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S-95-19

"RESPONDING TO THE DOUBLE BIND"

BY

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AT THE

THIRD ANNUAL CONFERENCE
COMMITTEE ON WOMEN IN SCIENCE AND ENGINEERING
NATIONAL RESEARCH COUNCIL
OCTOBER 22, 1995
WASHINGTON, D.C.

Good morning, everyone. I am delighted to join you today at this third national conference of the National Research Council's Committee on Women in Science and Engineering. As a former member of the WISE Committee, I fully appreciate the importance of these annual conferences in examining the status of women in science, engineering, and the health-related professions; and in spurring the recruitment and retention of women in science-based careers.

Of course, much has been written and even more said about the underparticipation of women in science and engineering, and about what could and should be done about it. For the most part, these discussions, and the potential solutions offered as a result, have tended to focus on formal organizational support to encourage women to participate more fully and directly in science-based careers. Over the three-day course of this meeting, you will have heard from a variety of distinguished speakers and panelists about institutional responsibilities toward minority women and additional steps that should be taken to recruit and retain minority women in science and engineering positions in government and the private sector. Having worked in both public service and private industry, I understand that this formal organizational approach to the underparticipation of women in scientific fields has been an essential contributor to the progress of women in these select fields over the last decade, and that it will play a continuing, vital role in the future.

I think it is worth noting here an important change in the perceptions of employers toward women in the last few years, a change only partly explained by reports such as "Civil Service

2000" which project that up to two thirds of all new entries into the workforce by the year 2000, which is just down the road, will be women. More to the point for our discussion today, but less easily quantifiable, I would suggest to you that most business and governmental organizations today, regardless of the reasons for their existence or their goals and objectives, are increasingly recognizing that if they are to compete successfully in the world as we know it, i.e. globally, or accomplish their particular missions, they must utilize all of the resources available to them, especially their human resources, both male and female, and that having highly qualified and highly motivated women (including minority women) already in the workforce will make their tasks easier.

These developments should portend a brighter future for minority women in science and engineering.

Like your careers, mine has had its seasons. I was trained and began my scientific career as a particle theorist. I later became a condensed matter theorist. When I was first invited to deliver these remarks last spring, I was a Professor of Physics at Rutgers University. A month or so later, when the confirming letter from the WISE Committee arrived, I had been appointed by the President and confirmed by the U.S. Senate as a member of the Nuclear Regulatory Commission (NRC). And as of today, I have been serving as the Chairman of the NRC for nearly four months -- sometimes the careers of minority women in science move along at a particularly heartwarming pace -- and then again, sometimes they don't! I can still recall the day in the early 1960's, when I was deciding what to study in college, being told by a professor that "Colored girls should learn a trade." Needless to say, this caused me a great deal of angst, but I responded by choosing a trade - physics! Whatever motivation the individual who said this to me may have had, I think you will all recognize its potential as a career-breaking statement. My remarks today could have focused on this statement, but in approaching the subject of the retention of minority women in science-based careers, I will focus instead on several questions which naturally come to mind, perhaps evoked by the type of early experience I just described. They are:

- What is/has been necessary for recruitment, retention and success of women in science and engineering?
- Have strategies devised to enhance women's careers generally worked or will they work for minority women in the sciences?
- Do women scientists and engineers have "the sister thing"? Whose sister?
- Is there a "double bind" for minority women scientists?
- If so, is there a way of taking advantage of the "double bind."

I will address these questions generally through the course of my remarks. I would also like to speak to:

- New careers or career paths for minority women through the illustrative example of the NRC.
- The role of leadership.
- The role of personal ambition.
- Whether there are results.

Now, let me talk about the Nuclear Regulatory Commission as an agency representing unique career opportunities and the need for a merging of skills, in areas where women, much less minority women, historically have not been well represented - the nuclear industry. The Nuclear Regulatory Commission is an regulatory agency created by the Congress in 1975 to regulate the civilian uses of nuclear material. Specifically, the NRC is responsible for ensuring that activities associated with the operation of nuclear power plants and fuel cycle activities, the operation of non-power research, test and training reactors, and medical, industrial, and research applications of radionuclides, are carried out with adequate protection of the public health and safety, the environment, and national security. These activities involve licensing, rulemaking, inspection and enforcement. We also have licensing and oversight responsibility for the storage, transportation and disposal of radioactive waste - both low level waste and high level waste. Our budget is approximately \$500 million. We regulate industries representing a net capital investment of hundreds of billions of dollars.

At full complement, at the top of the NRC are five Commissioners who are nominated by the President and confirmed by the Senate. They have policy formulation, rulemaking and adjudicatory authority and responsibility for the Commission. The technical/legal staff carries out a regulatory program based on Commission decisions which are rooted in the law. The President designates one of the Commissioners as Chairman, who, in addition to having the listed Commissioner responsibilities, is the Principal Executive Officer of the Commission. This involves specific administrative and budgeting responsibilities. The Chairman is also the official spokesperson, the primary Congressional point of contact and consensus builder. Finally, the Chairman is the principal U.S. government representative abroad on nuclear safety matters. I am that person.

In the minds of many, particularly today when government is not viewed as favorably as it has been in the past, the concept of an independent regulatory agency conjures up an image of prolonged legal proceedings, tedious and arcane rules, and a mission that the regulated entity, and therefore the country, would probably be better off without. On closer examination, however, the NRC is predominantly a technical agency, with engineering, scientific, and health physicist positions far outnumbering others. We also have a number of lawyers because of the legal nature of our regulatory work. Moreover, the NRC, by reputation, is the world's foremost independent nuclear regulatory body, whose technical studies, organization, and structure are widely emulated internationally. The NRC therefore makes an excellent case study of the kind of challenges and opportunities that the world of science and engineering offers to its practitioners, including the minority women who work there. I will speak more about women at the NRC shortly.

Let me illustrate this case study through a very brief survey of some of the NRC's major activities. Let me begin with the NRC Research Program, which provides the NRC the strong independent technical understanding that must underlie valid regulatory decisions and without which public safety could be compromised. By law, the research that we perform must be confirmatory in nature, but in practice, the Research Program must also anticipate the needs of the regulators and the problems that may occur in the future in the systems that we license. In the early 1970's, for example, the NRC undertook a number of research programs to confirm judgements that were made about the behavior of emergency core cooling systems in the event a reactor lost its continually circulating water coolant. The Research Program confirmed expected results, allowing for the safe operation of the larger nuclear power plants (600-1200 MWE) that are in operation today. It is also fair to say that almost the entire discipline of probabilistic risk assessment, as applied to nuclear facilities, was developed by the NRC Research Program, while over 75 percent of all severe accident research done in the U.S. has been performed by the NRC. All U.S. nuclear power plants have now performed risk assessments, and because of this work, the increased use of risk insights in regulatory activities has the potential to improve safety and at the same time reduce costs, by allowing an even sharper focus by both regulator and the regulated on activities and systems in commercial nuclear enterprises with the greatest safety significance. Current research is focused in such areas as high burnup fuel, thermal hydraulic work on the advanced light water reactor, and reactor aging issues including embrittlement by neutron fluence of reactor pressure vessels, and the integrity of steam generator tubes in pressurized water reactors.

The challenges that confront the nuclear power industry and, by oversight responsibilities, the NRC, related to aging of nuclear power reactors, in a time of restructuring of the electricity utility industry for competition and, enhanced economic performance, embraces a host of intertwined technical, policy, and legal considerations. Once again, the NRC is taking the lead worldwide in addressing the aging phenomenon, which is essentially an entirely new field of study. The first priority, of course, is to ensure that nuclear plants continue to operate safely. It is not the role of the NRC to promote the use of nuclear power, but it clearly makes sense that the nation makes the most efficient use of our energy resources. In the case of nuclear power plants, this means creating a regulatory environment in which plants which are still capable of additional years of safe operation may continue to operate. The NRC has developed a licensing process to handle plant life extension, but there are still a number of technical problems which need to be addressed including, as mentioned earlier, reactor pressure vessel embrittlement and steam generator tube integrity.

The Commission is currently evaluating the regulatory framework within which the NRC could eventually assess reactor pressure vessel integrity following thermal annealing to restore material properties.

The Commission is also considering a generic approach for dealing with steam generator tube degradation that will reduce plant specific regulatory decisions yet ensure defense-in-depth through a balance of protection, inspection, and mitigative measures.

One of the most important matters facing the nation is nuclear waste storage and disposal. Without satisfactory resolution of this issue, the role of nuclear energy in the nation's overall energy mix in the future will be severely constrained and a potential health and safety problem will continue to grow.

The Commission believes that deep geologic disposal is a sound and technically feasible solution to the problem of permanently disposing of spent fuel and other high-level radioactive waste. The Department of Energy has the responsibility for siting, developing and operating such a facility. The NRC has licensing and regulatory oversight for the design, construction and operation of a repository.

In support of that, the NRC maintains an independent regulatory research and development center, the Center for Nuclear Waste Regulatory Analyses, at San Antonio, Texas.

These are just some of the key issues that are being addressed in one small corner of the Federal Government where the science and engineering disciplines predominate. You will notice, I think, that these are not arcane, obscure, and uninteresting matters, but instead go to the very heart of important national policy issues and are directly related to the protection of the public health and safety. They are the kind of issues that are career makers for those with the talent and energy, but especially the opportunity to pursue them. Issues like these are also being addressed by other Federal agencies, by many State governments, by the private sector, and by many university research programs -- they are the reasons why all brains are needed.

I recently returned from the 39th International Atomic Energy Agency's (IAEA) General Conference in Vienna, Austria, where as NRC Chairman, I served as the Alternate U.S. Delegate to the conference. Secretary of Energy, Hazel O'Leary, led the delegation. The IAEA General Conference had a "Focus on Women" Event. At the IAEA, women are now playing, and will continue to play, an important part in carrying on the work of the IAEA. One important reason for this increasing role of women is the resolution passed last year by 40 member states, including the United States, supporting improved representation of women in the Secretariat of the Agency. This kind of formal, organizational support is essential to the effort to encourage women to participate more fully and directly in IAEA programs and can produce substantial results. This is no less true of the Nuclear Regulatory Commission. With continuous support over a considerable period of time from senior management, the USNRC, through extensive recruitment programs and an ambitious career development program, has evolved from a predominantly male-oriented employee population to one in which today over 37 percent of our employees are women, and more particularly, professional women, including lawyers, computer specialists, health physicists, and civil and mechanical engineers, among others. A significant number of these women are minority women including some from developing countries in Asia and the Indian subcontinent.

This is a reflection of what I said earlier, namely that organizations, as well as entire societies for that matter, are increasingly recognizing that, if they are to accomplish such specific missions as enhancing international nuclear safety, they must utilize all of the human resources available to them.

This recognition, as well as the creation of programs to support equal employment opportunity, are enhancing the economic opportunities available to women worldwide. To take full advantage of these opportunities, however, minority women need additional ingredients - that come from inside each one of us, namely, personal ambition, staying power and the multicultural awareness unique to our "minority" status.

My career has been the consequence of opportunities offered and opportunities seized. As many of you are undoubtedly aware, women still comprise < 15% of practitioners of physics in this country, although a larger percentage are entering the field now. African-American women PhD.'s in physics are a countable number - on the order of 10 - not 10%, but 10. The numbers are similar for women from other under-represented groups. Increases have been very slow in coming. Difficulties have been rooted in a kind of "double bind" these women face. A senior manager of a major corporation once said that minority women face a "halo" effect, i.e., when a person (male) sees a minority woman, her minority-ness and her female-ness so dominate his perception, that the individual does not see the scientist, does not "hear" her or "see" her work. this is anecdotal, but very telling. A partial "halo" effect has even been observed by minority women within women's groups where what is "blinding" is race or ethnicity, or in minority male group, where the "blinding" is due to gender. This has the result of having minority women only tangentially dealt with in various fora - they are seen and sometimes treated as less than full partners with respect to women's issues on the one hand and minority issues on the other. This has meant that strategies devised for women scientists have not always worked for minority women scientists, not because they can not, but because minority women are tangential to the process.

How can such a double bind work to the advantage rather than the disadvantage of minority women in the sciences? First, "halos" can be imprinting if used to advantage - if viewed as opportunities to showcase one's abilities and one's work - a good job can be remembered. In fact, there may even be multipliers to the "halo", if properly used. Second, women scientists themselves have to build a "sister thing", by recognizing differences - ethnic, cultural, language - and viewing them as sources of strength - providing the ability to bring different points of view and modes of thought to bear on a scientific issue.

Changes that have and are occurring with respect to women's access to and success in science-based careers are a consequence of women's motivations, institutional changes and the opportunities they present. This is no less true for minority women.

What is ultimately needed therefore for minority women is inclusion, personal ambition, staying power, equal rights, a global view and leadership - personal leadership at the national and organizational levels, by those in position to provide it.

I am often asked, as Chairman of the U.S. Nuclear Regulatory Commission - what my views are on Affirmative Action. Given our mandate and the technical basis of our responsibilities, the quality of our staff is the paramount interest, but we must be sensitive to the need for opportunities for and the recognition of talent in all groups. We don't have to create a Noah's Ark, but all who have talent and are given the opportunity to use that talent strengthen our work.

Finally, has there been progress? I will end as I began, on a slightly personal note. I just yesterday returned from Sweden and Germany, where I visited various nuclear waste facilities, and where, importantly, in Germany, a new agreement was signed between the U.S. NRC and the German Ministry of the Environment and reactor safety which continues a 20-year history of cooperation between the U.S. and Germany in nuclear safety matters. The headline and article in "Die Welt" (German daily) regarding this signing was translated by the U.S. Embassy in Berlin as follows:

INFORMAL TRANSLATION

"DIE WELT" ARTICLE, OCTOBER 20, 1995

Merkel: Increase Safety for East European Nuclear Power Stations

dpa Berlin - Federal Environmental Minister Angela Merkel has called for further efforts to increase safety in the atomic power stations of the former Eastern Bloc states. The Federal Republic attaches great importance to this, Merkel said yesterday in Berlin. The CDU politician signed a new arrangement on cooperation within the framework of nuclear safety with the Chairman of the American Nuclear Regulatory Commission, Shirley Jackson. Merkel said that the 20 years cooperation between the Federal Republic and the USA had proven its worth and should be intensified.

Dr. Merkel and Dr. Jackson are both Ph.D.'s in physical science. They both hold important positions in their respective governments. They signed the agreement in Berlin - which today is a literal and symbolic joining of Eastern and Western Europe. They shook hands across what was once a political and cultural divide. Dr. Merkel and Dr. Jackson are both women.

Going back to the questions I posed earlier in my remarks, in general, I personally believe that the day will come, and not very far down the road, when we are no longer concerned about diversity in or the underparticipation of women in science because the problem will gradually disappear. If I am right, then much of the credit will very deservedly go to such groups as the National Research Council's Committee on Women in Science and Engineering, to conferences like this one, and to organizations that have put into place formal programs to encourage the recruitment and retention of women in the workplace. And change will be due to leadership at the highest level. Nevertheless, I continue to believe that the motivation for progress must start from sources within each one of us, and that the future of women in science and engineering ultimately lies in our own hands. I hope all of you will keep seeking the opportunities that lie embedded in every challenge, and keep "reaching for the stars."

Thank you for your attention. I hope you are enjoying this conference as much as I have enjoyed being with you today.