Browns Ferry Nuclear Plant

Owner and operator

- The Tennessee Valley Authority is a federal corporation that has evolved into America's largest public power company, with operating revenues for the 2003 fiscal year of nearly $7 billion. Although TVA is owned by the federal government, all of its programs and business operations are self-financed.

TVA overview

- TVA supplies electricity to large industries and 158 distributors that serve approximately 8.5 million consumers in a seven-state service region, which covers most of Tennessee and portions of Alabama, Georgia, Kentucky, Mississippi, North Carolina, and Virginia.

- TVA also offers economic development services and manages the Tennessee River and its tributaries to provide multiple benefits, including flood control, navigation, water quality, and recreation.

TVA Nuclear overview

- TVA's three nuclear plants—Browns Ferry, in Athens, Alabama; Sequoyah, in Soddy-Daisy, Tennessee; and Watts Bar, in Spring City, Tennessee—account for about 20 percent of the corporation's total generating capacity. As an integral part of the company's diverse generating sources, these plants provide enough power to serve over three million homes in the Tennessee Valley.

- TVA Nuclear operates in a highly regulated environment and is overseen by the Nuclear Regulatory Commission, which has found in annual reviews that each of the nuclear plants operates in a manner that preserves public health and safety and fully meets objectives for safe operation.

Browns Ferry Nuclear Plant

- The plant is named after the ferry that operated at the site until the middle of the 20th century.

- It is located on 840 acres on Wheeler Reservoir near Athens, Alabama.

- The plant consists of three General Electric boiling water reactors. Units 2 and 3 are currently in operation and can produce enough electricity to supply about 1.3 million homes a day. Unit 1 is scheduled to return to service in 2007.

Browns Ferry Management: Ashok Bhatnagar, Site Vice President
Michael Skaggs, Plant Manager

Workforce

- During normal operation, Browns Ferry is staffed by approximately 820 TVA employees, primarily craftsmen, engineers, and operators.

- The site typically employs about 500 contract employees for maintenance activities during refueling and maintenance outages.

Economic impact

- Browns Ferry has an annual payroll of approximately $68.5 million, which generates a secondary local economic impact of an additional 3,400 jobs with a payroll of $98 million.

- As a result of Browns Ferry employment and the resulting jobs in the local economy, total local retail and service purchases amount to approximately $106 million each year. Additionally, these workers pay about $4 million in sales taxes and $500,000 in property taxes annually.

- The plant also spends over $50 million annually for materials and services to support plant operations.

Operating history

- Browns Ferry was TVA's first nuclear power plant.
- Major construction began in 1967.
- Unit 1 began commercial operation on August 1, 1974.
- Unit 2 began commercial operation on March 1, 1975.
- Unit 3 began commercial operation on March 1, 1977.
- The longest continuous operating run for Unit 1 is 137 days, 5 hours, and 40 minutes—September 1, 1984 to January 16, 1985.
- The longest continuous operating run for Unit 2 is 335 days, 14 hours, and 45 minutes—October 30, 1997 to October 1, 1998.
- The longest continuous operating run for Unit 3 is 669 days, 9 hours, and 15 minutes—May 25, 2000 to March 26, 2002.

Performance highlights

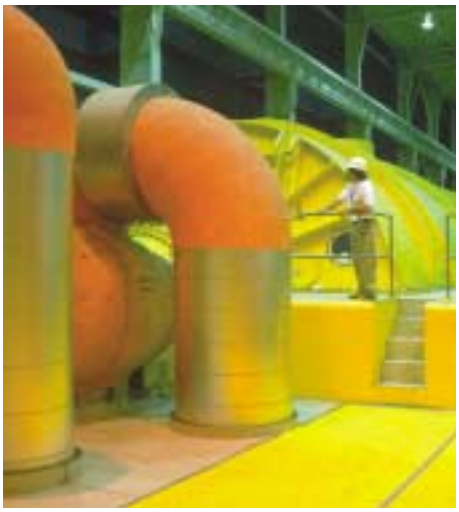
- Browns Ferry generated 17.55 billion kilowatt hours (net) in 2003.

- Browns Ferry achieved the nation's second-longest continuous run of 669 days, set by the Unit 3 reactor from May 2000 to March 2002. During that time, Unit 3 generated a world-record 18 billion kilowatt-hours of electricity.

- Browns Ferry Unit 3 was included in the top 25 percent of Navigant Consulting Inc.'s list of the best-performing reactors in the United States during 2003 based on nonfuel operations and maintenance costs, capacity factor, and regulatory performance, according to information published in *Nucleonics Week*, a trade publication. Navigant Consulting is a specialized consulting firm that provides a variety of services to government agencies, legal firms, and large companies.

- EUCG Inc. ranked Browns Ferry ninth out of 60 United States nuclear sites that filed performance information in 2003, including generation, operation and maintenance costs, capital costs, fuel costs, and staffing. EUCG Inc. is an association of utility professionals that tracks electric utility issues and provides data and feedback on utility- and plant-specific information.

- TVA is working to return Browns Ferry Unit 1 to service, which will provide an additional 1,280 megawatts of power to the Valley. Restart activities are on schedule and within the approved budget. The Unit 1 team is ensuring the quality and safety of the work by using the same programs that have proved effective in TVA's successful nuclear operations and in earlier projects restarting other TVA reactors.



- TVA Nuclear received a Top Industry Practice Configuration Management Process Award from the Nuclear Energy Institute for permanent drywell shielding installed at Browns Ferry.

Security

- Browns Ferry and TVA's other nuclear power plants were some of the most secure industrial facilities in the U.S. before September 11, 2001, and their security has been enhanced since then.

- The plants are fortified by robust concrete and steel structures that protect the reactor and other plant facilities.

- Since September 2001, a comprehensive review of security requirements has been conducted at TVA's nuclear power plants, and TVA Nuclear continues to refine existing security measures and add new ones. For example, the security perimeters at TVA nuclear plants have been extended, and security patrols and staffing have been increased. All of TVA's nuclear power plants feature state-of-the-art detection equipment and sophisticated access-control systems.

Emergency preparedness

- TVA Nuclear's standards for operating its plants and its highly trained workforce make it unlikely that a radiological incident would occur. Nevertheless, emergency preparedness is an integral part of TVA's nuclear power program.

- TVA works closely with federal, state, and local agencies to ensure that emergency response plans are in place to protect the public and employees.

- Each year, TVA and state and county agencies provide important emergency preparedness information to those within 10 miles of each nuclear power plant. The information includes instructions on what to do if sirens in the area sound and if residents are advised to take shelter or leave an area. To view a copy of the emergency planning information for each plant, go to www.tva.com/power/nuclear.htm

Radiation

- Radiation is a form of energy that can move through empty space, just as light does.

- When radiation passes through any kind of matter—solid, liquid, or gas—it transfers some of its energy into that matter. Ionizing radiation transfers enough energy to change the physical state of atoms with which it interacts, causing them to become electrically charged.

- Everyone is exposed to small amounts of radiation each day. On average, about 80 percent of the radiation to which the public is exposed every year comes from natural sources, such as air and water; the rest comes from man-made sources like medical and dental x-rays and color televisions.

- Nuclear power plants represent one of the smallest sources of radiation to which the public is exposed.

- A nuclear plant's containment building and reactor vessel, as well as other barriers, are designed to contain radiation and protect the public living near the plant from any exposure to elevated levels of radiation. Monitoring is conducted on a continuous basis to assess the impact of plant operations on the environment. The results of this monitoring demonstrate that the radiological impact is negligible when compared with natural background radiation levels.

- Safety standards are also in place to protect nuclear power plant workers. TVA Nuclear has practices in place to keep radiation doses "as low as reasonably achievable."

- Nuclear Regulatory Commission data in 2001 showed that half of the monitored workers at 103 nuclear power reactors received no measurable dose of radiation; the average worker received around 160 millirems—about half of the average natural background radiation. (Source: *Understanding Radiation, Its Effects and Benefits*, Nuclear Energy Institute.)

Waste management

- After a nuclear plant operates for 18 to 24 months, the buildup of depleted fuel and fission fragments makes it no longer practical or efficient to continue using the fuel. This "spent fuel" is removed from the reactor and stored in either steel-lined concrete vaults filled with water or in aboveground steel-reinforced concrete containers at the plant. It will remain there until a permanent federal repository is completed.

- In either case, the plant's containment systems are designed to prevent the release of radioactivity while withstanding natural disasters such as tornadoes and floods.

- After the federal repository is completed, the spent fuel will be transported for permanent disposal.

How nuclear power plants work

- All power plants convert a source of energy into electricity. Most plants do that by heating water to create steam, which turns a turbine that drives an electric generator. Inside the generator, a large electromagnet spins within a coil of wire, producing electricity.

- A fossil plant burns coal or oil to make heat. A nuclear plant uses slightly enriched uranium dioxide for fuel. The uranium dioxide is made into pellets and sealed in long metal tubes called fuel rods. The rods are bundled together in fuel assemblies that are placed in the reactor.

How reactors produce heat to generate electricity

- As a nuclear plant starts up, uranium atoms in the fuel rods release particles called neutrons. When the neutrons strike the uranium atoms, the atoms split (fission), producing heat and releasing more neutrons. Those neutrons strike other atoms, causing them to split. This process continues in a chain reaction, creating the heat needed to turn water into steam.

- The two main types of nuclear reactors are boiling water reactors and pressurized water reactors.

How a boiling water reactor, like Browns Ferry, operates

- Water (dark blue) is pumped through the reactor and is heated by the fuel rods.
- The water boils, turning to steam (light blue).
- The force of the expanding steam drives the turbines, which spin the generator to produce electricity.
- After its energy is used up in the turbines, the steam is drawn into a condenser, where it is cooled back into water and reused in the reactor.
- The availability of an ample supply of water for cooling in the condenser is critical for the successful operation of nuclear and coal-fired plants. TVA manages the Tennessee River system to meet the cooling water needs of its generating plants while balancing the public benefits of navigation, flood control, power supply, water quality, and recreation.