T3.1-P29

Lawrence Livermore National Laboratory

Operational Interface And Capability Of A Carborne Survey Instrument Developed For The Provisional Technical Secretariat

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The Lawrence Livermore National Laboratory developed an easy to use software interface for use with NaI-based survey instruments that also use the Ortec Digibase. Our interface, now operating on two U.S.-loaned 2-L NaI systems with integrated GPS, enables both the rapid detection of radiation anomalies as well as determination of the relative direction of the source. Combined with GPS and producing standard ANSI-formatted file outputs, the LLNL-developed detector system and interface are being evaluated by the PTS for use in mobile survey training. This poster will describe the technical specifications of the interface and the hardware.

WIDE-AREA VEHICLE-BASED RADIATION SURVEYS ARE ESSENTIAL TO REDUCING THE SEARCH AREA IN OSI

- CTBT On Site inspection (OSI) will search up to a 1000 km^2 area for signatures that may be related to a recent nuclear explosion
- OSI teams use (among other tools) mobile radiation detection systems as part of vehicle-based search operations
- The challenge is instrumentation that is easy to use and that effectively detects and identifies radionuclide anomalies and their direction
- Reducing the training burden required by creating common interface character and features eases the burden on inspectors

DESIRED SOFTWARE FUNCTIONS TO ADDRESS SPECIFIC OSI NEEDS AND ENABLING USE ON RELATED HARDWARE

- Interface with all DigiBase-based scintillation detector hardware
- Count rate trend display and spectral display (NaI detectors)
- Adjustable alarm threshold
- Ability to start/stop data acquisition on the fly (IFE lesson)
- GPS location tagged data acquisition and ANSI standard file format for easy import into the PTS information system
- Display directional response for case of ganged detectors

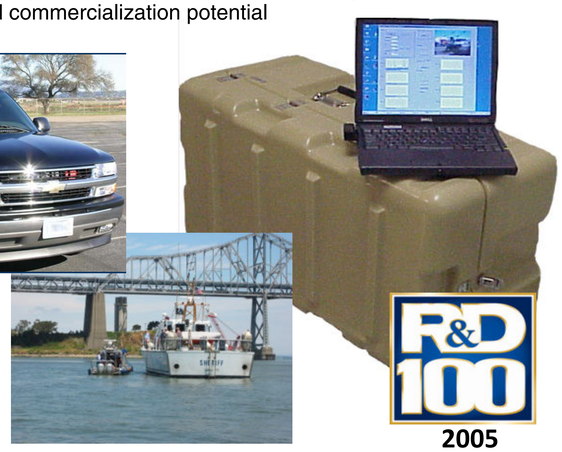
DESIRED HARDWARE CAPABILITY TO ADDRESS SPECIFIC OSI RADIONUCLIDE SURVEY OPERATIONAL FUNCTIONS

- Detectors sensitive to gamma-rays between 0.05 and about 2.5 MeV
- Room-temperature operation (requiring no liquid nitrogen) with gain stabilization
- Integrated GPS
- Ganging of detector systems to increase efficiency or support directionality determination (and display)
- Single hand-held control tablet
- Environmentally hardened transport case
- Self powered with swappable batteries
- Able to accept vehicle power
- Each detector system in it's deployable configuration weights approximately 20 kg

LEVERAGING LLNL'S COMMERCIALIZED ADAPTABLE RADIATION AREA MONITOR (ARAM)

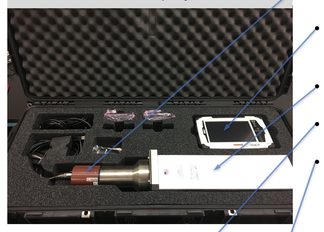
- The Adaptable Radiation Area Monitor was developed by LLNL for the U.S. Department of Homeland Security a decade ago (and commercialized)
- Awarded a prestigious R&D100 in 2005 which recognized superior innovation and commercialization potential

RadTruck



ARAM CUSTOMIZED FOR PTS OSI APPLICATION (HARDWARE)

2-L NaI detector and system hardware in a deployable case



- Digibase (Detector electronics)
- Computer (and detector power)
- NaI crystal
- Battery (for USB hub)
- USB hub (for ganging detectors)

Operated by ALGIZ-7 model tablet computer with touch screen

Second system has powered USB hub to enable ganging, increases efficiency and gives directionality

Ganged together in the back of a vehicle for directional detection

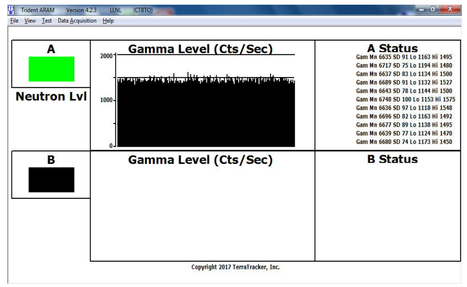
Connections hardened for field operations

ARAM CUSTOMIZED TO PTS OSI APPLICATION (SOFTWARE)

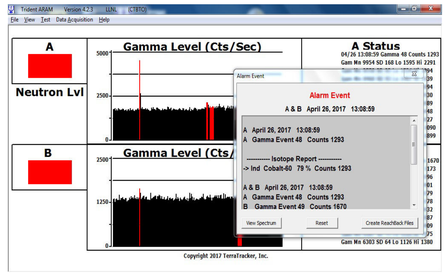
- Simple multi-detector display showing relative signal rates against a time averaged background with rate data shown in 1-second intervals

Gamma count rates tracked and displayed in 1-s intervals against averaged background, one detector shown operating

Averaging time window adjustable as is the alarm threshold



- Alarming condition indicator and two detectors ganged together with directional indication

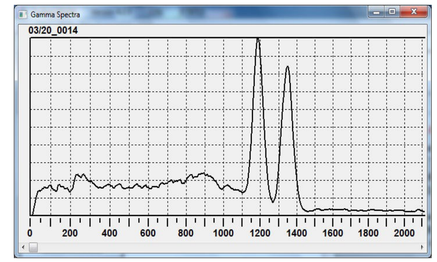


Gamma counts exceeding the averaged background shows as a highlighted alarm

Directionality can be deduced from relative signal intensity between the two systems

- Spectral display of alarm condition enables the user to identify the radionuclide based upon the energy spectrum

Display data feature shows energy spectrum of alarming activity, a ^{60}Co source with its two distinct gamma energies in this case



CURRENT STATUS AND REMAINING WORK

- Two complete systems delivered to PTS for evaluation
- Further software interface modification will place large buttons on the touch screen to ease control while in motion
- Additional modifications such as files created with specific PTS GIS file characteristics are being discussed
- Training materials need to be refined

National Nuclear Security Administration

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