

ABSTRACT

This final safety evaluation report (FSER) documents the U.S. Nuclear Regulatory Commission (NRC) staff's technical review of the design certification application (DCA) submitted by NuScale Power, LLC (NuScale) (NRC docket No. 52-048).

In a December 31, 2016, letter, NuScale submitted its DCA in accordance with Subpart B, "Standard Design Certifications," of Title 10 of the Code of Federal Regulations (10 CFR) Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants." Revision 5 of the DCA dated July 29, 2020, is the latest revision on the docket. On July 13, 2020, NuScale submitted a request for a Standard Design Approval in accordance with 10 CFR Part 52, Subpart E, "Standard Design Approvals," supported by the DCA FSER, upon its completion.

The NuScale DCA is the first application for a Small Modular Reactor (SMR). The applicant's design consists of up to 12 NuScale Power Modules (NPMs). Each NPM is a collection of systems, subsystems, and components that together constitute a modularized, nuclear steam supply system. The NPM is composed of a reactor core, a pressurizer, and two steam generators integrated within a reactor pressure vessel and housed in a compact steel containment vessel. Each NPM is rated at 160 megawatts thermal (MWt) (up to 1,920 MWt total for 12 NPMs), with approximately 50 megawatts electric (MWe) (up to 600 MWe total for 12 NPMs) output.

This FSER presents the results of NRC staff's review of the NuScale SMR design against the requirements of 10 CFR Part 52, Subpart B, and delineates the scope of the technical details considered in evaluating the proposed design.

The NRC staff has completed its review of the DCA, as documented throughout the FSER and finds it to be acceptable, recognizing three issues as not resolved within the meaning of 10 CFR 52.63(a)(5) due to the absence in the design of sufficient information regarding: (1) the shielding wall design in certain areas of the plant; (2) the potential for containment leakage from the combustible gas monitoring system; and (3) the ability of the steam generator tubes to maintain structural and leakage integrity during density wave oscillations in the secondary fluid system, including the method of analysis to predict the thermal-hydraulic conditions of the steam generator secondary fluid system and resulting loads, stresses, and deformations from density wave oscillations reverse flow.