



OPPD's Fort Calhoun Station Nuclear Fuel Cycle

The first step in the nuclear fuel cycle is the mining of the uranium.

After the ore is mined, the uranium is extracted by a chemical process called milling. The refined uranium is then enriched – a process that increases the proportion of U-235, the most highly fissionable uranium isotope. Natural uranium contains 0.7 percent U-235. The uranium fuel used in OPPD's reactor is enriched to greater than four percent U-235, with the rest being primarily U-238, a non-fissionable isotope.

The enriched uranium, uranium dioxide (UO₂), is fabricated into ceramic pellets 0.476 inches long and 0.3805 inches in diameter. The fuel in OPPD's reactor consists of more than six million pellets. Each of these pellets can produce approximately the same amount of electricity as 2,400 pounds of coal.

The pellets are stacked and sealed in tubes or rods, made of zirconium alloy. These fuel rods are about 11 and 1/3 feet long and about 1/2 inch in outside diameter. The fuel rods are then bundled together into fuel assemblies. There are 176 rods in each fuel assembly and 133 assemblies in the reactor core.

Spacer grids in each fuel assembly separate the fuel rods from one another. The reactor coolant or moderator water will circulate through these spaces between the fuel rods.

The nuclear fuel in OPPD's reactor is replaced on a regular basis. The lifetime of a batch, approximately one-third of the total amount of nuclear fuel, is four to five years. Every 18 months, the oldest batch of fuel (about 44 assemblies) is removed, and a fresh one is placed into the reactor.

Used fuel is stored in the spent fuel pool – an area that resembles a swimming pool about 43 feet deep. The spent fuel pool is a reinforced concrete structure lined with stainless steel that provides storage capacity for 1,083 fuel assemblies.

The spent or used fuel taken from OPPD's reactor contains valuable material that can be reclaimed. In fact, only about three percent of the uranium is used, while the remainder is still locked in the fuel rods.

The Nuclear Waste Policy Act of 1982, as amended in 1987, provides for eventual shipment of this material to federal repositories. In the meantime, Fort Calhoun Station's spent fuel pool and on site dry-cask storage of the oldest spent fuel assemblies will be used to provide the necessary storage space.