

Nuclear Fuel Contingency Redesign

Background

Westinghouse core designers spend considerable time and effort developing high-performing loading patterns (LPs). However, redesigns are sometimes necessary, and even well-designed loading patterns can be adversely affected by fuel issues. When this occurs, months worth of design effort must be compressed into weeks or even days. Utilities can incur substantial costs waiting for a new loading pattern to be developed, analyzed and verified before continuing with the reload.

Description

The contingency redesign is an analysis process that anticipates different potential fuel scenarios and provides a new plan for each. Work is done prior to the outage to develop and analyze a set of alternative LPs to account for the various possible fuel issues. A typical delivered product of the contingency redesign is a report that documents an alternate LP to use if any one of the burned assemblies is found to be unusable in the upcoming cycle.

Instructions are provided to the utility for shuffling in the replacement fuel and a safety assessment provides justification for operation to allow the movement of fuel. The contingency redesign scope can be customized to fit a customer's specific needs and values.



Review of fuel loading pattern

Benefits

- Turn-around Time:
Allows for a much decreased turn-around time for redesign work once the fuel issue is known.
- Critical Path Protection:
Reduces the risk that the customer will be waiting for the Westinghouse redesign analysis during an outage.
- Increased Confidence:
Provides confidence that a suitable loading pattern exists if a fuel assembly is damaged.
- Protection of Quality:
Time pressure is a significant error precursor, which is almost always present in a redesign situation. The contingency redesign reduces that time pressure in the redesign model development.

Experience

A contingency redesign has been successfully performed ahead of the outage on various plants that have shown indication of an unknown fuel issue during operation. However, for some plants, a contingency redesign is a supplemental project that is performed in parallel every cycle with the standard design, even when there is no indication of fuel issues.