Joseph M. Farley Nuclear Plant

Southern Nuclear

Alabama Power

About Plant Farley

The Joseph M. Farley Nuclear Plant is located along the Chattahoochee River in Southeast Alabama near Dothan. The plant is owned by Alabama Power and operated by Southern Nuclear. The plant is named for Joseph M. Farley, former president and chief executive officer of both Southern Nuclear and Alabama Power. Plant Farley is one of three nuclear facilities in the Southern Company system.

Construction of the plant began in 1970. Unit 1 began commercial operation in December 1977, and Unit 2 began commercial operation in July 1981.

Plant Farley is powered by two Westinghouse pressurized water reactors, and each reactor unit is capable of generating approximately 900 megawatts (MW) for a total capacity of 1,800 MW. The plant generates approximately 20 percent of Alabama Power's electricity.

Almost 900 people – including engineers, mechanics, control room operators, lab technicians, instrument and control technicians, electricians, security officers and others – oversee the plant's operation 24 hours a day, seven days a week. Full-time, on-site inspectors from the U.S. Nuclear Regulatory Commission (NRC) monitor the plant to ensure it is maintained and operated safely, efficiently and in accordance with established nuclear operating procedures.

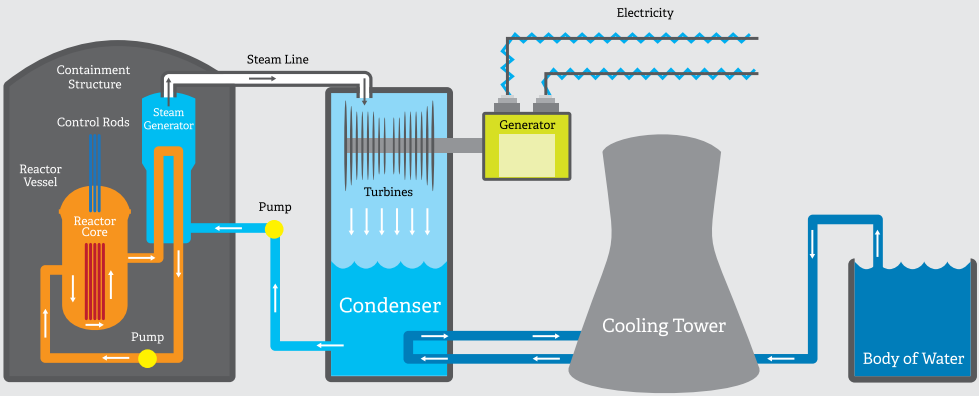
Plant Farley uses approximately 400 of its 1,850 acres to accommodate two reactors, six cooling towers, a state-of-the-art control room, turbine building, low-voltage and high-voltage switchyards, training facilities and our Energy Education Center, which is open to tour groups year-round for scheduled tours.

Nuclear power plants – with their huge output, low operating costs, minimal impact on the environment and inexpensive uranium fuel – continue to be an important and strategic energy resource for the United States.

How Nuclear Power Plants Operate

While fossil power plants generate steam by burning oil, gas or coal, nuclear power plants generate steam with the use of ceramic pellets made from uranium or other fissionable elements. This steam spins the propeller-like blades of a turbine connected to the generator shaft. The electrical current from the generator is then fed to a network of wires (the electric grid) and delivered to consumers. The cylindrical pellets, each about the size of the end of your little finger, are arranged in long vertical tubes within the reactor. Many tubes are bundled together to form a fuel assembly. Control rods can be inserted in the fuel assemblies. These rods regulate a process called fission in splitting atoms. As the atomic pieces split, they generate heat. Operation of the reactor is controlled by varying a number of parameters, including the number of control rods and the degree to which they are inserted or withdrawn.

Pressurized Water Reactor (PWR)



This simplified diagram shows how the steam generating process works.

The Water Cycles

Pressurized water reactors, such as the two at Plant Farley, use three separate water systems. To begin, water is pumped under high pressure through the reactor core where the nuclear chain reaction heats the water to a temperature of about 577 degrees Fahrenheit. Because the water in the reactor is kept under pressure, it does not boil into steam. This hot water travels from the reactor to the three steam generators – located inside the protective containment structure – before it is pumped back into the reactor.

In the steam generator, cooler water in a separate system surrounds the tubes filled with hot water from the reactor core, which heats the cooler water until it boils into steam. This water does not mix with the reactor water. The hot steam passes to the turbine where it hits the turbine blades, making the turbine spin much like a windmill when wind hits its blades. The turbine spins an electric generator, producing electricity. The used steam then enters condensers where it is cooled back into liquid to continue the cycle.

The water that circulates through the condenser is cooled by large fans, much like a car's radiator is cooled by a fan. The circulating water system never comes in contact with the water in the reactor cycle.

Public Safety

Safety is the top priority of the U.S. nuclear energy industry. We take very seriously our obligation to protect the health and safety of our employees, the public and the environment.

Securing Our Facilities

Prior to Sept. 11, 2001, nuclear power plants were already the most secure facilities of any industrial sites in the nation. Since Sept. 11, the nuclear power industry has taken a number of significant steps to reinforce and enhance our security measures, including increased personnel, training, technology and barriers – spending an additional $1.2 billion on security throughout all commercial nuclear power facilities in the United States.

Nuclear power plants are an important component of the nation's critical infrastructure and have been designed with multiple layers of protection, including structural strength, highly trained operators and proven emergency plans.

The NRC holds nuclear power plants to the highest security standards of any American industry. And, of the 17 infrastructure categories currently under evaluation by the U.S. Department of Homeland Security, nuclear plants are by far the best protected. Furthermore, the nuclear power sector is referenced by Homeland Security as its security standard.

Emergency Planning

Comprehensive plans have been developed in accordance with federal requirements by the NRC and other oversight agencies to respond to an emergency at facilities operated by Southern Nuclear.

Southern Nuclear has overall responsibility for the emergency plan, which involves Southern Nuclear, Alabama Power and the various county, state and federal agencies.

The emergency plan specifies the procedures, personnel and equipment used to classify an emergency. This plan defines and assigns responsibilities and outlines an effective course of action for safeguarding personnel, property and the general public.

These plans are updated regularly. Drills and exercises are conducted frequently to test these plans and to train and test personnel on procedure adherence.

In the unlikely event of an emergency, Southern Nuclear would notify off-site authorities such as the Alabama Emergency Management Agency, the NRC and local officials. Communication would be maintained with these agencies to keep them fully aware of the emergency status, including on-site and off-site radiological and security information.

FLEX Strategy

Following the earthquake and tsunami that impacted the Fukushima Daiichi Nuclear Plant in March 2011 in Japan, industry leaders in the U.S. worked together to develop a flexible, diverse coping strategy that would protect U.S. plants against extreme events. The FLEX strategy includes built-in safety systems at the plant, as well as portable emergency equipment such as generators, battery packs, pumps, air compressors and battery chargers to the plant site. With this backup equipment that is stored in a dome on site, the plant has greater capability for ensuring power and water are available to maintain key safety functions. In the absence of AC power from built-in safety systems, this equipment can be deployed quickly by plant employees. It would be used to maintain reactor core cooling, used fuel pool cooling and containment integrity. This equipment provides the greatest safety benefit to the plant in the shortest amount of time.

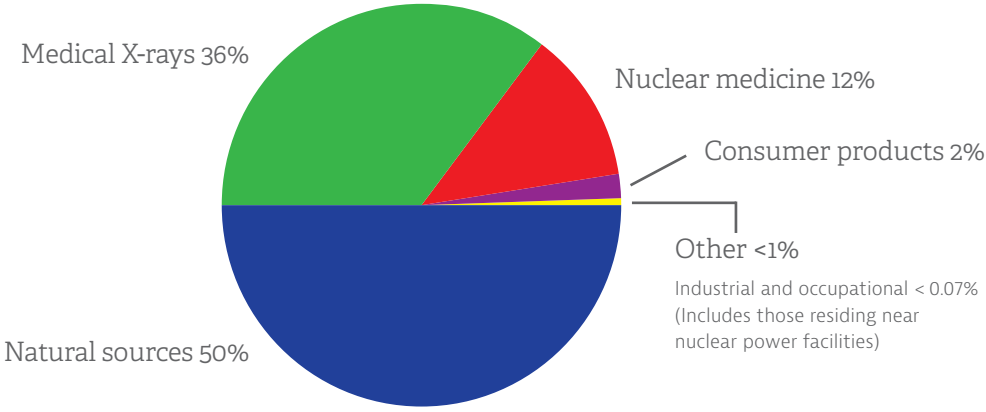
The FLEX strategy also has a third component – two emergency response centers, one in Memphis, Tenn. and one in Phoenix. Each of these secure, 80,000-square-foot facilities has five sets of equipment that can be transported by truck or air to a plant site anywhere in the United States in 24 hours. The equipment at the centers is the same as the equipment that's stored in our dome. It would only be sent if something happened to our on-site equipment during an extreme and unexpected event. This backup equipment – both at the emergency response centers and here at the dome – ensures that plant operators can maintain key safety functions even if off-site power sources are curtailed.

Radiation

The combined effect of the structural, mechanical and human safety systems built into our nuclear plants means that a person living within a few miles of a plant receives less radiation from its presence than from watching television.

Radiation absorbed by the human body is measured in millirem. The average "background" radiation from our natural environment (sunlight, food, rocks, soil) adds up to around 260 to 300 millirem a year, depending on where we live. Other man-made sources of low-level radiation add to this total.

Exposure to Radiation



A typical chest X-ray is about 10 millirem of radiation; a jet airplane flight from New York to California and back again adds 5 millirem. Living within a 5-mile radius of a nuclear power plant will give less than one millirem of radiation exposure per year to an individual.

Federal regulatory agencies carefully set and enforce dose limits to protect the public, the environment and plant employees.

Defense in Depth

Nuclear power plants are designed with many redundant safety systems, sometimes called "defense in depth." Fuel pellets, which are between three and five percent fissionable U-235, are sealed in zircaloy tubes. The fuel assemblies are then contained in a reactor vessel, which has 8-inch-thick steel walls and

weighs 359 tons. This in turn is housed within a containment building – a leakproof, carbon steel liner surrounded by 3.75 feet of reinforced concrete. There are several redundant cooling systems to minimize the possibility of overheating the reactor core. A nuclear reactor operating at full power can be shut down in only a few seconds by rapidly inserting control rods to stop the fission process.

New Nuclear Plant Development

Southern Company, Southern Nuclear's parent company, has a long-range generation-planning process that seeks to identify the most cost-effective, reliable and environmentally responsible fuel sources to meet growing electricity demands in the areas we serve. Nuclear power is a proven technology that is a viable generating source.

Increased demand for energy is driving the need for new baseload capacity. The population of the southeastern United States continues to expand rapidly, and according to the U.S. Department of Energy, 40 percent of the U.S. population will live in the Southeast by 2040.

As energy needs grow in the Southeast, Southern Company is on the forefront of exploring nuclear energy as an option for meeting rising electricity demand. The process of building the first two new reactors in more than 30 years at Plant Vogtle is well underway.

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The Nuclear Advantage

Nuclear energy is a safe, reliable, cost-effective form of energy. Since 1974, Southern Company has operated nuclear plants safely and reliably. The average 3-year capacity factor of our nuclear power plants is more than 90 percent. Capacity factor is the percent of time the unit is available to provide power to the electrical grid. Nuclear power has a low production cost compared with other fuel sources. Uranium is used as nuclear fuel, and it has less price volatility than other fuel sources such as coal and natural gas.

Nuclear power adds diversity to our energy portfolio. Twenty percent of the nation's electricity is supplied by nuclear power. Behind coal and natural gas, it is the third leading source of electricity. The use of nuclear power increases our independence by decreasing our dependence on foreign oil.

Nuclear power produces no greenhouse gases, making it a sound, environmentally responsible fuel source. Nuclear power accounts for three-quarters of all emission-free electric generating capacity in the U.S.

Protecting Our Environment

Plant Farley's Commitment to the Environment

Since 1992, Plant Farley has been recognized as a certified wildlife habitat by the Wildlife Habitat Council. The council is a non-profit international organization dedicated to protecting and enhancing wildlife habitat. Almost half of Plant Farley's 1,850 acres are wooded, with the remainder consisting of meadows, wetlands, ponds and a 100-acre lake.

Shortly after the plant was built, a detailed land management plan was developed. The plan outlines strategies for enhancing the habitat for waterfowl, songbirds, deer and plant life.

As a steward of the environment, Plant Farley also manages an extremely successful bluebird nesting program. More than 30 bluebird boxes have been installed on the site, and plant workers monitor the boxes and count the number of nests, eggs and baby bluebirds. The nesting program has expanded into the local community. One of the Farley Energy Education Center outreach programs is a partnership with local school-aged children to monitor the boxes and record the results.

Storage of Used Fuel

A solid material, used nuclear fuel is safely stored at nuclear power plant sites, either in steel-lined, concrete pools filled with water or in steel or steel-reinforced concrete containers with steel inner canisters. The first on-site storage method is referred to as the spent fuel pool. The second is called dry cask storage.

Spent Fuel Pool

When most of the uranium has been used in the fission process, the fuel assemblies are removed and replaced with new fuel assemblies. At most plants, used fuel is stored in large, steel-lined concrete pools filled with water. Both water and concrete are excellent radiation shields. In a spent fuel pool, the water acts as an absorber and prevents radiation from escaping from the pool. The water also keeps the fuel cool while the fuel decays or becomes less radioactive over time. The water itself never leaves the inside of the plant's concrete auxiliary building.

Spent fuel pool

Dry Cask Storage

Under the Nuclear Waste Policy Act of 1982, the U.S. Department of Energy is the federal agency responsible for the disposal of high-level waste such as used nuclear fuel. After decades of exhaustive scientific and engineering research, a permanent repository for the used fuel still has not been established.

The government's delay in providing a permanent repository for used nuclear fuel means that nuclear plants must store more used fuel than expected and

store it for longer than originally intended. Since 1986, dozens of U.S. nuclear plants have supplemented storage capacity by building above-ground dry storage facilities. Other countries have also safely and successfully stored used fuel above ground since the mid-1970s.

All of Southern Nuclear's plants use dry cask storage. Dry storage containers are cylindrical containers constructed of steel or steel-reinforced concrete and lead, which serve as proven, effective radiation shields. These containers effectively shield the radiation as used fuel continues its cooling process. Once loaded with used fuel assemblies, the containers are stored either horizontally in a concrete vault or stored upright on a thick concrete pad.

Dry cask storage

Each dry storage container design must be approved by the NRC. The agency requires that dry storage containers constantly be monitored and relicensed every 20 years. The containers are designed and tested to prevent the release of radiation under the most extreme conditions – earthquakes, tornadoes, hurricanes and floods – and they are naturally cooled and ventilated.

Nuclear plants were designed to store at least a decade's worth of used fuel. And, with dry storage, the NRC has determined that used fuel can safely be stored at plant sites for at least 30 years beyond the licensed operating life of the plant. While used nuclear fuel can be safely stored on-site, Southern Company and the industry maintain that a permanent underground repository is the best, long-term solution.

These storage areas are well protected by a combination of sturdy plant construction, state-of-the-art surveillance and detection equipment, in addition to armed, well trained paramilitary security forces.

Owners and Operators

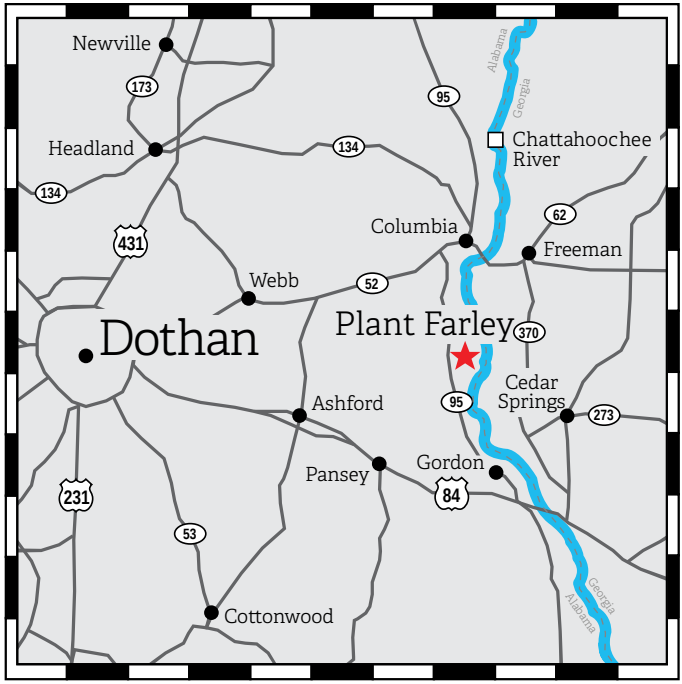
Southern Nuclear, headquartered in Birmingham, Ala., operates Southern Company's six nuclear units at three locations: the Alvin W. Vogtle Electric Generating Plant near Waynesboro, Ga., the Edwin I. Hatch Nuclear Plant near Baxley, Ga., and the Joseph M. Farley Nuclear Plant near Dothan, Ala. Plants Vogtle and Hatch were built by and are co-owned by Georgia Power, Oglethorpe Power Corporation, the Municipal Authority of Georgia and Dalton Utilities. Together, these two nuclear power plants generate approximately 20 percent of Georgia Power's electricity. Plant Farley was built and is owned by Alabama Power, and the plant generates approximately 20 percent of Alabama Power's electricity.

With more than 9 million customers and approximately 44,000 megawatts of generating capacity, Atlanta-based Southern Company (NYSE: SO) is the premier energy company serving the Southeast through its subsidiaries.

Southern Company and its subsidiaries are leading the nation's nuclear renaissance through the construction of the first new nuclear units to be built in a generation of Americans.

Southern Company has been named by the U.S. Department of Defense and G.I. Jobs magazine as a top military employer, recognized among the Top 50 Companies for Diversity and the No. 1 Company for Progress by DiversityInc and designated as one of America's Best Employers by Forbes magazine.

Plant Farley's contributions to the nuclear industry, the environment and commitment to the community have been recognized with a variety of awards and honors. In 2016, the Wildlife Habitat Council presented the station with their Invasive Species Project Award and the Reptiles and Amphibians Project Award for work done to improve and enhance wildlife habitat. Contributing more than $100,000 annually, Plant Farley has been a long-time pacesetter in the local United Way campaign efforts and was recognized by the Wiregrass Area United Way with their 2016 Giving Excellence Award following the 2016 fundraising campaign. In 2018, the SNC Farley Charitable Committee Campaign awarded $56,500 to local STEM programs and other 501c3 non-profit organizations focused on improving lives and communities throughout the surrounding counties.



Joseph M. Farley Energy Education Center

7388 North County Road 95
Columbia, AL 36319
334.814.4879

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