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**UNIVERSITIES AND NATIONAL LABORATORY
ROLES IN NUCLEAR ENGINEERING**

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Universities and National Laboratory Roles in Nuclear Engineering

Nuclear Engineering Education is being significantly challenged in the United States. The decline in enrollment generally and the reduction of the number of nuclear engineering departments has been well documented. These declines parallel a lack of new construction for nuclear power plants and a decline in research and development to support new plant design. Precisely at a time when innovation is needed to deal with the many issues facing nuclear power, the number of qualified people to do so is being reduced. It is important that the University and National Laboratory Communities cooperate to address these issues. The Universities must increasingly identify challenges facing nuclear power that demand innovative solutions and pursue them. To be drawn into the technology the best students must see a future, a need and identify challenges that they can meet. The University community can provide that vision with help from the National Laboratories.

It has been a major goal within the reactor development program at Argonne National Laboratory to establish the kind of program that can help accomplish this. The Integral Fast Reactor (IFR) program represents opportunities for joint research in fuel technology, fuel reprocessing, and waste handling, reactor-plant design to emphasize passive response to upsets, development and testing of advanced diagnostic and control-system technology core designs to enhance breeding while minimizing sodium void effects and reducing the magnitude of reactivity changes with burnup, development of approaches to the PRA which fully integrate passive responses, and many others. To involve students and faculty, we have established the IFR fellows program, bringing approximately 20 students from Universities around the

country to ANL-W each summer. The focus is on students who are completing their Junior or Senior years as nuclear engineering students and are at the top of their class. It is our goal to interest them in the technology, continuing their research into graduate school. This also means support for faculty in cooperative research and we have proposed programs which could accomplish it.

The major initiative for definition of the kind of program best suited for faculty support came from a faculty institute sponsored by ANL and held at ANL-W during August of 1989 for senior faculty or department heads from major nuclear engineering departments. The major recommendations from the week-long workshop addressed:

- Recruitment of talented high school students into under-graduate programs in science and engineering.
- Attraction of an adequate number of highly qualified students into nuclear engineering graduate studies.
- Involvement of students and faculty in research projects related to advanced reactor and fuel cycle development.
- Development of long-term affiliations between universities and the IFR Program.

These objectives can be met if exciting challenges for students and faculty are developed. It is also important that these challenges be developed in the context of reactor and power-plant design, which represent the unique aspects of nuclear engineering departments. It is important, for example, that if there are students interested in computer science, that they be fully aware of the possibilities for application of such technology to diagnosis and support of reactor operation. The point is that there are many important challenges that are worthy of the nations best faculty and students.

Many of them are working in repeated technologies but need to be made aware of the opportunities with nuclear.

The Universities provide considerable credibility within the technical community and the public along with an emphasis on new ideas and approaches. The National Laboratories provide a link with DOE and industry, a sort of middle ground between the University community and industry.

So what must be done? The National Laboratories must increasingly recognize the importance of the University community in nuclear engineering. The major aspects of that contribution are as follows:

- (1) Nuclear Engineering education is a unique, integrating technology. Whereas past emphasis has been on reactor core design, the needs now are seen as being much broader, having to do with a systems approach to all aspects of reactor plant design and operation.
- (2) The Universities provide credibility in openly and honestly addressing issues surrounding nuclear power. The University community must increasingly speak out on those issues.
- (3) The energy future of the country depends on nuclear power and the University communities must fully explore this and make it known. Students must understand the possibilities and the need.

Likewise, the National Laboratories can help in the following areas:

- (1) Provide definition of the issues to be addressed on a national scale for the future of nuclear power.
- (2) Identify and encourage areas of joint research, providing opportunities for both faculty and students.
- (3) Work with the University community in sharing resources of people and facilities.

In summary, there are many needs and opportunities for cooperation between the University and National Laboratory community. It is in the interest of both to do so and it is important to the country. Agencies which provide funding for research in nuclear engineering must be convinced of the importance and relevance of this work to the energy future of the country.

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