



High-Sensitivity Monitor for Radionuclides



Developer: NeuTek
Contract Number: DE-AR21-95MC32090
Crosscutting Area: CMST

Deactivation & Decommissioning FOCUS AREA

Problem:

Of the many environmental hazards found at Department of Energy (DOE) sites, radioactive contamination poses a special challenge.

- Mobile system or in situ measurement
- Low secondary waste
- Fast turnaround and low operating cost

characteristics and experimental work to evaluate its capability for quantitation analysis of radioactivity as an environmental sampler.

Solution:

Radionuclides such as transuranic elements and fission products, while posing serious health threats, are usually difficult to identify and currently require complicated and time-consuming sampling and laboratory procedures. Assessing the feasibility of applying a recently developed charged particle radiation imaging concept in biomedical research for fast, cost-effective characterization of radionuclides in environmental samples from contaminated sites.

Technology:

The concept uses sensors with storage photostimulable phosphor (SPP) technology as radiation detectors. These new sensors offer considerable promise as large-area detectors for fast characterization of radionuclides with added ability to locate and identify hot spots. Tests with SPP sensors have found that single alpha particle effect can be observed and an alpha field of 100 dpm/100 cm² or a beta activity of 0.15 dpm/mm² can be identified in minutes. For areas with possible neutron contamination, a neutron to charged particle converter screen, such as a dysprosium foil can be used to detect neutrons with these sensors.

Project Conclusion:

This project was terminated at the end of the base contract (Phase I) effort in April 1996. NeuTek, Inc. cleverly investigated improved resolution and calibration methods related to the photostimulable phosphor technique (SPP), but came up short in devising the overall logic for using this technology in environmental applications.

Benefits:

- High sensitivity can measure all types of radiations, including tritium
- Large active area imaging sensors

The base contract encompassed analysis of the SPP sensor

Review of the technology was solicited from throughout the complex as the base effort neared completion. Consensus of the reviews indicated that the SPP was yet another method for radiation detection, but that the method did not have exponential gains over traditional techniques. In particular, it seemed that for the soils market, SPP would have limited value over traditional methods of radionuclide detection/quantification. Given the overall assessment that additional



Government investment would most likely yield little return, it was decided to terminate the effort.

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DOE's Federal Energy Technology Center supports the Environmental Management - Office of Science and Technology by contracting the research and development of new technologies for waste site characterization and cleanup. For information regarding this project, the DOE contact is:

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