEM graduates entering the aerospace workforce.
University Research Centers (URC)	DFRC	URCs are multi-disciplinary scientific, engineering, and/or commercial research centers at host universities from MSIs. URCs provide a broad-based, competitive NASA-related research capability among the Nation's MSIs that foster new aerospace science and technology concepts. Designed to expand the Nation's base for aerospace research and development, URCs provide mechanisms for expanded participation by faculty and students of MSIs in mainstream research and increase the number of underrepresented and underserved U.S. students obtaining advanced degrees in NASA-related fields. URCs are collaborative Centers conducted in cooperation with NASA's Mission Directorates and NASA Centers, substantially contributing to NASA's space and aeronautics goals and objectives. URCs are awarded as five-year cooperative agreements selected through a rigorous peer- and panel-review process.

APPENDIX C: ACRONYMS

21C	21st Century Explorer Project
AAUW	American Association of University Women
AISES	American Indian Science and Engineering Society
ARC	Ames Research Center (NASA)
ARMD	Aeronautics Research Mission Directorate (NASA)
ATDP	Agency Training and Development Program
BEST	Boosting Engineering, Science & Technology Robotics Project
CCD	Charge coupled device
CDP	Career Development Program
CINDI	Coupled Ion Neutral Dynamic Investigation
CIO	Chief Information Officer
CIPAIR	Curriculum Improvement Project Award for Integration of Research into the Undergraduate Curriculum
CO-OP	Cooperative Education Program
DFRC	Dryden Flight Research Center (NASA)
DLN	Digital Learning Network
DOJ	Department of Justice
E/PO	Education and Public Outreach
EAP	Employee Assistance Program
EARLY	Engineering and Robotics Learned Young Project
ED	Department of Education
EEO	Equal employment opportunity
EEOC	Equal Employment Opportunity Commission
ERC	Educator Resource Center
ESMD	Exploration Systems Mission Directorate (NASA)
FAPAC	Federal Asian Pacific American Council
FDA	Food and Drug Administration
FIRST	For Inspiration and Recognition of Science and Technology
FIRST	Foundations of Influence, Relationships, Success, and Teamwork
FLL	FIRST LEGO League
FY	Fiscal year
GAO	Government Accountability Office
GRAIL	Gravity Recovery and Interior Laboratory
GRC	Glenn Research Center (NASA)
GS	General (pay) scale
GSFC	Goddard Space Flight Center (NASA)
GSUSA	Girl Scouts of the USA
HACCP	Hazard Analysis and Critical Control Point food safety system
HACU	Hispanic Association of Colleges and Universities
HENNAC	Hispanic Engineering National Annual Awards Conference
HQ	Headquarters (NASA)
HRDR	Human Resource Development Representatives
INSPIRE	Interdisciplinary Science Program Incorporating Research and Education Experience
IPP	Innovative Partnership Program Office
ISEB	International Space Education Board
ISS	International Space Station
JPFP	Jenkins Pre-doctoral Fellowship Program
JPL	Jet Propulsion Laboratory (NASA)
JSC	Johnson Space Center (NASA)

KSC	Kennedy Space Center (NASA)
LaRC	Langley Research Center (NASA)
LED	Light emitting diode
LunarOPS	Lunar Orbital Photography for Students Project
MAES	Society of Mexican American Engineers and Scientists
MSFC	Marshall Space Flight Center (NASA)
MSI	Minority Serving Institutions
MSIRP	Minority Serving Institutions Research Partnership Conference
MUREP	Minority University Research and Education Program
NAFP	NASA Administrator's Fellowship Program
NAR	National Association of Rocketry
NASA	National Aeronautics and Space Administration
NSBE	National Society of Black Engineers
NSF	National Science Foundation
NSTI-MI	NASA Science and Technology Institute for Minority Institutions
OCHMO	Office of the Chief Health and Medical Officer
ODEO	Office of Diversity and Equal Opportunity
ODU	Old Dominion University
OHCM	Office of Human Capital Management
OLC	On-line community
OPM	Office of Personnel Management
OSBP	Office of Small Business Programs
OSDBU	Offices of Small and Disadvantaged Business Utilization
PI	Principal Investigator
R&D	Research and development
S&E	Science and engineering (workforce)
SBA	Small Business Administration
SBIR	Small Business Innovation Research Program
SCEP	Student Career Experience Program
SEMAA	Science, Engineering, Mathematics and Aerospace Academy
SERP	Science and Engineering Research Program
SES	Senior Executive Service
SESCDP	Senior Executive Service Career Development Program
SHPE	Society of Hispanic Professional Engineers
SISTER	Summer Institute in Science, Technology, Engineering and Research
SLI	Student Launch Initiative
SMD	Science Mission Directorate (NASA)
SOMD	Space Operations Mission Directorate (NASA)
SSC	Stennis Space Center (NASA)
STEM	Science, technology, engineering, and mathematics (education)
STTR	Small Business Technology Transfer Program
SWE	Society of Women Engineers
TARC	Team America Rocketry Challenge
TCU	Tribal colleges and universities
TCUP	Tribal Colleges and Universities Project
UNCFSP	United Negro College Fund Special Programs
URC	University Research Centers
USRP	Undergraduate Student Research Project
VASC	Virginia Air and Space Center
VSCC	Virginia Space Grant Consortium
WARP 10	Warfighter Accelerated Recovery by Photobiomodulation medical device

WBEA	Women's Business Enterprise Alliance
WIA	Women in Aerospace
WISE	Women in Science and Engineering
WOSB	Woman-owned small business