REMARKS PREPARED FOR
WOMEN IN ENGINEERING PROGRAM ADVOCATES NETWORK CONFERENCE
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INTRODUCTION

Thank you for inviting me to participate in this Women in Engineering Program Conference. I commend WEPAN for being one of the important, pro-active organizations, dedicated to advancing the progress of women in the field of engineering.

Although women have made some very substantial progress in the fields of engineering and science over the past two decades, equality in representation is still far away. Women comprise only 10% of all employed scientists and engineers, although they account for 43% of the U.S. population. Progress is not self-executing. It requires visions, energy, tenacity, organization, and goodwill. As I learn more about WEPAN, this organization appears to possess these attributes. And, I commend you because gender and racial stereotypes are still major forces in shaping the career expectations and opportunities of young people.

NASA is an organization that relies very heavily upon the engineering profession. Approximately half of our 24,400 permanent employees are engineers. They work in a variety of inter-disciplinary specialities, including flight systems; data systems; fluid and flight mechanics; measurement and instrumentation systems; facilities; materials and structures; propulsion and power and space and aircraft operations. Against that backdrop I would like to talk to you briefly about NASA's mission and recent progress, and opportunities for women engineering students and faculty.

NASA Mission and Recent Progress

NASA is the civilian Federal research and demonstration agency responsible for acquiring, expanding, and applying new knowledge

about our planet Earth and space; and helping to preserve the U.S. role as a world leader in aeronautics and space science technology. Our success in accomplishing that mission is heavily dependent upon having a continuing supply of knowledgeable and skilled workers. The quality of our Nation's workforce begins - and ends, with education. In fact, education is exploration - the perpetual search for and application of new knowledge and understanding.

Let me identify several examples of the new knowledge that NASA has acquired in just the past three years.

(1) The Magellan spacecraft (May 1989) has successfully mapped over 92% of the surface of planet Venue, with a degree of resolution that shows details as small as RFK Stadium. We now have a better global map of Venue that of Earth. (Parenthetically, thru JPL:, the public has been invited to propose names of notable women for some of the impact craters on Venus, which are some of the most beautiful features in the solar system).

(2) The spacecraft Galileo (Oct. 1989) is on a 6 year journey to probe the planet Jupiter. Right now, it is about 500 miles away from Earth.

(3) In January of 1990, our Space Shuttle and astronaut crew brought back to Earth, a school bus size spacecraft called the Long-Duration Exposure Facility (LDEF) that had been in space since April of 1984, nearly 6 years. Nothing like LDEF has stayed in space so long and been brought back to Earth. It's 57 experiments, including tomato seeds, provided a rich body of knowledge that is being applied to the design and operation of Space Station Freedom.

(4) The Hubble Space Telescope, launched in January 1991, inspite of some technical problems, has produced some excellent science. For example, recent Hubble images indicate the discovery of a star 33 times as hot as the Sun, some 200,000 degrees Celsius. Moreover, this morning, at 11:00 P.M., a panel of distinguished astronomers will discuss the significance of a new set of Hubble images which show distant colliding galaxies.

(5) Luminescent Paint Aircraft. A recent innovation in aerospace engineering involves using a luminescent paint under ultraviolet light to determine the strength of an aircrafts wings and tail. These

tests may make it possible to replace the sensing devices traditionally used to gather such data because it allows large areas of a test aircraft to be studied at once.

(6) And I believe we can all agree that the Space Shuttle Endeavor crews recent successful grapple of the INTESAT satellite was a triumph of space engineering.

New Leadership and Workforce Composition

On April 1, 1992, NASA welcomed a new Administrator, Mr. Daniel S. Goldin, formerly Vice-President and General Manager of the TRW Space and Technology Group. As a result, we are literally in transition. The following quotes from Mr Goldin will give you a flavor of the process that has begun:

> "For NASA to become a more mission-driven organization, we need an agency filled with leaders -- people who are empowered to act, have the resources they need, and are accountable for what they do. NASA has been entrusted with several important missions: space exploration, scientific study of the solar system and universe, monitoring Planet Earth, and cutting-edge aeronautics. To fulfill those missions, every employee, every contractor, every program, every dollar spent, must relate to those missions, and mesh together in pursuit of them. Everything in the space program, must be driven not by bureaucracy, or rules that don't make sense, or by narrowly focused programs, but by the integration of those missions."
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> "The New NASA will work to build a consensus -- to create a shared vision of how our daily work relates to our missions. We are devising an integrated plan of programs, schedules, and budgets -- not just for the next few years, but 10, 20, 30 years into the future -- so that out programs are no longer viewed in isolation, but support one another. Then we will work with all the space stakeholders, both here and abroad, so that they become full partners -- part of the team -- sharing our vision and strategy. We need to find way to

do things safer, faster, better, cheaper, and to make continuous improvement a part of everything we do Because if you can't measure it, you can't manage it. We will set clear milestones. Only through increasing accountability, and holding ourselves and our contractors to the highest standards, can we hope to achieve our sacred missions."

Women comprise 29.9% of NASA's 24, 416 permanent employees, and 14.3% of our 13, 694 scientists and engineers. Also, there are 17 women in the Astronaut Corps. There has been a slow, but steady increase over the years.

By the year 2000, it is projected that approximately 47% of the workforce will be women. The outlook for organizations such as NASA, that rely heavily on scientists and engineers to accomplish their missions, looks very bleak indeed, if we do not take significant actions to ensure that the largest group of underrepresented human resources is cultivated.

I'm happy to tell you that in 1991, 55% of NASA's new employees were women and minorities. Administrator Goldin is committed to creating a more culturally diverse workforce and his recent senior appointments bear witness to that commitment.

NASA and the Higher Education Community

Our external education programs are managed by the Education Division, headed by Mr. Frank C. Owens, one of five divisions in the Office of Human Resources and Education. Although the program covers elementary school through post-graduate education, this morning I will only focus on the university programs. NASA's partnership with the higher education community spans its history. The universities are the training ground for the Nation's aeronautics and space workforce and the laboratory for much of NASA's research and development activities.

In FY 1991, $595.4 million was spent on R&D activities at colleges and universities around the country. Engineering research accounted for 24% of those funds, physical sciences (36%), and environmental sciences (23%).

Increased national attention to education and the subsequent expansion of post-secondary educational programs during the mid-1980's resulted in the organization of the University Programs Branch in NASA's Educational Division. This group initially developed and managed several agencywide university programs, primarily focused on individual student and faculty support. Within the last three or four years, the role of the University Affairs Branch, recently renamed the Higher Education Branch, has broadened considerably.

Implementation of the Congressionally mandated National Space Grant College and Fellowship Program has resurfaced NASA's role in addressing the institutional concerns of universities and colleges. The Higher Education Branch is also working with the National Science Foundation to redefine programs designed to strengthen the research infrastructure of universities in states that do not receive significant Federal funds. This is being done through the Space Grant program as well as through other programs

Program Examples

NASA has a number of programs aimed at all levels of the higher education community Although not targeted specifically at women, we are looking at ways to increase the representation of women in all of these programs, including recruitment and retention strategies. I will briefly describe some of the programs that would be of interest to engineering students and faculty.

Undergraduate

1. The Spelman College Women in Science and Engineering Program provides scholarships and academic support for high potential freshmen entering Spelman College in Atlanta, Georgia. Students pursue majors such as electrical or aeronautical engineering, physics or math through a dual degree engineering program and do research at NASA facilities during the summer.

2. The Advanced Design Program gives senior engineering students at participating universities an opportunity to work on real life space and aeronautics design issues as part of their capstone

engineering design course. Working relationships with NASA centers and the opportunity to develop skills in teamwork, problem solving, verbal and written communication help to make this a valuable experience for all concerned. Projecting some 20-30 years into the future, students for example, are using transport equations to study the spoke rings around Saturn; designing a lunar factory; designing a high-speed transport aircraft.

3. The Cooperative Education Program provides an opportunity to integrate academic study with full-time work experience. In FY 1991, there were 1,158 co-op students in the program, 467 (40%) of whom were female and 316 (27%) were minorities. A feature of this program is the opportunity for full-time employment with NASA upon graduation. In FY 1991, of the S&E co-op conversions, 23% were non-minority women and 20.5% were minorities.

4. The Undergraduate Researchers Program is a new fellowship program for underrepresented minority students. In addition to providing an award of $12,000 per year, each student has the opportunity to spend time at a NASA Center conducting research.

Graduate

The Graduate Student Researchers Program and its underrepresented minority component, awards up to $22,000 to US. graduate students who are pursuing academic programs of interest to NASA. About half of these students spend time at a NASA Center doing research. Many are specializing in various branches of engineering.

Faculty

1. The Summer Faculty Fellowship Program offers summer research opportunities to college and university faculty in all disciplines, but especially in engineering at NASA Centers

2. The Resident Research Associateship Program offers postdoctoral research opportunities at field centers for one or two years of concentrated research.

How to Access the System

Further information on the opportunities just described can be obtained from the Higher Education Branch of the Education Division at NASA Headquarters. One of our Higher Education program analyst is here today, Ms. Sherri McGee, who will be glad to talk with you.

Each field center has a University Affairs Officer. They are often the first point of contact for university personnel and provide information and guidance on any aspect of NASA/university collaboration, be it research, training, or institutional development.

NASA participates in FEDIX, an on-line system providing information on research programs and opportunities at several federal agencies. All NASA research announcements are automatically placed on this system for easy reference.

If you wish to submit an unsolicited proposal, an easy reference guide is available from the Higher Education Branch or the Procurement Office. However, before you spend time and money on the development of a proposal, contact the relevant discipline area to discuss the outlook for funding. If you do not know who to call, contact the Higher Education Branch and we will attempt to connect you with the right person.

Perhaps the most promising source of funding for non R&D educational programs is through the National Space Grant College and Fellowship Program. This program was designed to form a national network in support of the NASA mission. All states plus DC and Puerto Rico have a Space Grant presence, tying together universities, nonprofits, businesses and state and local governments. Undergraduate and graduate fellowship opportunities in Space Grant institutions are a key component. In addition to fellowships, a major Space Grant objective is to increase the participation of underrepresented groups. including women in science and engineering. In that respect, these programs might be a source of funding for programs designed to meet local needs.

NASA is a complex, and at the moment a changing organization. However, it is an approachable Agency with a commitment to increasing the participation of women our principle investigators, program participants, and employees. We strongly encourage you to take advantage of these opportunities.