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Test and Evaluation Summary Report for the GammaTect-Plus and GammaTect (solid state)

July 2008

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Analysis, Characterization, and Technology Support Program
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Background

On May 22, 2008, testing was conducted on the GammaTect-Plus (NaI) pedestrian portal monitor system and GammaTect (solid state). Testing was based on section 5.1 (the radiological performance sections) of ANSI Standard N42.35, American National Standard for Evaluation and Performance of Radiation Detection Portal Monitors for Use in Homeland Security. Testing consisted of both dynamic and static testing. The tests were performed by Stephen Lancaster for Oak Ridge National Laboratory. The vendor was represented by Harold Harbison of JRT, James Ackerly of Splinternet, and Keith Reynolds of Defentect.

Series I - Dynamic Testing

Test Conditions

The GammaTect-Plus was setup in accordance with N42.35 Table 1 - Reference and standard test conditions, Table 2 – Evaluation distance for different applications, Table 3 – Speed of moving sources, and Table 4 – Activity values for gamma-ray and neutron sources, for multi-sided **pedestrian monitoring**.

The GammaTect-Plus provided status information to a remote computer. Alarms, when they occurred were observed on the remote display.

Dynamic Testing

- Using a ^{137}Cs source, 10 trials were performed.
  Results – 10 of 10 trials the system alarmed; 0 of 10 trials for isotope identification.

- Using a ^{133}Ba source, 10 trials were performed.
  Results – 10 of 10 trials the system alarmed; 5 of 10 trials for isotope identification. The correct identification occurred during the passage of the source in only one direction. Using the Driven Linear System (DLS) located in the Environmental Effects Laboratory, the source would pass through the detection zone on the rail in one direction then return through the detection zone in the opposite direction (returning to the original position).

- Using a ^{133}Ba source, 8 trials were performed at a travel speed of 80 cm/s (slower than standard-based speed of 1.2 m/s)
  Results – 8 of 8 trials the system alarmed; 6 of 8 trials for correct isotope identification. Testing was performed to determine if the correct identification could be obtained at a slower speed. The instrument would indicate a source with a 152 keV photon present.

(Note: The vendor entered ^{131}I for ^{133}Ba in the system library.)

- Using an ^{241}Am source, 10 trials were performed.
  Results – 0 of 10 trials the system alarmed; 0 of 10 trials for correct isotope identification. There was a slight count per second (cps) increase, but not enough to activate an alarm.

- Using a ^{232}Th source, 10 trials were performed.
  Results – 10 of 10 trials the system alarmed; 0 of 10 trials for isotope identification. The proper identification did not occur because ^{232}Th is not in the system library. Identification of ^{226}Ra, and 160, 186, and 240 keV photons were listed.

- Using a ^{57}Co source, 10 trials were performed.
  Results – 10 of 10 trials the system alarmed; 7 of 10 trials for correct isotope identification.

Series II - Dynamic Testing

Test Conditions

The GammaTect-Plus was setup in accordance with N42.35 Table 1 - Reference and standard test conditions, Table 2 – Evaluation distance for different applications, Table 3 – Speed of moving sources, and Table 4 – Activity values for gamma-ray and neutron sources, for multi-sided **vehicle monitoring**.

- Using a ^{133}Ba source, 6 trials were performed.
  Results – 0 of 6 trials the system alarmed; 0 of 6 trials for isotope identification. Testing was stopped after 6 trials because the system would not alarm in these conditions. The system would indicate a cps increase of about 80 cps above background but this was not enough to alarm the system.

Series III - Static Testing

GammaTect-Plus

Radioisotope Identification Only

- With a ^{133}Ba source located centerline between the two detectors; the system correctly identified the source. This static test was repeated by placing the source on the one detector face, correctly identifying the source, and then after allowing the system to reset, placing the source on the second detector. Both NaI detectors independently correctly identified the source.

- Using an ^{241}Am source, the above test with ^{133}Ba was repeated. The one detector indicated that a 108 keV source was present and the second detector indicated ^{57}Co was present.

- Using a ^{57}Co source, the above test was repeated. Both detectors indicated ^{57}Co was present.

GammaTect (solid state)

- The GammaTect (solid state) system was located on a table top nearby the sources during the testing of the GammaTect-Plus (NaI) system. The GammaTect did not detect the sources. The detector was "response checked" with ^{137}Cs and ^{60}Co sources with positive results, meaning the sources were observed on the screen display.

Table 1: List of Sources Used

Source Identification	Activity
Am-241-5447	51.059 µCi
Ba-133-5283	20.792 µCi
Co-57-5432	5.34 µCi
Co-60-3690	0.57 mCi
Cs-137-5284	17.345 µCi
Th-232-5461	14.3 µCi

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