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Abstract

This final safety evaluation report documents the technical review of the AP1000 standard nuclear reactor design by the U.S. Nuclear Regulatory Commission (NRC). Westinghouse Electric Company submitted the application for the AP1000 design on March 28, 2002, in accordance with Title 10 of the Code of Federal Regulations (10 CFR) Part 52, Subpart B, “**Standard Design Certifications**,” and 10 CFR Part 52, Appendix O, “Standardization of Design:

Staff Review of Standard Designs.”

The AP1000 nuclear reactor design is a pressurized water reactor with a power rating of 3415 megawatts thermal (MWt) and an electrical output of at least 1000 megawatts electric (MWe). The AP1000 design contains many features that are not found in current operating reactors. For example, a variety of engineering and operational improvements provide additional safety margins and address the Commission’s severe accident, safety goal, and standardization policy statements. The most significant improvement to the design is the use of safety systems that employ passive means, such as gravity, natural circulation, condensation and evaporation, and stored energy, for accident mitigation. These passive safety systems perform safety injection, residual heat removal, and containment cooling functions.

Some features of the AP1000, compared to currently operating reactors, include a longer reactor core design, a larger pressurizer, an in-containment refueling water storage tank, an automatic depressurization system, a revised main control room design with a digital microprocessor-based instrumentation and control system, hermetically sealed canned reactor coolant pump motors mounted to the steam generator, and increased battery capacity. In addition, the facility is designed for a 60-year life, which exceeds the projected 40-year combined operating license period, and employs structural modules.

On the basis of its evaluation and independent analyses, as set forth in this report, the NRC staff concludes that Westinghouse’s application for design certification meets the requirements of 10 CFR Part 52, Subpart B, that are applicable and technically relevant to the AP1000 standard design. Appendix G includes a copy of the report by the Advisory Committee on Reactor Safeguards, as required by 10 CFR 52.53.