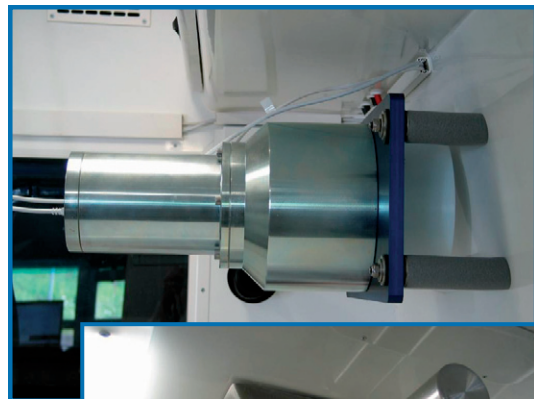


SONNI – Radiation measurement vehicle

SONNI is a versatile mobile platform for sampling, measurement and analysis of radioactive substances. SONNI is a useful tool not only in a radiological emergency but also in a nuclear security threat situation. This capability is achieved through integration of commercially available hardware with customized data collection and management software. SONNI measurement vehicle implements several technologies developed in the Security Technology laboratory.

Features

- Direct radiation measurements with high sensitivity and robust on-line identification algorithms
- Integrated dual air sampling lines for simultaneous sampling to different filter media
- Sample measurements with gamma and alpha spectrometers
- Central database for sampling, measurement, analysis and geospatial information
- Versatile broadband data communication capabilities
- Secured voice communication
- Direct integration to a reach-back support centre
- Portable measurement and sampling equipment



Specifications

Direct measurement systems

- Two side mounted low resolution spectrometers with 5" x 4" NaI(Tl) scintillation detectors facing outward (approximately 180 degree field of view)
- Front mounted low resolution spectrometer with 2" x 2" NaI(Tl) scintillation detector facing forward (18 degree field of view)
- Ceiling mounted high resolution spectrometer with electrically cooled HPGe detector (40% efficiency, 360 degree field of view)

Sample measurement systems

- Gamma spectrometry system with electrically cooled HPGe. System has sample holders for thin samples (air filters, swipes etc.) and for one liter square bottles (liquids, soil etc.).
- Alpha spectrometry system. System has simplified (non-radiochemical) sample preparation procedures for direct measurement of air filters, swipes and evaporated liquid samples.

Portable measurement systems

- Portable RID based on HPGe detector
- Measurement backpack with a gamma spectrometer based on LaBr₃ detector and a neutron count rate detector
- Surface contamination meter with alpha and combined beta/gamma detector

Sampling equipment

- Two integrated air sampling lines with easy to use filter cassettes and approx. 40 m³/h capacity
- Portable battery powered air sampler with with easy to use filter cassettes and approx. 12 m³/h capacity

Further reading

- Smolander P, Toivonen H. Mobile In-field Measurements in Nuclear or Radiological Threat Situations, IRPA11 conference proceedings, Madrid: Spanish Radiation Protection Society; 2004. <http://irpa11.irpa.net/pdfs/7a24.pdf>.
- Smolander P, Kuukankorpi S, Moring M, Toivonen H. In-field management of spectrometric data in radiological threat and emergency, Journal of Radioanalytical and Nuclear Chemistry, Vol. 276, No.2 (2008) 341–346.
- Karhunen T, Smolander P, Toivonen H. Detection of radiation sources and assessment of measurement signals for nuclear security, Abstracts – Third European IRPA Congress, 14–18 June 2010, Helsinki, Finland. Helsinki: Nordic Society for Radiation Protection; 2010. p. 193. Available online: http://www.irpa2010europe.com/pdfs/Proceedings_-_Third_European_IRPA_Congress_2010.pdf
- Smolander P, Toivonen H, Pelikan A, Karhunen T, Salonen T. Mobile radiation measurement system with remote data handling and analysis. In: Maatela P, Korpela S (Eds.). Symposium Proceedings. NBC 2009. 7th Symposium on CBRNE threats. 8–11 June, 2009, Jyväskylä, Finland. Defence Forces Technical Research Centre, Publications 18. Helsinki: Defence Forces Technical Research Centre; 2009. p. 135–138.

Data collection and management

- Server computer running with central data collection software and LINSI database for data storage.
- Three workstation laptops for full measurement control and data visualization. Laptops can also be used as back-up data collection computers.

Communication

- Intercom with voice radio communication integration
- Voice communication via secure TETRA radio network to operation centre and to other safety/security authorities
- Data communication in mobile phone networks
- Data communication with satellite broad band connection
- Data communication in Flash-OFDM wireless wide area broad band network (@450 network in Finland)
- Global positioning with DGPS option in Finland

Physical

Height	3.05 m
Width	2.33 m
Weight	3800 kg

Electrical (available)

VDC	100 A
ADC	5000 W

Crew

Full	Leader, driver and specialist x 2
Minimum	Can be operated by a single crew member, but minimum crew of two recommended

Technology readiness level 8

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