NE-25-37551 – Reference Data for Determination of Carbon and Oxygen Content in TRISO Fuel Kernels

Standard Nuclear Inc., located in Oak Ridge, TN, is a technology company whose mission is to deliver the essential building blocks of nuclear power reliability and at scale, enabling cost-effective, safe, and secure energy for the world. Standard Nuclear is focused on production of tristructural isotropic (TRISO) fuel particles and other non-fuel advanced nuclear ceramics used in advanced reactor systems.

TRISO-based fuel forms undergo rigorous characterization after various manufacturing steps to adhere strictly to the specification defined and approved by the regulator. One requirement, the carbon and oxygen content in the uranium-bearing fuel kernel of the TRISO particle is currently tested by the LECO method. This method has several drawbacks. It is a destructive method that consumes a fraction of material that could be used as fresh fuel; it produces results with some run-to-run variability; and it requires additional hazards and as low as reasonably achievable (ALARA) controls to management potential contamination. Therefore, it does not lend itself to large-scale commercial production of TRISO-based fuels.

Standard Nuclear is developing alternative methods to assess the carbon and oxygen content in the fuel kernel. They will partner with Oak Ridge National Laboratory (ORNL) to perform LECO testing in the Low Activation Materials Development and Analysis (LAMDA) laboratory to help baseline and calibrate the method. By developing an alternative method for assessing carbon and oxygen content in TRISO fuel kernels, this project will reduce the cost and inefficiencies associated with current destructive testing methods.