

NE-21-26414: Radiation Testing for High-Resolution, Radiation-Hardened Camera Systems

West Chicago is home to Vega Wave Systems, Inc., a small business whose mission is to commercialize innovative technologies in photonics and electronics in the communications and industrial systems markets.

Every 12-18 months, refueling and inspection operations are required on all operating commercial reactors. During these inspections, high resolution cameras are needed that can, for example, read serial numbers of fuel assemblies that need to be visually verified. In a reactor environment this poses significant challenges due to issues such as contaminants and thermal currents in the pools. Additionally, currently available cameras tend to lose functionality when they get within two meters of the core. Specific industry needs for these cameras include higher radiation hardness, better image quality, smaller size and weight, and no radiation-induced noise (RIN).

Vega Wave has developed a camera head and needs to complete radiation testing to achieve market acceptance and verify radiation tolerance limits. The following criteria have been identified for ideal testing: high dose rate equivalent or exceeding 1kGy/hr, easily controllable radiation dose rate for evaluating dose rate tolerance, non-activating radiation fields for early prototype evaluation and debugging, and relevant energy spectrum. Argonne National Laboratory's Van De Graaff system is ideally suited to meet these requirements and will be utilized to demonstrate efficacy of the newly developed camera.