

Draft for Comment



U.S. NUCLEAR REGULATORY COMMISSION **DESIGN-SPECIFIC REVIEW STANDARD FOR NuScale SMR DESIGN**

BRANCH TECHNICAL POSITION DSRS 8-3

STABILITY OF OFFSITE POWER SYSTEMS

REVIEW RESPONSIBILITIES

Primary - Organization responsible for electrical engineering

Secondary - None

A. BACKGROUND

The staff has traditionally required each applicant to perform stability studies for the electrical transmission grid that would be used to provide the offsite power sources to the plant to demonstrate compliance with GDC 17. The basic requirement is that loss of the largest operating unit on the grid will not result in loss of grid stability and availability of offsite power to the plant under consideration. Isolated power systems of limited generating capacity are inherently less stable than equivalent systems with supporting grid inerties. Limited systems may also be more vulnerable to natural disasters, such as tornadoes or hurricanes. Therefore, due to the siting versatility expected of the modular NuScale design and the potential for a limited number of transmission lines to the plant site, grid stability needs to be a focus of the electrical power system review.

Regulatory Guide (RG) 1.206 addresses anticipated combined license applications submitted under Title 10 of the *Code of Federal Regulations*, Part 52. Detailed information and guidance are provided in Section C.1.8, Electric Power, of RG 1.206, with guidance to the applicants to submit detailed analyses and studies for staff review, to demonstrate compliance with the last paragraph of GDC 17.

In addition, Institute of Electrical and Electronics Engineers (IEEE) Standard (Std.) 242 and IEEE Std. 399 provide technical information and guidance regarding the protection and performance of the offsite electric power system.

B. BRANCH TECHNICAL POSITION

1. Given that NuScale designs may well be sited in fairly remote areas, grid stability may become more of a concern. The offsite power system interface requirements in the design control document must be fully defined to enable the combined license applicant to perform the necessary stability studies required to support the requirements of GDC 17 and the safety analyses of the NuScale design.
2. The staff will examine the generating capacity of the offsite power system per the guidance of Section C.1.8 of RG 1.206. If, based on the applicable criteria in RG 1.206,

offsite power system generating capacity may be inadequate in its ability to provide adequate stability of the grid, additional measures may be necessary. These may include provisions for additional capability and margin for the onsite power system beyond the normal requirements or other measures that may be appropriate in a particular case. The additional measures to be taken should be determined on an individual case basis.

C. REFERENCES

1. RG 1.206, "Combined License Applications for Nuclear Power Plants (LWR Edition)," 2007.
2. IEEE Std. 242-2001, "Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems," 2001.
3. IEEE Std. 399-1997, "Recommended Practice for Power Systems Analysis," 1997.