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High-Temperature Teaching and Test Reactor Research Facility

FACT SHEET

The total cost, including engineering, licensing, and construction in West Texas, is estimated to be approximately \$400 million - to be raised from government, industry, and private sources.

1. A Pre-Conceptual Design (PCD) of the facility will be completed to obtain the funding. The contents of this PCD will include a project business plan, academic plan, and technical plan for the engineering, licensing, construction, and operations of the facility. The estimated cost of this PCD is \$3 million and it is being funded from local and private sources.
2. Components
 - a. **Reactor** – 25 MWth (Mega Watt thermal) high temperature (eventually greater than 950° Celsius), helium cooled, passively safe reactor that uses TRISO-coated fuel particles in a graphite prismatic core.
 - b. **Radiation Laboratory** – Will contain regular and remote radiation handling facilities and state-of-the-art nuclear spectroscopic equipment.
 - c. **High-Temperature Process & Materials Laboratory** – Will initially use the reactor waste heat at temperatures up to 950° C to test and develop new industrial processes and materials. The processes of interest include hydrogen and synfuels production while the materials will include the development of new alloys and ceramics that can be easily machined and tooled.
 - d. **Brayton Cycle Development Laboratory** – Will test and develop high-efficiency electricity generation methods and equipment that utilize high-temperature gas turbines like those in jet aircraft.
3. The Team
 - a. **The University of Texas System** - Operates nine academic campuses and six health institutions. It has more than 184,000 students, \$9.6 billion operating budget, almost \$29 billion in total assets, and an investment portfolio of more than \$16 billion. <http://www.utsystem.edu>
 - b. **The University of Texas of the Permian Basin (UTPB)** - Created in 1969 as an upper-level university, UTPB began offering a full four-year undergraduate curriculum in 1991, and now provides 28 undergraduate and 17 graduate degree programs. <http://www.utpb.edu>
 - c. **General Atomics of San Diego, California** - Developed much of the modern gas reactor technology. More about them can be seen at their Web Site at <http://www.ga.com>

- d. **Andrews, Texas** - Located 35 miles east of what is sometimes locally called the “Permian Basin Nuclear Industry Park.” Andrews County is home to Waste Control Specialists which is one of the only two Nuclear Regulatory Commission-licensed facilities approved in the U.S. in the past 20 years. The other is Louisiana Environmental Services which is located west and adjacent to the WCS in Lea County New Mexico.
 - i. Waste Control Specialists (WCS). The WCS facility is low-level nuclear (LLN) and hazardous waste facility that is currently permitted for Resource Conservation and Recovery Act (RCRA) waste treatment and disposal plus LLN waste storage. Their LLN treatment and disposal licenses are expected to be granted within the next few months.
 - ii. Louisiana Environmental Services (LES). LES is completing the last steps of their licensing while finishing the site evaluation engineering work for their \$1.4 billion National Enrichment Facility (NEF). Construction is expected to soon start for this first privately operated uranium enrichment facility in the U.S.
 - e. **Midland, Texas** - The economic and finance center of the Permian Basin oil and gas production region.
 - f. **Odessa, Texas** - The operations center of the Permian Basin oil and gas production region and home of UT-Permian Basin
 - g. **Collaborators**
 - i. The University of Texas at Arlington. Materials Science Engineering <http://www.mse.uta.edu> and Electrical Engineering <http://www-ee.uta.edu>
 - ii. The University of Texas at Austin Mechanical Engineering Department <http://www.me.utexas.edu/> and Nuclear Engineering Teaching Lab <http://www.me.utexas.edu/~nuclear/>
 - iii. The University of Texas at Dallas Electrical Engineering – Microelectronics <http://www.ee.utdallas.edu>
 - iv. The University of Texas at El Paso Mechanical Engineering <http://academics.utep.edu/me/> and Metallurgical & Materials Engineering <http://academics.utep.edu/mme/>
 - v. Thorium Power, Inc. (McLean, Va.) – Potential thorium fuel designs <http://www.thoriumpower.com>
4. Goals of the Facility
- a. Educate and train a new generation of engineers and scientists in:
 - i. High-temperature gas-cooled reactor technology and design
 - ii. Advance nuclear fuel cycle development
 - iii. High-temperature materials science and engineering
 - iv. High-temperature industrial process development
 - v. Use of Brayton Cycles systems in electricity production
 - vi. Basic scientific research
 - b. Develop new materials that can successfully operate in temperatures in excess of 950° Celsius.
 - c. Develop new industrial methods and processes that require large quantities of process heat in excess of 950° Celsius (economic production of hydrogen from water, synthetic fuels (synfuels) from coal and petroleum refinery wastes, new desalination methods, etc.)

- d. Optimize the use of modern high-temperature gas turbines to generate electricity with increased efficiency
- e. Help wean the US from its dependence on petroleum-based hydrocarbons.

The University's Wants

1. UT Permian Basin is raising \$3 million in charitable donations to complete the PCD. As of February 22, 2006 a total of slightly over \$3 million has been received or pledged for the project. Below is a summary of fundraising efforts to date:
 - a. \$193,575 from individuals in west Texas
 - b. \$500,000 from economic development funds raised in Andrews, Texas
 - c. \$500,000 from economic development funds raised in Midland, Texas
 - d. \$500,000 from economic development funds raised in Odessa, Texas
 - e. \$17,500 from Caprock Electric
 - f. \$50,000 from Western National Bank
 - g. \$50,000 from Thorium Power
 - h. \$1,200,000 pledged from Thorium Power
2. UT Permian Basin is actively seeking financial and technical support from industrial sources to pay for the engineering, licensing, construction, and operations of this facility.