

NE-20-21392, On-Line Lead/Water Heat Exchanger Sensor/System Feasibility

Hydromine, a sustainable energy company based in New York, recognizes the difficulty and expense of shutting down and flushing a lead-cooled reactor for inspection and maintenance. The primary lead coolant is radioactive and system temperatures are such that a manned approach for inspection and repair is difficult even with draining, cooling, and flushing. On-line structural health monitoring (OLSHM) of the most susceptible components could support extended periods of operation and limit shutdowns for inspection and repair/maintenance to “for cause” rather than based on arbitrarily chosen inspection intervals.

This project will leverage Pacific Northwest National Laboratory’s experience with high temperature ultrasound to demonstrate feasibility for OLSHM of the Hydromine lead-cooled reactor heat exchanger for cracks and corrosion. OLSHM benefits to the Hydromine reactor system include (1) minimizing the expense of a reactor shut down for periodic inspection—only shutdown for cause, (2) reducing the risk of pressurization of the primary system from a steam generator tube rupture and (3) reducing costs by minimizing need to design for manual/robotic inspectability.