Surveillance and Measurement System (SAM) model 935

Technology Demonstration Summary Sheet
SURVEILLANCE AND MEASUREMENT SYSTEM (SAMS)

THE NEED

The Idaho National Engineering and Environmental Laboratory (INEEL) has a need for a radiation detection monitor that can provide isotopic characterization on a real-time basis. Many of the facilities undergoing Decontamination and Decommissioning (D&D) have been contaminated with radionuclides and must be characterized before D&D operations may proceed. Currently, technicians use handheld detectors to identify radioactive contamination in hazardous environments. Currently these detectors do not provide isotopic characterization capabilities. When isotopic characterization of a sample is needed, a sample is collected and sent to a laboratory for analysis. Depending upon the sample media, laboratory analysis costs approximately $150 per sample and can take weeks or even months to receive the analytical results.

THE TECHNOLOGY

The SAM 935, a product of Berkeley Nucleonics (www.berkeleynucleonics.com), uses a thallium-activated sodium iodide (NaI(Tl)) detector to provide isotopic identification in a hand held radiation detector. This innovative technology combines the NaI(Tl) detector with a time-slicing, data compression technique resulting in shorter acquisition times, accurate identification, and spectroscopic capabilities. Quadratic Compression Conversion (QCC), a data compression technique, allows the operator the ability to identify multiple isotopes in one-second intervals. Using an internal database, the SAM 935 can detect up to 90 radionuclides. The library is expandable to 128 radionuclides and the controller offers an optional neutron detector. In this demonstration the neutron detector was not used. The basic model 935 comes with a two 1.5-inch x 2-inch NaI(Tl) crystal. Two other sizes (2-inch x 2-inch and 3-inch x 3-inch) are also available. The particular model used in this demonstration contained the 3-inch by 3-inch crystal with a cost of approximately $10,000. The cost of the basic model is approximately $7,800.

THE DEMONSTRATION

The SAMS was demonstrated in April 2000 at various INEEL D&D projects. Measurements were performed on a variety of media, including equipment, paint, and soil. The demonstration of the SAMS analyzer took place in the Test Area North (TAN). Samples were analyzed using the SAMS and were compared to laboratory analysis and to other handheld detectors used at the INEEL.

THE RESULTS

The SAMS provided real-time data. The SAMS was as easy to operate as other handheld detectors, but was able to identify the contributing isotopes where the baseline handheld detectors could not. The analytical laboratory generally requires about 100 grams of sample, which can take hours to collect. By using the SAMS, technicians can take fewer samples resulting in less time spent in potentially hazardous environments. The SAMS provides almost instantaneous results while the contract laboratory can take up to 90 days to provide equivalent results. The demonstration was able to reduce costs associated with sample collection and expedite D&D schedules. In addition, both worker exposure and waste generation were significantly reduced. At a cost of $10,000, the SAMS will pay for itself after 66 samples have been analyzed based on a cost of $150 per sample for laboratory analysis.

BENEFITS

- Provides instant results thus expediting D&D schedules
- Fewer samples will be required to be sent to a laboratory for analysis
- Significant reduction in worker exposure
- Once paid for, the SAMS will save $150 per sample over laboratory analysis
- Increase waste minimization efforts
- SAMS provides isotopic information that baseline handheld detectors cannot

Operation of the SAMS.

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