

## **RFA-17-14585, Performance of System Stability Analysis for the SMR-160 Small Modular Reactor Design**

SMR Inventec, LLC, is performing system stability analysis for the SMR-160 small modular reactor design. The SMR-160 is a fully passive circulation pressurized water reactor. As primary flow through the core at full-power operation is driven only by natural circulation, the nuclear and thermal-hydraulic parameters of the primary system are inherently coupled. This coupling, combined with the use of control blades for reactivity control in lieu of chemical shim, the long primary loop transit time, and the behavior of the once-through steam generator and its associated control system, presents a unique operational challenge as there are several, non-independent time constants which could potentially lead to oscillations or flow instability. Since the reactor must be protected from oscillations that may challenge the specified acceptable fuel design limits (GDC 12), the reactor protection system and other relevant control systems in combination with the inherent feedback mechanisms must be designed to suppress and detect or exclude by operating procedure such undesirable conditions. Therefore, it is necessary to prove by analysis, supported by relevant experiments if necessary, the stability of the SMR-160 reactor. SMR Inventec, LLC will work with Oak Ridge National Laboratory to perform this analysis.

SMR Inventec, LLC believes that the unique design principles, leveraging of best practices and operating experiences, and development approach employed for the SMR-160 will result in the most cost-effective, reliable, and readily deployable small modular reactor technology on the market. The SMR-160 represents a significant step forward in economical nuclear power with reduced capital cost, improved safety, and a mature fuel management strategy.