

# Emergency Fuel Pool Cooling System

## Background

On March 11, 2011, Japan experienced tandem, unprecedented natural disasters. First, a magnitude 9 earthquake – the country’s largest ever – hit. Power generation at the operating Fukushima Daiichi reactors ceased, and the emergency core cooling system (diesel generators) started up, as planned.

Approximately one hour later, a 46-foot tsunami struck the country’s northeastern coast, breaching the plant’s 19-foot protective wall, flooding the diesel generators and incapacitating all but one of the emergency core cooling systems (batteries). While the severity of these events was previously unanticipated, the industry is responding appropriately and taking actions based on lessons learned from the Fukushima events.

## Description

Westinghouse has built on its patented temporary fuel pool cooling system capabilities and experience to develop an emergency fuel pool cooling system (EFPCS) to address these recent events. This system consists of a permanently installed “primary” cooling loop located inside the reactor building or SFP building, and a mobile “secondary” cooling loop. The secondary cooling loop is stored off-site and then located outside the reactor building for either emergency or pre-planned use. This approach reduces the time required for system assembly and startup, which is especially important during emergency situations, and eliminates the need to enter the reactor building. The EFPCS includes mobile diesel generators, air compressors, switchgear and other support equipment required to operate this stand-alone system.

## Benefits

### Emergency Response

Westinghouse’s EFPCS is designed primarily to be a stand-alone backup system for the removal of decay heat from the spent fuel pool during site emergencies when off-site electrical power or emergency diesel power is not available. The system also allows for the addition of makeup water so that safe SFP water levels are maintained.

The safety design and features of the Westinghouse EFPCS allow for plant requirements such as:

- Seismic requirements
- Environmental release limits
- Fuel pool temperature limits
- Supplemental cooling mode
- Remote operating interface
- Independent diesel power
- SFP keep-fill system



Spent fuel pool

### Normal Plant Operations:

During refueling outages, the Westinghouse EFPCS can be operated in the temporary cooling mode, similar to Westinghouse's patented temporary fuel pool cooling system. Operation of this system during refueling outages can reduce fuel movement delays (based on SFP decay heat) and improve refuel floor working conditions by reducing SFP temperatures.

### Experience

Westinghouse is a global leader in providing nuclear field services. The EFPCS is Westinghouse's response to recent industry events and in support of the global nuclear fleet.



Secondary cooling pumps and cooling tower



Primary cooling pumps

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