ITRAP CERTIFICATION OF RADIATION MONITORS (ILLICIT TRAFFICKING RADIATION ASSESSMENT PROGRAM)

INTRODUCTION

The ITRAP Program[1] provides certification of radiation monitors for their ability to detect illegal transport of radioactive materials. ITRAP is conducted by the International Atomic Energy Agency (IAEA) in Austria. Following the break-up of the Soviet Union in 1991, incidences of illicit trafficking increase dramatically. Over 300 cases have been documented and verified by the IAEA, suggesting that many more have gone undetected. The hazards range from inadvertent health affects to terrorism to the production of nuclear bombs. Critical standards were developed to maximize the detectability of radioactive materials, particularly at border crossings where rapid throughput is needed. The last ITRAP certification examined 23 companies' monitors and ran from 1997 to 2000. Different criteria were established for fixed-point systems, hand-held and pocket monitors. The IAEA is continuing to refine these test criteria.[2]

ITRAP Criteria and Results

ITRAP Specifications are listed in Tables 1 and 2. Results for each monitor were presented as pass/fail without further details. The GammaRAE and NeutronRAE Pagers and NeutronRAE Pocket designs were the only monitors in this class certified to pass all requirements out of all the pocket/pagers tested. The NeutronRAE Handheld design passed the criteria for Hand-held Instruments.

REFERENCES

1) ITRAP Pilotstudie zur Praktische Erprobung von Grenz-monitorsystemen gegen Nuklearkriminallität; Dr. Peter Beck, Manager; Austrian Research Centers – Siebersdorf, ca. 2001.

2) *Co-ordinated Research Project "Improvement of Technical Measures to Detect and Respond to Illicit Trafficking of Nuclear and other Radioactive Materials"* Consultants Meeting 17 – 21 March 2003.

Table 1. IAEA ITRAP Criteria for Pocket and Pager Radiation Monitors

Function	Pocket/Pager Specification
Gamma Sensitivity	Dose rate of 1.0 µSv/h (^{137}Cs) from 0.06-1.5 MeV should trigger alarm
Neutron Detection	Not required (available on NeutronRAE)
Isotope Identification	Not required
Alarm Threshold	Check validity of alarm setpoint using ^{137}Cs source
Dose Rate Indication	±30% accuracy of intensity response to using ^{137}Cs source at low and high end of range
Detection Probability	≥99%; ≤100 failures in 10,000 tests using ^{137}Cs source at defined alarm threshold
False Alarm Rate	≤10 false alarms in 120 hours of testing at 0.2 µSv/h (^{137}Cs) at defined alarm threshold
Temperature Range	-15 to +45°C (+5 to 113°F), must alarm with known source at temperature extremes
Humidity Range	0 to >95% RH; must alarm with ^{137}Cs source at >95% RH for 30 min
Battery Life	>800 hours non-rechargeable or >12 h rechargeable batteries without alarm >3 hours under alarm conditions
Drop Resistance	Meet all specifications after 0.7 m (2ft.) drop on concrete 3 times in 3 directions

Table 2. IAEA ITRAP Criteria for Hand-held Radiation Monitors

Function	Hand-held Specification
Gamma Sensitivity	Dose rate increase of 0.2 µSv/h (^{137}Cs) for 3 sec at background of 0.2 µSv/h should trigger alarm in the energy range 0.06-1.5 MeV
Neutron Detection	ITRAP Test source (^{252}Cf) exposed at 25 cm for 10 seconds should trigger alarm
Dose Rate Indication	±30% accuracy of intensity response to using ^{137}Cs source at low and high end of range
Detection Probability	≥99%; ≤100 failures in 10,000 tests using ^{137}Cs source at defined alarm threshold
False Alarm Rate	≤1 false alarm per minute at 0.2 µSv/h (^{137}Cs) at defined alarm threshold
Isotope Identification	Desired but not required
Temperature Range	-15 to +45°C (+5 to 113°F), must alarm with known source at temperature extremes
Humidity Range	0 to >95% RH; must alarm with ^{137}Cs source at >95% RH for 30 min
Battery Life	>12 hours without alarm; >3 hours under alarm conditions
Search Capability	Tested under field conditions at a border. Time required to find a source in a vehicle should as short as possible