

## **AC 2008-769: PREPARING FOR EXPANDING THE NUCLEAR WORK FORCE IN TEXAS**

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## Preparing for Expanding the Nuclear Workforce in Texas

**Abstract:** Electric utility companies in Texas are planning on increasing the number of nuclear power reactors in the state from four to ten by the end of the next decade. Because of the significant work force needs and because the US Navy no longer provides the same numbers of skilled operators and engineers trained in the nuclear area, the utility companies requested that the State of Texas assure its own economic development by providing for the training of the required workforce within the framework of the state's system of higher education. To assist in assuring the availability of a trained workforce, the Texas Workforce Commission awarded a grant of \$2,000,000 to the Texas A&M University System to foster the growth of nuclear education and graduation of students prepared to enter the nuclear workforce. In response, A&M established the Nuclear Power Institute (NPI). NPI met with industry and many educators in the state to develop a plan for meeting the goal of training a new nuclear workforce. The utilities requested that the emphasis be put on operations and maintenance rather than design. With this in mind, a new Nuclear Power certificate program as well as a Power Technology program have been developed at Texas A&M University. The program is being developed in such a way that many of the courses will be available at other sites by use of distance learning technology. Other participants include other members of the Texas A&M System (Prairieview A&M University, Texas A&M University Kingsville and Texas A&M University Corpus Christi), community colleges (Hill College and Wharton County Junior College), Texas State Technical College and the University of North Texas.

**Background information:** The fact that the last nuclear power plant to be built in the US was ordered in 1973 has many implications for the availability of a trained nuclear workforce in 2008. Many of those who built the last generation of nuclear power plants are now retiring. Further adding to the problem is the fact that many of the plant operators and technicians are at an age where many begin to consider retirement. The average Reactor Operator's age at the Comanche Peak Nuclear Power Plant is 52 and the average Senior Reactor Operator's age is 55.

Compounding the problem of lack of trained workers is that many of the proposed plants are being supplied by foreign vendors and are significantly different in design from the current generation of operating nuclear power systems. Indeed all of the proposed reactor systems in Texas have a significant Japanese component in their design and manufacture. This implies that much of the experience in the operation of older plants will not directly translate into safe and economic operation of the next generation of plants.

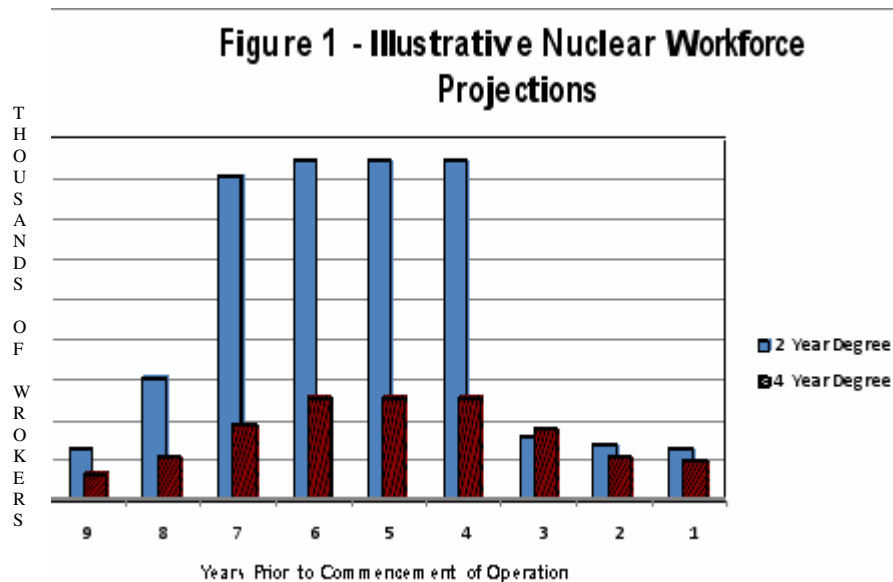
All these facts suggest that a new workforce, well trained in fundamentals, is required. This paper describes the efforts in Texas to meet this changing demand.

**Timing:** Of the six additional plants proposed in Texas, two are seeking construction and operating licenses and four more are expected to seek licenses within the next two years. Considering that production of a Technician will require at least two years to produce and a

minimum of four years is needed to graduate an Engineering Technologist or Engineer, it is not too early to start the development of the academic programs required to produce required talent.

The academic training alone is insufficient. All plant personnel must go through extensive training programs. In the United States, these training programs, which are accredited by the National Academy of Nuclear Training (NANT) of the Institute for Nuclear Power Operations (INPO), can last up to three years. It is very helpful to the utility-employers if the perspective employees can come into their positions with a background in nuclear energy and nuclear power that might shorten the onsite training required.

Figure 1 shows an illustrative estimate of the manpower requirements during construction and commissioning of a nuclear power plant.



Steps in executing the plan: The work of preparing the workforce falls to many Texas institutions as seen in the following list:

1. Wharton County Junior College will lead a program to establish a two-year Power Technology Program. Graduates from this program will be prepared to enter into accelerated accredited training as mechanics, electricians, and chemistry technicians.
2. Hill College will be the lead institution to create a two-year Radiation Protection Technology Program. The program will be developed to meets the needs of new hires as radiation detection technician trainees at the new plants.
3. Texas State Technical College will lead establishment and development of a two-year Digital Instrumentation and Control Curriculum. Because much of the instrumentation and control systems in current nuclear power plants in the U.S. are based on analog technology, there is need for graduates with a knowledge base of digital I&C systems for future nuclear power plants.
4. The Department of Nuclear Engineering at Texas A&M University will coordinate development of a four-year Certificate Program in Nuclear Power Systems and

Operations. This program material will be available to engineering students in the disciplines of mechanical engineering, electrical engineering, and chemical engineering.

5. The Department of Engineering Technology at Texas A&M University will establish a four-year Power Engineering Technology program. This program will prepare graduates for several roles in plant operations, maintenance, systems engineering and licensed operator training programs.
6. All will work to expand recruiting programs to attract students into academic programs to serve the Texas Nuclear Workforce Development Initiative. This will build on the very successful recruiting program by the Department of Nuclear Engineering, and expand it to the other disciplines, institutions and geographical areas of study that are part of this initiative.
7. Texas A&M University Nuclear Science Center will expand the Reactor Operator Training Program to increase the number of students who would qualify to become licensed reactor operators and senior reactor operators.
8. The University of North Texas will lead development of a number of web based on-line courses on nuclear power plant systems and operations that can be utilized by the various institutions participating in this program.

Summary and Concluding Remarks: The state of Texas is moving well ahead of the power curve in preparing to increase the fraction of electric power from nuclear sources in the state. Long known as one of the “dirtiest” for its large carbon footprint, Texas is carefully preparing for a nuclear future that should assure that the skies of Texas are cleared. The plan involves many of the state’s educational facilities in a truly cooperative effort.

References: K. L. Peddicord et al, “Sustainable Nuclear Power-The Human Dimension”, PHYSOR 2008 International Conference on the Physics of Reactors, Track 16, September 14-18, Interlaken, Switzerland.