West Texas Nuclear Energy Education (NEEd) Project
University of Texas of the Permian Basin
HT^{3}R Office (James F Wright, PhD, Director)
2011-2012 Academic Year

Executive Summary

The University of Texas of the Permian Basin (UTPB) is a small (~3,700 students) Hispanic Serving Institution (HSI) with two-thirds of the students being first-generation college graduates. UTPB seeks to increase the number of West Texans, particularly Hispanic West Texans, entering careers in nuclear science and engineering in our region and nationwide. A key part of our program is the NRC Coordinator/Mentor who was hired from the Dallas (Texas) Independent School District "talented and gifted program." The NRC Coordinator/Mentor also helps with their Senior Projects, is the Advisor for the Student ANS Chapter, helps recruit students from targeted high schools, assists with the regional science fair, and coordinates one "nuclear" field trip per semester when funds are available. An agreement between the Los Alamos National Laboratory and UTPB also allows some students to work at LANL in the summer.

The NEEd program at UTPB was instrumental in starting new degree programs in 2005 that included Bachelor Degrees in Mechanical Engineering (ME), and Mechanical Engineering with a "Nuclear Emphasis" (ME-Nu). In 2011 a Bachelors Degree in Petroleum Engineering (PE) is being added. In May and June of 2011 UTPB graduated its first five ME students with four being ME-Nu. One of first graduates is attending Graduate School on a research fellowship in Nuclear Engineering at North Carolina State University. Two of the other "ME-Nu" graduates are now working in the nuclear industry, and one plans to eventually work in the nuclear industry but currently has a position in another phase of the energy industry to be near his parents.

This past year the Texas Higher Education Coordinating Board (THECB) mandated that all publicly-funded universities in Texas have a minimum of 10 students in each academic classroom. UTPB intends to use a "structured ladder" system of nuclear scholarships from the NEEd program to maintain at least this minimum number of students for program sustainability. The ladder is currently structured as: Rung 1 - $1,000/semester, Rung 2 - $2,000/semester, and Rung 3 - $4,000/semester. Students with the higher grades are Rung 3 and those with the lower are Rung 1. If a student has a decrease in GPA in any one semester they are lowered a rung. If their GPA improves, they are eligible to be raised a rung (based on available funding).

The NEEd project is a University-wide effort to meet the needs of the growing regional nuclear energy industry for science and engineering degreed graduates with expertise in nuclear energy. NEEd activities include:

- Curriculum development to create academic programs appropriate for entry into nuclear energy industry careers;
- Promotion of nuclear energy careers to students in area junior high schools, high schools, and colleges;
- Support for UTPB students identified as pursuing nuclear career education (NEEd students); and
- Provision of extracurricular experiences in nuclear energy for NEEd students.

Budget Description & Narrative

Object Class Categories	Description
a. Personnel	Cost of Mentor/Coordinator Salaries & Wages
b. Fringe Benefits	Estimated Cost of Fringe Benefits for above
h. Other	Student Scholarships
i. Total Direct Charges	Sum of all Direct Charges
j. Indirect Charges	8% of "Sum of all Direct Charges"
k. TOTALS	Grand total of Object Classes j. and k.

The Mentor/Coordinator, Garnet Cameron, is in his 3rd year in this position. His time and effort allocation for this coming Fiscal Year, for the budget allocation as stated on the SF424, is as follows:

Object Class	Cost Allocation ($) to NRC	Effort Allocation (%) to NRC
Personnel (Cameron)[1]	$50,538	85.5561%
Fringe (Cameron) [2]	$2,218	85.5561%
Other (Scholarship Costs) [3]	$33,174	100%

Notes:

1. In addition to mentoring, coordinating, and recruiting students to the NEED program, he also provides academic advising, progress monitoring, etc for these same students and prospective students. His time spent outside that paid by the NRC is used for UTPB administrative and instructions (Physics Labs).
2. The "Fringe Benefits" are estimated to be 26% of the salary.
3. Scholarships will be allocated on a competitive basis to less than 12 students each semester. The amount given to each student will range between $1,000 and $4,000 per semester, with the actual amount to be determined competitively by their grades and interest in a nuclear career, plus availability of funds.

B. Project Description

NEEd's Foundation

The University of Texas of the Permian Basin (UTPB) is a public university serving Odessa-Midland, Texas and surrounding areas in West Texas and Eastern New Mexico.

This region includes a number of existing nuclear energy facilities. These include:

- Waste Control Specialists LLC—A low-level nuclear and mixed waste treatment, storage, and disposal facility in Andrews County Texas (Approx. 40 miles from UTPB).
- Louisiana Energy Services National Enrichment Facility (NEF) in Lea County, New Mexico directly across the state line from, and contiguous with, the WCS facility (Approximately 40 miles from UTPB)
- The Waste Isolation Pilot Plant (WIPP)—A Department of Energy underground repository licensed to safely and permanently dispose of transuranic radioactive waste left from the research and production of nuclear weapons. (Approx. 113 miles from UTPB).
- PANTEX—A Department of Energy weapons assembly facility (Approximately 275 miles from UTPB)
- Los Alamos National Laboratory—A DOE National Laboratory (largest in the DOE). This major nuclear research center is becoming more involved in supporting education with a

limited number of institutions. Their arrangement with the University of Texas System is unique in size and scope.

UTPB is the University of Texas System (UTS) lead for the Cooperative Research And Development Agreement (CRADA) between UTS and Los Alamos National Laboratory (LANL). The two principle projects in this CRADA are the High-Temperature Teaching & Test Reactor (HT^3R) and Green Freedom™. The HT3R is a proposed Fuel Qualification Facility for GEN-IV Reactors and a GEN-IV education center for the United States. Green Freedom is a process by which billions of cubic feet per day of CO_2 can be extracted from the atmosphere using a proprietary process that is ~38 times more efficient than any other known process. Other's supporting the HT^3R project are five other UT System institutions, Texas A&M University (TAMU) Nuclear Engineering Department, Idaho National Laboratory (INL) plus local governments in Andrews, Midland, and Ector Counties. The first $3 million dollars to fund the Pre-Conceptual Design (PCD) of HT^3R were half raised from local governments and half from private donors and industry. The CRADA is working with private industry, Areva, and west Texans to fund the next stage of Green Freedom. Another project has been recently added to the CRADA, is to examine the potential for local support for developing facilities in west Texas to temporarily store, reprocess, and finally dispose of High-Level Radioactive Waste (HLRW).

With these growing nuclear energy related industries already in the region, and good prospects for new facilities, there is a growing need for professionals in the region that are educated in the nuclear sciences and engineering. UTPB is working to create new academic programs in nuclear fields and to recruit students in these programs.

We also have ongoing industrial collaborations with Westinghouse Nuclear, Areva NP, PMBR, SPX Cooling Technologies, Luminant, Entergy, Technology Insights, and other industry vendors.

The University of Texas of the Permian Basin (UTPB) seeks to increase the number of West Texans, particularly those that are Hispanics and other Minorities, entering careers in the nuclear industry with relevant science and engineering degrees. U.S. Census release in June, 2006 show that there is no majority ethnic group in Odessa/Ector County with approximately 42% of the population being Hispanic and approximately 48% being white. Many counties in the region are majority Hispanic and Hispanics are the fastest growing ethnic population in the region. The ethnicity (Fall-2009) of its undergraduate student body (2739 students) was 42.7% Hispanic and 50.2% non-white. As a "Hispanic Serving Institution" (HIS) with two-thirds of its students being first-generation college graduates, UTPB started this program July 1, 2007 with the intent of recruiting students from our region to careers in nuclear energy. Should its efforts in producing new nuclear engineering and science professionals continue to be successful, UTPB could become a major source for new Hispanic professionals in nuclear technology fields in the US.

Importantly, UTPB has a good track record in serving Hispanic students! Its freshman class reflects the ethnic make-up of the high-school seniors of the Ector, Midland, and Andrews counties showing University success in recruiting. With funding from the U.S. Department of Education Hispanic Serving Institution grants, the University has been able to add a number of "Services for Student Success" to help these students succeed. UTPB retention and graduation rates for Hispanic students are now higher than that for any other demographic group, including white. This is important because many of these incoming Hispanic students are at a severe disadvantage when they enroll since if they come from small school districts in west Texas and New Mexico. As an example, it is not uncommon for these students to have had minimal

exposure to even Algebra in High School. With proper course structure they can be ready to take Calculus in the start of their Sophomore Year, at the latest. In addition some our students start their Freshman Year after taking all of their High School English taught in Spanish. This means that these students are incapable of reading or writing at the college level without substantial remedial help. Therefore all of our incoming students are thoroughly tested if they were admitted based on their high school graduating rank. Based on these tests they are placed into some of the services listed below:

- AVID (Advancement Via Individual Determination) in Freshman Seminar: a program designed to help underachieving middle and high school students prepare for and succeed in colleges and universities.
- Supplemental Instruction and Tutoring: Available to all students
- Math and Science Center: Provides tutoring on a "walk in" basis for all Math and science courses.
- Writing Center: Helps them acquire the necessary skills to write at the University Level through private tutoring.
- Literacy Center: Work with students so they acquire a better grasp of the English language through ESL (English as a Second Language), improved reading and comprehension skills, plus planning and time management.
- The PASS Office: Provides academic counseling, assistance with study skills. The PASS Office also assists students with disabilities with accommodations. It also provides testing services for admissions, and placements plus sponsors the international tutoring program, SI or Supplemental instruction
- Expanded night time Tutorials in Student Housing: This allows students to have student tutors available in student housing.

The University also has experience in successfully helping Hispanics move into fields of science and mathematics. The University is a long time member of the UT System Alliance for Minority Participation which recruits and supports minority students into science and engineering fields. The NEEd project will build on UTPB's successful experience in recruiting minorities as a Hispanic Serving Institution, and the HT^3R partnership.

The Current Program

The backbone of our NEEd program is our Mentor. He was hired by UTPB from the Dallas Independent School District when they decided to lay off over 1,000 of their STEM Teachers in the "Talented and Gifted Program" because of budgetary shortfall. He has an Undergraduate Degree in Engineering Physics (Queens University, Canada) and a MS in Computer Science (Columbia University) plus his interpersonal skills with students are great. He is also the Faculty Advisor for the local ANS Chapter (which is mentored by the TAMU Student ANS Chapter). Every Semester our Students take a Field Trip (attendance required for NRC Students but on a "space available" for other students) to relevant facilities that have included: Waste Isolation Pilot Plant (WIPP), Comanche Peak Nuclear Power Plant, Sandia Solar Power Tower, National Enrichment Facility, Carlsbad Environmental Monitoring Research Center, GNOME Peaceful Nuclear Energy Site, and Roscoe Wind Farm. Further some of our students have interned at the NRC and others at LANL. Some of the duties of the Mentor include:

- Develop programs to promote nuclear energy studies to area high school and community colleges. Visit area high school and community college science teachers and counselors

about promoting nuclear energy studies to their students, sometimes accompanied by students.

- Runs a series of Special Summer Programs each Summer that has included: Introduction to Nuclear Energy for regional High School students, and NEEd students learning how to use MCNP with real problems.
- Mentor all Students working for a degree in Mechanical (Nuclear) Engineering and Nuclear Chemistry
- Monitor progress of NRC ME, ME-Nuc, and Nuclear Chemistry Students and place them in appropriate "Services for Student Success" if needed
- Manage the "Student Scholarship Ladder" described below.
- Manage and Participate in NRC Student Field Trips twice yearly
- Work with the appropriate University faculty groups in the development of courses, minors, and degrees in nuclear energy related fields
- Work with the University's Career Counseling and Placement Office to help NEEd students identify career options and assist the office by recruiting nuclear energy companies to list available job openings with the program
- Work with the HT^3R faculty in creating additional meaningful internship opportunities
- Work with area nuclear energy related organizations to create internships, coop education, or other educational experiences for NEEd students outside the University;
- Serve as the instructor/mentor for a Science and Engineering Freshman Interest Group (FIG);
- Prepare materials and programs for the promotion of nuclear energy careers and UTPB degrees related to nuclear science and engineering for use in regional public schools and community colleges and UTPB student recruiting programs
- Develop extracurricular activities such as guest lecturers, field trips, and student club activities related to nuclear energy issues
- Develop and administer a prize to be awarded to students in the regional high school science fairs of West Texas and Eastern New Mexico for the most outstanding projects related to nuclear energy
- Help UTPB faculty identify resources for incorporating nuclear energy topics in established science courses, especially lower division entry level courses;

In 2006 we started with three "Internships" that was equivalent to our highest current level of support (see below for Rung 4). In the Spring 2010 Semester we had twenty students at 4 "levels" of support (we call ladder rungs) that would not have otherwise been able to attend a University. These rungs vary from lowest to highest at: 1) $1000/semester, to 2) $1,185/ semester, to 3) full fees, books and tuition (~9,500/year/student), to 4) full fees, books and tuition plus a $1036/month stipend ($21,000/year/student).

The Proposed Scholarship Program

At a funding level of $105,000 the program has had to be considerably scaled back in both the number of scholarships, and the funds per student, available. Since the cost per year of attending UTPB is less than most other institutions that offer degrees in nuclear engineering, we believe we can still attract students to the program. These new award amounts range from

$1,000, $2,000, to $4,000 and will still be a strong incentive for students to study nuclear engineering, even though the students say it is the most difficult major in the University.

Our first Engineering graduates completed their study this year and 4 of the first 5 were Mechanical Engineers with a Nuclear Emphasis (ME-Nuc).

Because of budget reasons, the Universities in Texas are now being required to have no fewer than 10 students in any class and graduate at least 50% of our first-time, full-time, Freshman Class. This places a real hardship on UTPB since we have less than 3700 students and approximately half our incoming students are academically disadvantaged. Therefore we plan to use the NRC student scholarships to accomplish the following:

1. Help funnel the brightest students to the Nuclear field, and
2. Maintain a sufficient number of successful students in the program such that we will have at least 10 students in all of our Junior and Senior-level classes.

We will maximize the effectiveness of the $33,174 annually that we have allocated to student scholarships through 1) soliciting additional funds from: the NRC, DOE, other sources, and 2) providing the scholarships to only the very best students.