

ADOPT™ Fuel

Background

Westinghouse developed Advanced Doped Pellet Technology (ADOPT™) fuel to improve fuel cycle economics and enhance the accident tolerance of conventional uranium dioxide (UO₂) fuel pellets.

ADOPT fuel is an advanced doped pellet, developed in conjunction with Westinghouse's EnCore® fuel program.

Description

ADOPT fuel is an improved UO₂ design, doped with small amounts of chromia (Cr₂O₃) and alumina (Al₂O₃). By utilizing small amount of alumina, Westinghouse has been able to keep the amount of chromium (a parasitic neutron absorber) to a minimum, thereby improving neutron efficiency.

ADOPT fuel can be employed in all Westinghouse and Combustion Engineering (CE) Pressurized Water Reactor (PWR) and Boiling Water Reactor (BWR) designs, and is compatible with all zirconium-based cladding materials and fuel enrichments.



ADOPT Pellets

Benefits

Increased density of fissile material

The ADOPT pellet design achieves greater uranium efficiency through an approximate 2 percent increase in fissile material, as compared to Westinghouse's conventional UO₂ product.

An increased uranium density promotes core design flexibility and higher discharge burnups.

Enables higher burnups

Several features of ADOPT fuel enable higher burnup, such as enlarged grain structure and reduced transient fission gas release (FGR). ADOPT fuel is also expected to provide additional safety benefits in terms of fuel fragmentation, relocation, and dispersal (FFRD) in an event such as a loss-of-coolant accident.

Lower transient FGR

The enlarged grain structure of ADOPT fuel results in better intragranular fission gas retention capability. Ramp testing has demonstrated a 30 percent reduction in fission gas release as compared to that of undoped UO₂ fuel.

Higher thermal stability

An increased thermal stability allows for more accurate prediction and enhanced control of pellet-cladding gap closure.

Increased PCI margins

ADOPT fuel exhibits reduced Pellet Clad Interaction (PCI) under accident conditions due to its enhanced creep rates at high temperatures.

Enhanced corrosion & washout resistance

With an oxidation rate 50 percent less than conventional UO₂, ADOPT fuel is expected to have reduced wash-out in the event of a fuel rod leaker.

Experience

ADOPT fuel is a commercial product within the European market with extensive manufacturing and operating experience. Westinghouse has over 20 years of irradiation experience in delivering over 25 regions of fuel containing ADOPT fuel pellets.

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