Los Alamos National Lab Unveils 21st Century Radioactivity Sensors

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For the future of radioactivity detection, scientists at Los Alamos National Laboratory looked to nautical history of past centuries.

The “lighthouse detectors,” which are a product of more than six years of development by inventor Jonathan Dowell and colleagues at Los Alamos, adapted the concept of the old-time nautical warning system. But instead of warning sailors away from the hazards of shore, the advanced new tools can alert the presence and direction of radioactivity.

The detectors, which have been honed in size by 80 percent, are now about the size of a peanut butter jar, said officials.

Their application could soon see use at sensitive security checkpoints, locating contaminants at waste sites and verifying storage location of “hot” materials, said Los Alamos in a recent release.

“Lighthouse Detectors move the state-of-the-art forward in radiation detection, saving humans from harm in the process, performing positive surveys where radiation is present and positive evidence of a negative result where radiation is absent,” the Laboratory stated.

The lighthouse detector made one of its biggest steps in development when the team miniaturized its bigger Gamma Lighthouse Detector in 2015. The breakthrough was the TRL-9 detector. It was realized partly through a Cooperative Research and Development Agreement with Quaesta Instruments. Together, they not only reduced the size, they also packed in more capabilities, including lowered noise floor for better speed and sensitivity, a digital interface for customizable software, and a built-in web server for accessing data through a laptop.

The Los Alamos team has five Lighthouse projects underway, with a budget of more than $11 million

Field demonstrations of the Gamma Lighthouse Detector have been made in the laboratory’s HAZMAT robots. The robots could be potentially used in making radiation and isotopic-survey measurements while minimizing human exposure to energy sources.

The Los Alamos Earth System Observation also has used the Gamma variety of the tool for geological surveys in New Mexico. The Los Alamos Nuclear Materials Science group uses the Thermal-Neutron variety for inventory and measurements. Ocean surveys of radioactivity using the detectors are also in development, through a partnership with Phoenix International Holdings and the Sexton Corporation.

“Survey, assay, and inventory for radioactive materials are important capabilities for various global security objectives,” said Los Alamos National Laboratory.

Ocean trials will begin later this year, said a Los Alamos spokesperson. Other targeted applications included universities and hospitals, the spokesperson added.