“Changes in Nuclear Engineering Education”
Session 2-13A: Information Knowledge Transfer

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University Nuclear Science and Reactor Support

Our Programs

- Providing fresh fuel to university research reactors via the Reactor Fuel Program
- Providing funding for innovative research at universities under the peer-reviewed Nuclear Engineering Education Research Program
- Providing institutional support to universities offering a degree in nuclear engineering through the DOE/Industry Matching Grants Program
- Encouraging universities with research reactors to “share” them with surrounding institutions providing research, training, and instructional opportunities through the Reactor Sharing Program
- Encouraging partnerships among universities with research/training reactors, other universities, industry and utilities to improve the nuclear infrastructure regionally in the U.S. (INIE)
University Nuclear Science and Reactor Support

**Our Programs (cont.)**

- Awarding fellowships and scholarships to nuclear engineering students and minority students through the [Fellowship and Scholarship Program](#).
- Partnering minority institutions with Nuclear Engineering Universities for the purpose of increasing the number of minorities in the nuclear disciplines ([University Partnerships](#)).
- Making improvements to university research reactors via the [Reactor Upgrade Program](#).
- Supporting [Radiochemistry](#) graduate and postgraduate students and faculty through fellowships and faculty assistance.
- Supporting the [Nuclear Engineering Education Recruitment program](#) to encourage high school students to consider careers in nuclear engineering and related scientific courses of study by providing information on nuclear issues to them through American Nuclear Society Teacher Workshops.
States With Participating Universities

Clemson University
Colorado State University
Georgia Institute of Technology
Howard University*
Idaho State University
Kansas State University
Massachusetts Institute of Technology
Morgan State University*
New Mexico State University**
North Carolina State University
Ohio State University
Oregon State University
Pennsylvania State University
Prairie View A&M University*
Purdue University
Reed College
Rensselaer Polytechnic Institute
Rhode Island Nuclear Science Center
South Carolina State University*
Texas A&M University
Texas A&M Kingsville**
Tuskegee Institute*
University of Arizona
University of California-Berkeley
University of Cincinnati
University of Florida
University of Illinois
University of Maryland
University of Massachusetts-Lowell
University of Michigan
University of Missouri-Columbia
University of Missouri-Rolla
University of New Mexico**
University of South Carolina
University of Tennessee
University of Texas
University of Utah
University of Virginia
University of Wisconsin
Washington State University
Worcester Polytechnic Institute

*U.S. Historically Black Colleges and Universities; **Hispanic Serving Institution
Trends In Enrollments

- **Undergraduate Student Enrollment**
- **DOE Investment** ($ in Millions)


- **Number of Students**

1. **Undergraduate Student Enrollment**
   - Peak in 1992
   - Decline in 1994
   - Increase after 1998

2. **DOE Investment**
   - Steady increase from 2000 to 2006
   - Question mark for 2006
University Programs
FY 2004

- Fuel: 21%
- NEER: 22%
- Radiochemistry: 1%
- Matching Grants: 3%
- Fellow & Scholars: 5%
- INIE: 39%
- Reactor Upgrades: 4%
- Education Outreach: 2%
- Reactor Sharing: 3%

Total $22.9 Million
We’ve Grown Over Seven Years . . .

- Supporting 6 Innovations in Nuclear Infrastructure and Education (INIE) Consortia
- Supporting 26 new and 21 continuing Nuclear Engineering Education Research (NEER) grants
- Granting 95 Fellowships/Scholarships/Internships
- University Reactor Instrumentation – 20 grants
- Providing Reactor Sharing support to 21 universities
- Supporting 35 Teacher Workshops through the American Nuclear Society
- Funding 3-4 Radiochemistry programs
- Funding 5 University Partnership Programs at minority institutions
- Supporting 2 new nuclear engineering schools
- Providing fresh fuel and spent fuel support for all requesting university research/training reactors
- Supporting 6 U.S. and 6 foreign students in the International Student Exchange Program
- Outreach to High School Students – Hydrogen Initiative
Two Examples ...
One...

INIE
Innovations in Nuclear Infrastructure and Education (INIE)

♦ Six university consortiums funded – number of schools within consortiums has grown from 14 to 33 schools

♦ For FY 2004 -- $9.0M available

♦ Consortium members
  - BIG-10: Penn State, Illinois, Wisconsin, Ohio State, Purdue and Michigan
  - New England: MIT, Rhode Island Nuclear Science Center, Massachusetts-Lowell
  - Southwestern: Texas A&M, Texas, and New Mexico
  - Western: Oregon State, UC-Berkeley, UC-Davis, Washington State, Idaho State, Reed, and UC-Irvine
  - Southeastern (MUSIC): NC State, Tennessee, South Carolina, Maryland, Georgia Tech, Florida, Air Force Institute, and South Carolina State
  - Midwest: Missouri-Columbia, Missouri-Rolla, Missouri-KC, Tuskegee, and Polytechnic University of Puerto Rico
Two . . .

University Partnerships
University Partnerships in Nuclear Engineering Education: Program Objectives and Purpose

♦ Designed to attract minority college students into the field of nuclear engineering

♦ Partners a majority school with a nuclear engineering program with a minority institution

♦ Students at the minority school can complete their degree in a selected scientific field while obtaining a second or advanced degree in nuclear engineering
# University Partnerships in Nuclear Engineering Education: Program Participants

Since the program was established the following partnerships have been established:

- South Carolina State University/University of Wisconsin
- Tuskegee Institute/University of Cincinnati
- University of New Mexico/New Mexico State University (changing)
- Prairie View A&M University – Texas A&M, Kingsville/Texas A&M University
- NCA&T – NCSU (terminated after 2 years)

New Partnering in 2004: Polytechnic University of Puerto Rico and the University of Missouri-Columbia

Two additional partnerships will be awarded for FY 2005

Support has been provided for over forty (40) students and two junior faculty members
Where We’re Headed

♦ Support for new research reactor designs and/or increases in power at existing research reactors
♦ Support of Junior Faculty research
♦ More support for INIE and Matching Grants
♦ Additional University partnerships to increase the number of minority nuclear engineers – links with other minority schools
♦ Begin to improve the manufacturing process through the modernization of fuel fabrication facilities
♦ Addressing security requirements at research reactors and increased focus on the conversion of plate type university reactors to LEU fuel
♦ Partnering with School Districts to offer nuclear science instruction to high school students – Pittsburgh 2004/2005
♦ Evaluation and potential growth of the International Student Exchange Program
♦ Establishment of an INIE Summer Institute to be held at selected INIE consortium universities
New Initiatives and International Activities

♦ Revising a nuclear science teaching module, “The Harnessed Atom,” for introduction into the Physics curriculum in Pittsburgh, Pennsylvania high schools and eventually offered to other school systems

♦ Expanding our Nuclear Engineering Grant Research (NEER) program to include health physics

♦ Beginning in FY 2005, offer a distinct program for health physics scholarships and fellowships

♦ Issuing the “Nuclear Competence Building” report this year – a product of the OECD/NEA Expert Working Group on Nuclear Competency
New Initiatives and International Activities (cont.)

♦ Pursuing educational opportunities as a result of the International Conference on Nuclear Knowledge Management in Saclay, France
  ● Begin to establish cooperative efforts with the European Nuclear Education Network (ENEN) and
  ● The Asian Network for Education in Nuclear Technology (ANENT)

♦ Hosting the first Annual Summer Institute of the World Nuclear University (WNU) at Idaho Falls, Idaho in July 2005
  ● WNU Summer Institute is a career building experience for future leaders in nuclear science and technology
Summary

♦ University Program has come a long way from, essentially, a fuel supplier to a program that supports major initiatives in many aspects of nuclear engineering education

♦ Enrollments are soaring; funding is steadily rising, and the university nuclear engineering community is working cooperatively with one another

♦ New initiatives will make more research funding available for young professors, expand research and/or reactor facilities, and increase student interest in NE

♦ A new generation of nuclear scientists, engineers and leaders is emerging and must have access to existing “corporate” knowledge before it is lost

♦ Need to grow U.S. university nuclear engineering student population carefully so that supply is consistent with demand; this will help preserve salary levels, job opportunities and retain student interest in nuclear engineering

♦ Expand international cooperation/agreements in education; WNU is a step in that direction as is ENEN and ANENT