RN SECURITY SUITE: TRAINING

BACKPACK

G. MANGIAGALLI

Viareggio, July 28 – August 01, 2025

SNIPER-GN: Gamma Neutron Counting

A Transportable Radiation Detection System for Homeland Security

The most performant GAMMA and NEUTRON isotope identifier for
Special Nuclear Material (SNM)

NEW GRAPHICAL INTERFACE

BACKPACK

- Less than 8 kg
- 38 x 30 x 14 cm
- Battery: 8 hours (hot-swap)
- Wireless/USB connectivity
- Autonomous offline identification

SNIPER-GN Connectivity Overview

CONNECTIVITY

Wi-Fi connection to its designated tablet (or any other mobile device) for undercover data visualization

Wi-Fi allows for higher distance than Bluetooth thus reducing user exposure

Alternatively, **USB connection** is also available

USB is preferable in the presence of an emergency Wi-Fi jammer

SNIPER-GN Connectivity PLUS!

AUTONOMOUS OFFLINE IDENTIFICATION

SNIPER-GN can autonomously perform isotope identification without needing a connected device

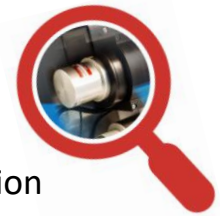
When gamma or neutron counts **exceed** the **threshold**, an **automatic ID** is triggered and logged in a dedicated **report**

No worries if you forget your tablet — the system keeps working, and reports can be downloaded later from the office!

SNIPER-GN: Detectors

The SNIPER-GN has **2 detectors**, one selected for its gamma resolution efficiency and one capable to discriminate neutrons

$CeBr_3$ Gamma Detector

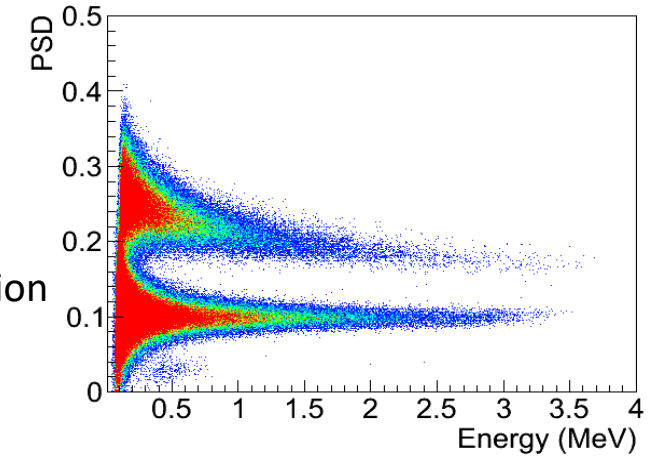


- Superior resolution <3.5% @662 keV
- Enables gamma peak search identification
- Allows SNM enrichment level estimation
- Enhanced signal-to-noise ratio

EJ309 Neutron Detector

- High-efficiency liquid scintillator
- Gamma/neutron discrimination via PSD
- Onboard pulse shape analysis
- Maximizes detection distance

The system includes an **extended gamma library** covering NORM, industrial, medical, and SNM sources, making it versatile for multiple applications.

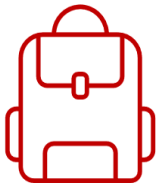


The **dual-detector approach** provides comprehensive radiation monitoring with **excellent** discrimination **capabilities**

SNIPER-GN: Functionalities

CONNECTIVITY
Wi-Fi, USB and autonomous offline mode available

Weighs less than 8 Kg
38 x 30 x 14 cm^3
8-hour battery (hot-swap)
Wireless/USB Connectivity
Autonomous offline identification



FOOD/ENV. SAMPLES
Quantitative analysis
Bq/g or Bq/l
in fixed geometries

COUNTING
Real-time gamma and neutron rates and thresholds update

SNIPER-GN software runs via **web-interface**

No installation required on tablet or mobile device

The web-interface allows to detect, identify and localize radioactive materials such as SNM and RDD

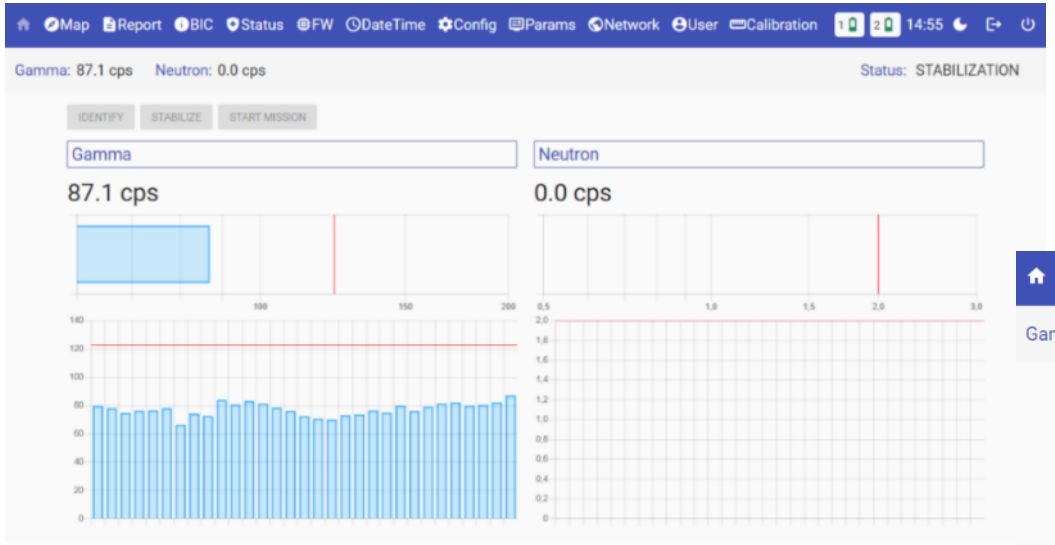
AIR FILTERS Measurements
Quantitative measurements on filter paper and iodine cartridges

SEARCHING
Gamma and neutron counting and Gamma Spectrometry

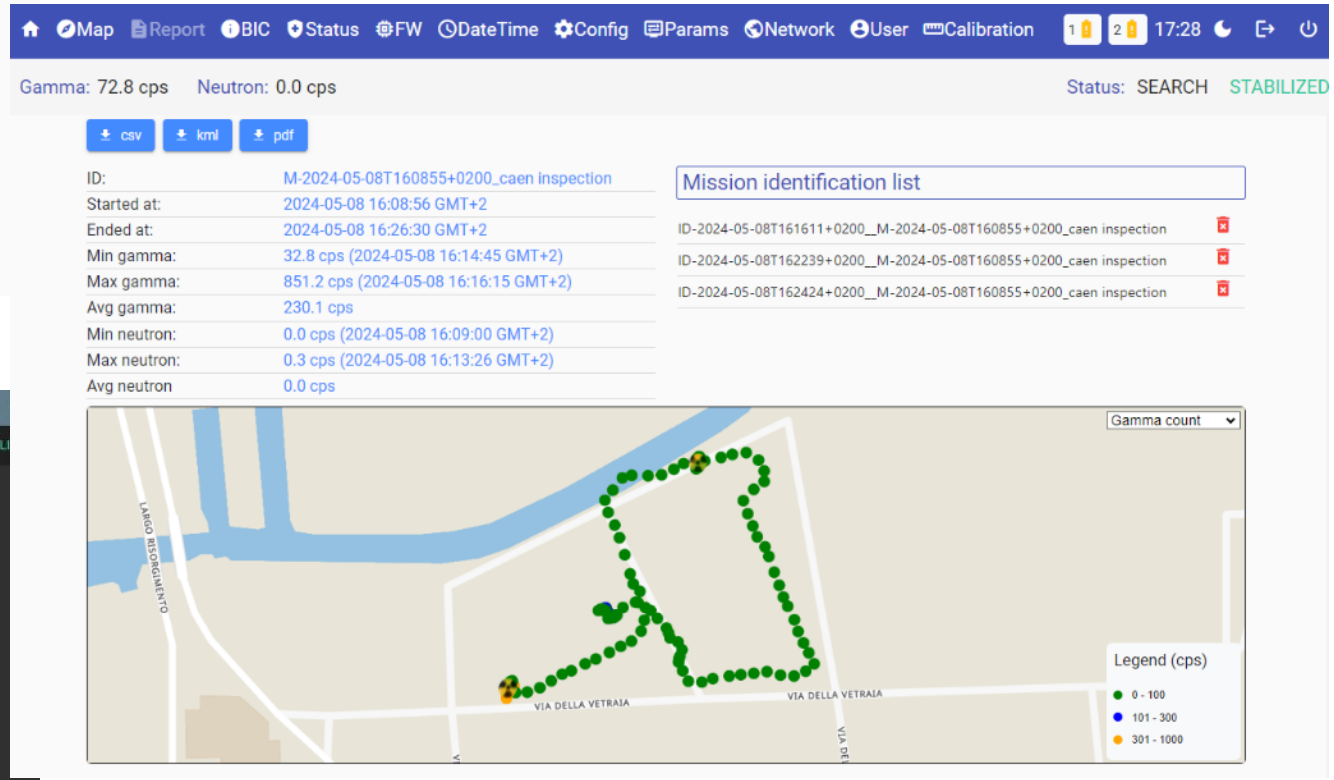
MAPPING
Real-time position visualized on the map with customized colored legend

REPORT
Alarm report with list of identified isotopes, spectra, coordinates and extra info

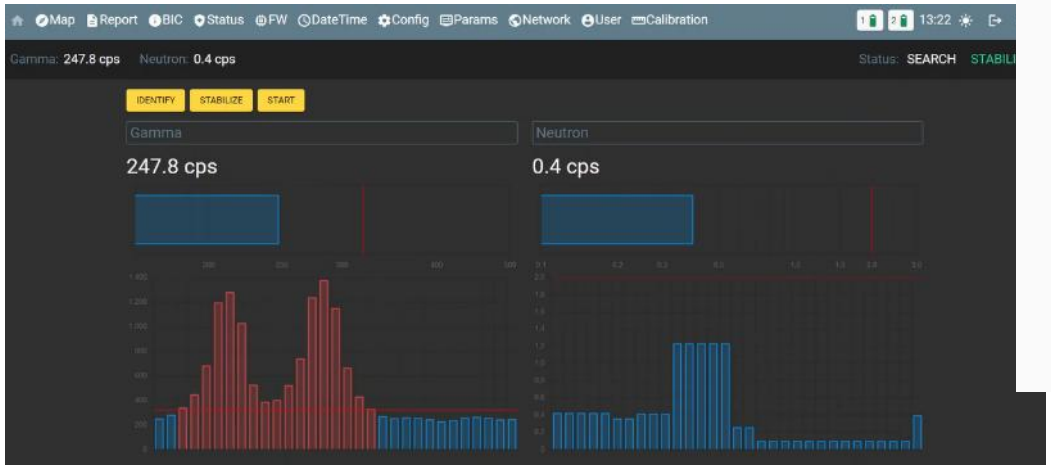
SNIPER-GN Software Overview



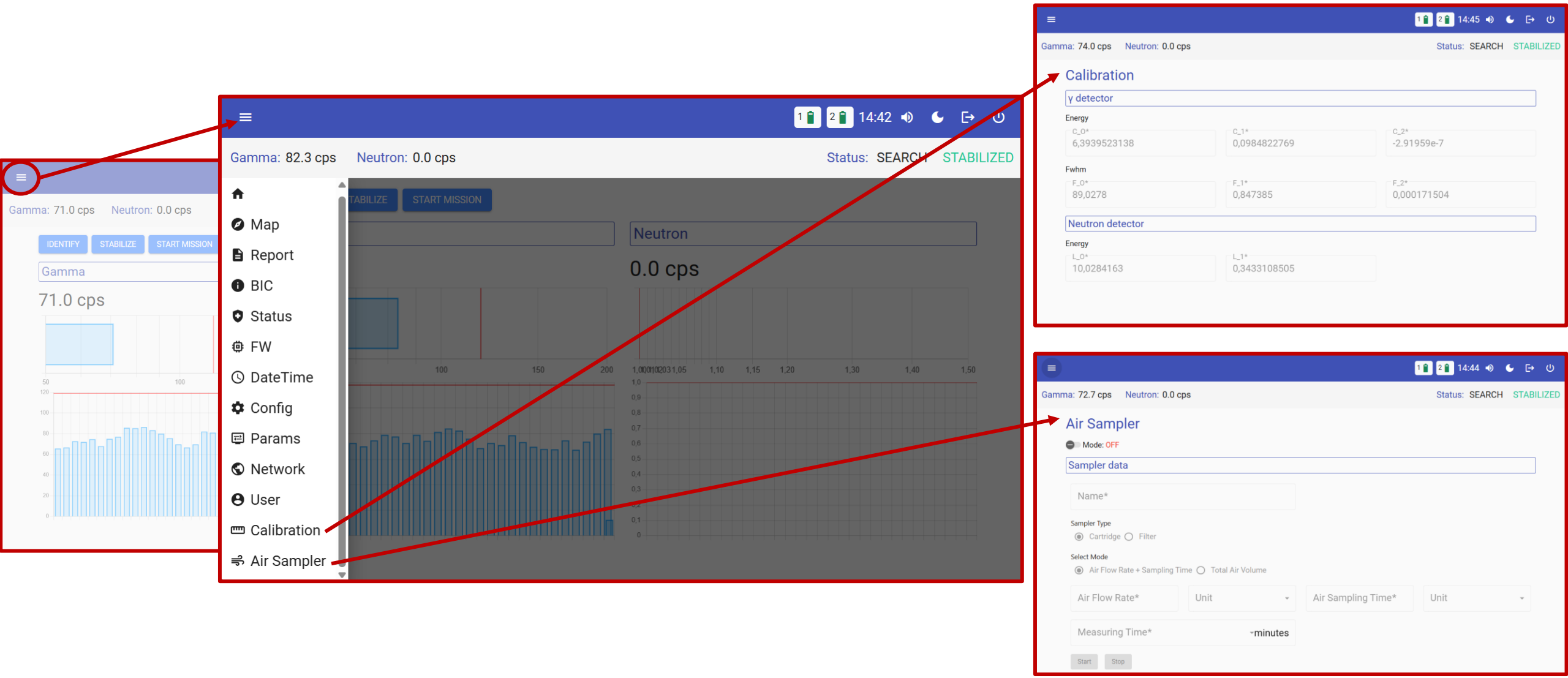
Realtime waypoint and mission report



Dynamic alarm with Pu source



SNIPER-GN: Connectivity Overview



SNIPER-GN Software - Counting

REAL-TIME COUNTING

Separated real-time gamma and neutron rates (separation based on PSD discrimination)

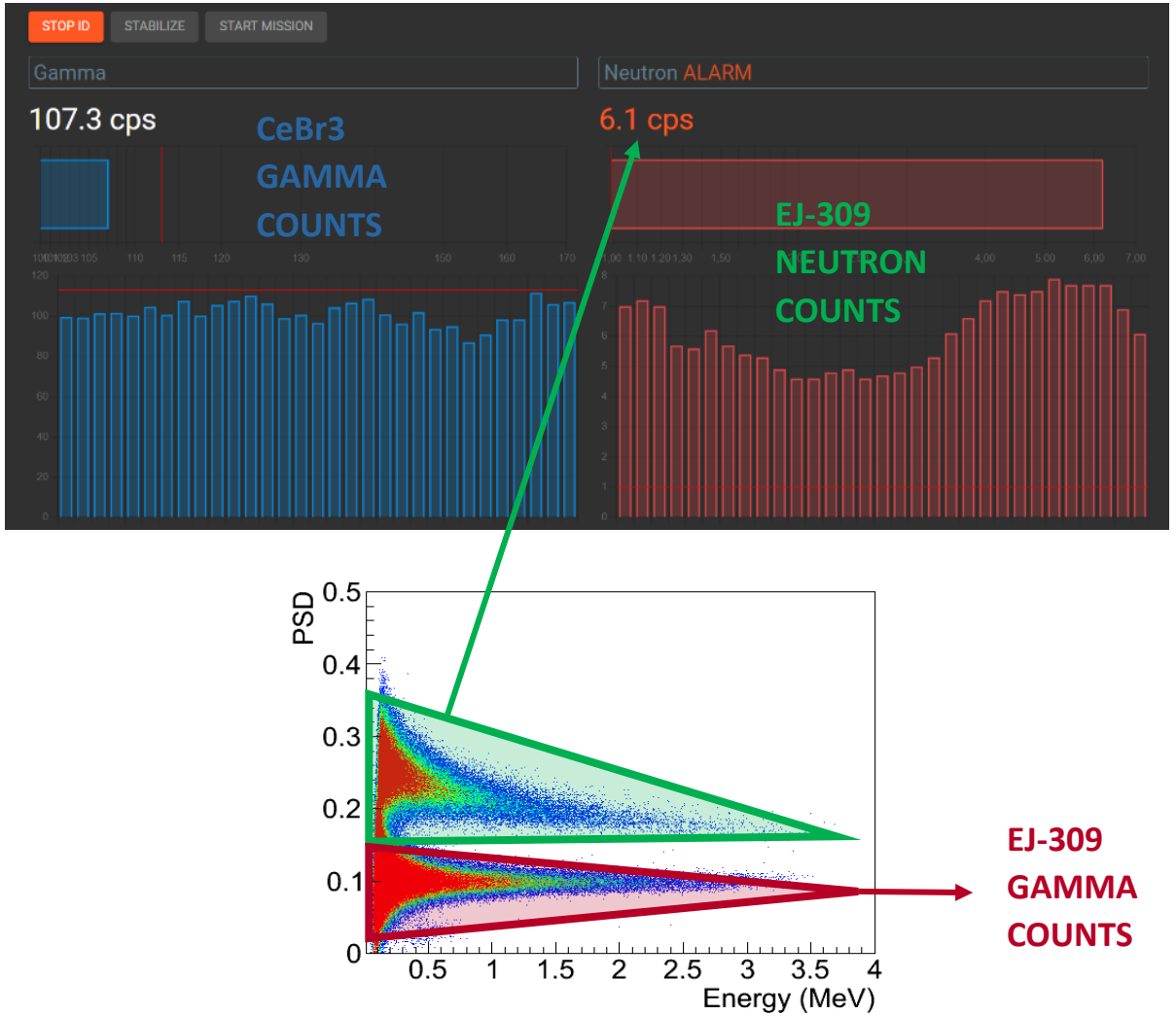
BACKGROUND AND ALARM THRESHOLDS

Automatic separated gamma and neutron alarm threshold calculation based on the surrounding background

Proximity of the rate to the alarm threshold is displayed

ALARMING

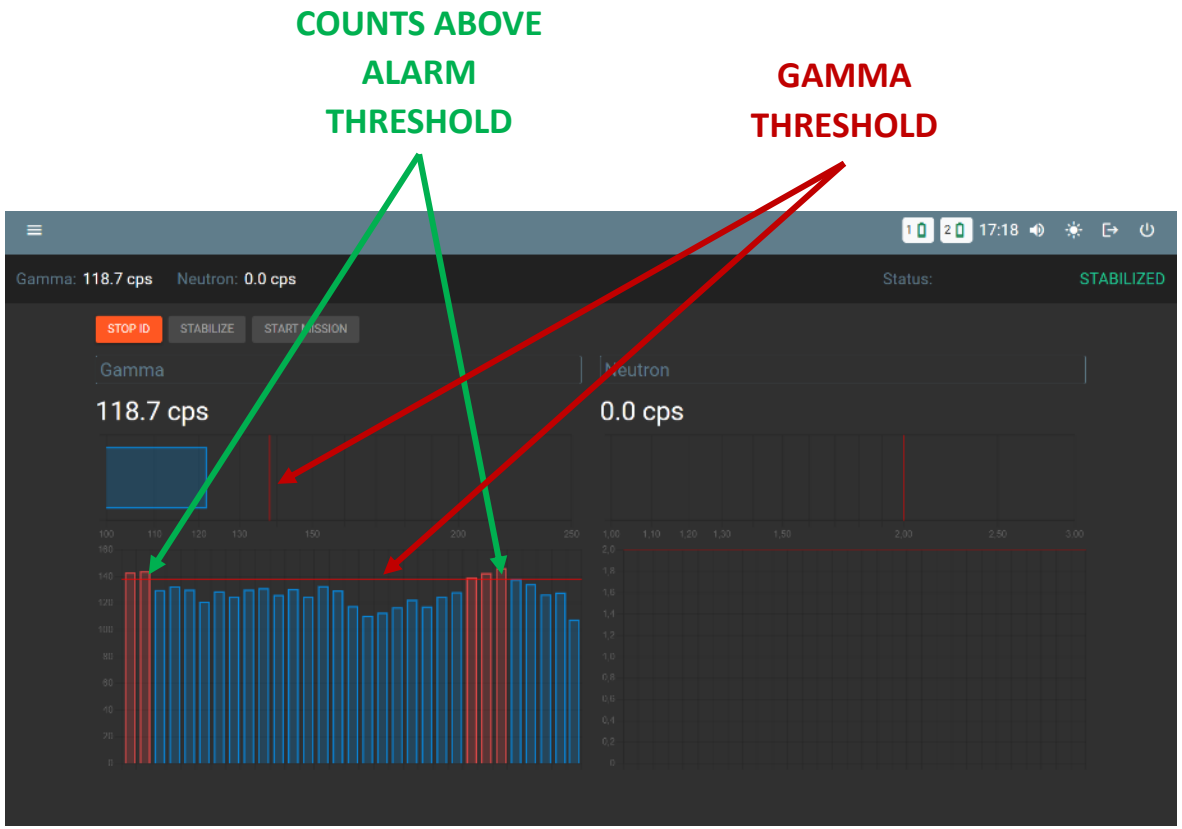
When the threshold is exceeded an alarm pop-up is visualized and the identification starts autonomously (Pop-up alerts can be turned off)



SNIPER-GN Software - Searching

TREND VISUALIZATION

Rates over last few seconds with the respective alarm thresholds visualized to enable hot-spot searching



WARM-UP PROCEDURE

3 minutes for the **default** gamma and neutron background acquisition and alarm threshold calculation

+2 minutes for **default** temperature stabilization of the gamma spectrum

DEFAULT TOTAL: 5 min to be FULLY OPERATIVE

Default settings are user-configurable!

BACKGROUND UPDATE

The background updates dynamically during movement (every 30s by default, configurable). If counts remain below threshold, a **moving average** is applied. Thresholds adjust continuously while moving.

SNIPER-GN Software - Mapping

REAL-TIME POSITION

The included GPS allows to monitor the real time position on the map

HOT-SPOT VISUALIZATION

ID measurements, alarmed or forced, are shown on the report map with ID results and CPSs

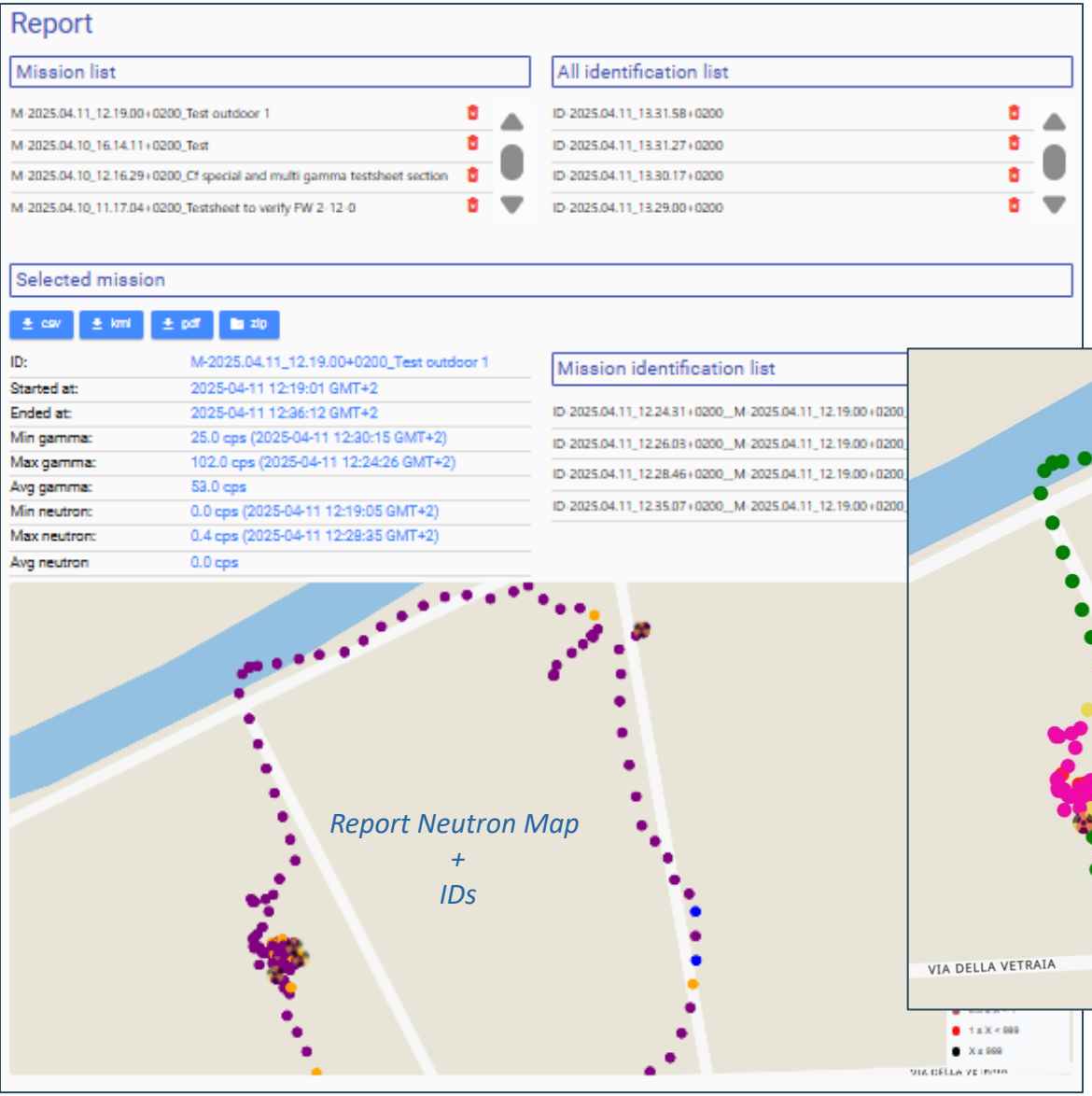
Customized colored map displayed during mission

TRACK STORAGE

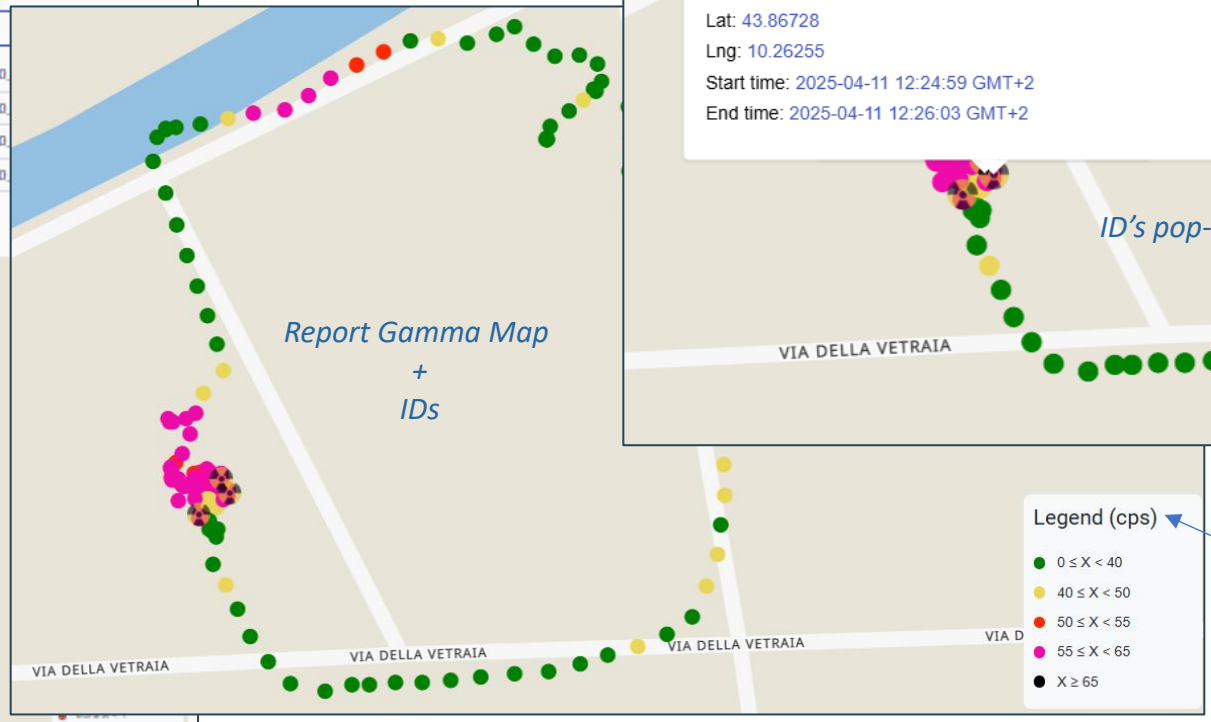
The track of the user is recorded and saved in a dedicated “MISSION” file

Both lat-long and MGRS coordinates are available

SNIPER-GN Software - Mapping 2



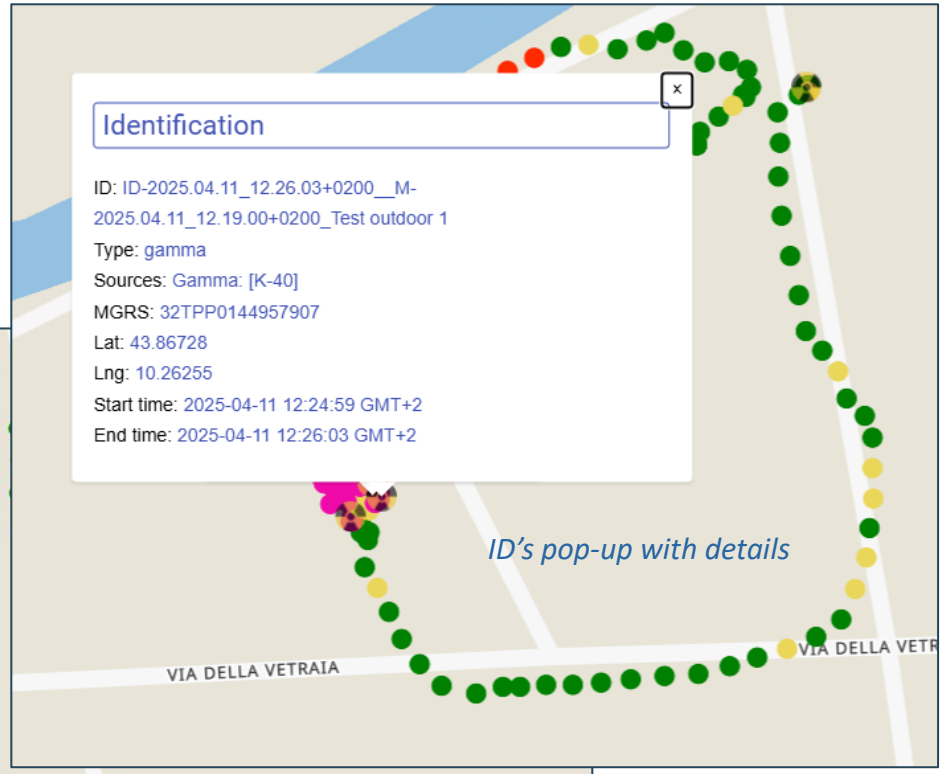
Report Neutron Map + IDs



Report Gamma Map + IDs

Legend is totally user-configurable!

Live Gamma Map



ID's pop-up with details

SNIPER-GN Software – ID Report

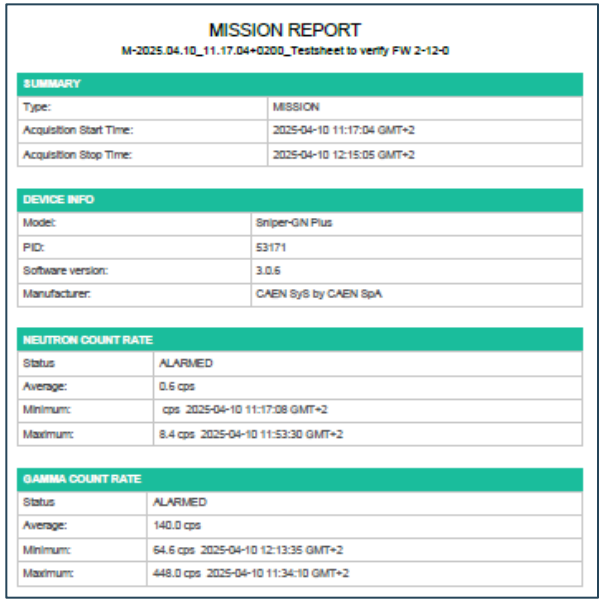
REPORT

After each identification, a result pop-up appears automatically. In addition, data is saved both on the connected device and locally on the Sniper-GN

Local saving can be disabled if needed!

Multiple formats are available, including spectra, CSV, PDF, and KML

PDF MISSION REPORT



MISSION REPORT

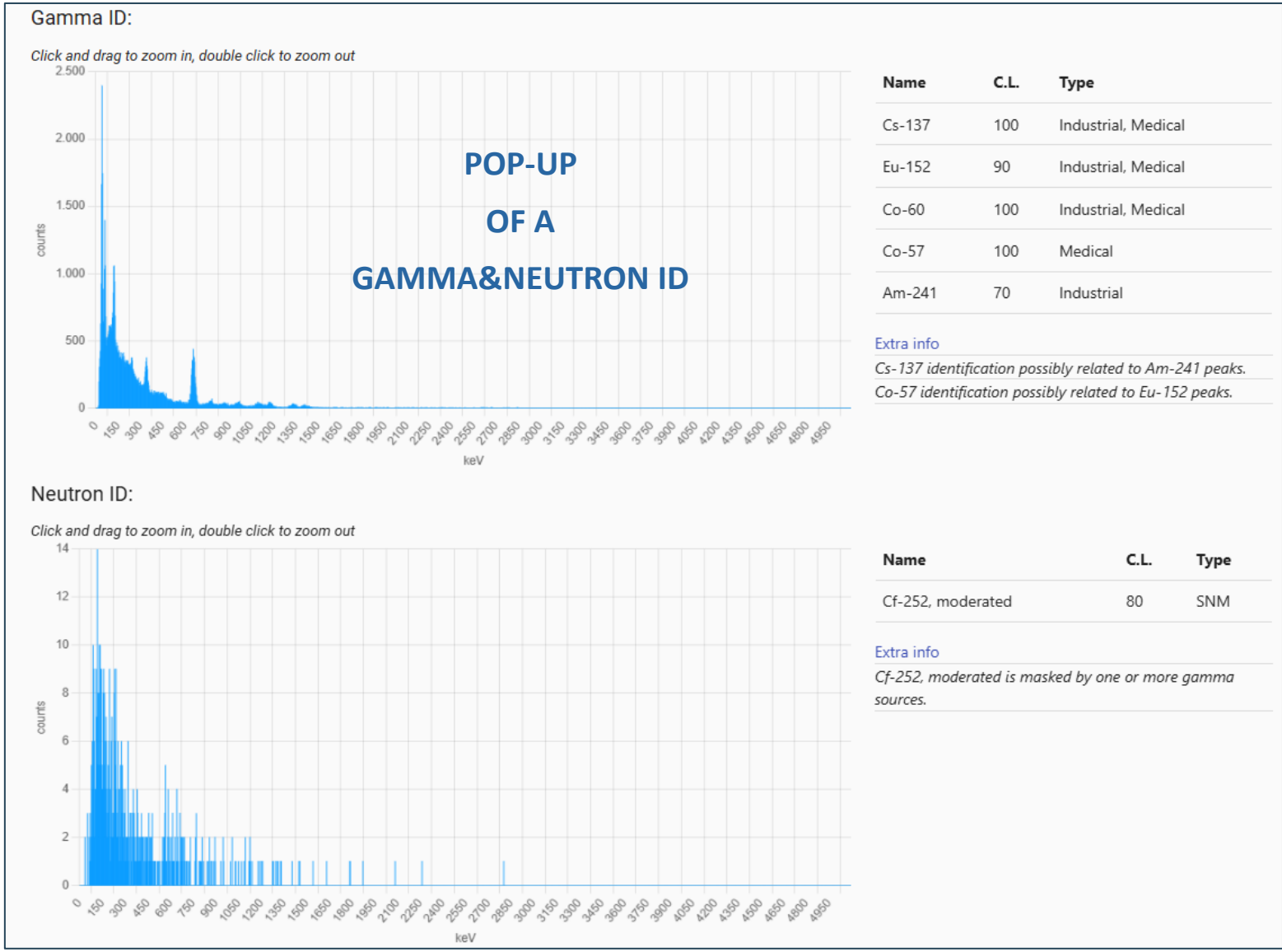
M-2025.04.10_11.17.04+0200_Testsheet to verify FW 2-12-0

SUMMARY	
Type:	MISSION
Acquisition Start Time:	2025-04-10 11:17:04 GMT+2
Acquisition Stop Time:	2025-04-10 12:15:05 GMT+2

DEVICE INFO	
Model:	Sniper-GN Plus
PID:	53171
Software version:	3.0.6
Manufacturer:	CAEN SyS by CAEN SpA

NEUTRON COUNT RATE	
Status	ALARMED
Average:	0.6 cps
Minimum:	cps 2025-04-10 11:17:08 GMT+2
Maximum:	8.4 cps 2025-04-10 11:53:30 GMT+2

GAMMA COUNT RATE	
Status	ALARMED
Average:	140.0 cps
Minimum:	64.6 cps 2025-04-10 12:13:35 GMT+2
Maximum:	448.0 cps 2025-04-10 11:34:10 GMT+2



Name	C.L.	Type
Cs-137	100	Industrial, Medical
Eu-152	90	Industrial, Medical
Co-60	100	Industrial, Medical
Co-57	100	Medical
Am-241	70	Industrial

Extra info

Cs-137 identification possibly related to Am-241 peaks.

Co-57 identification possibly related to Eu-152 peaks.

Name	C.L.	Type
Cf-252, moderated	80	SNM

Extra info

Cf-252, moderated is masked by one or more gamma sources.

SNIPER-GN: Air Sampler & Food/Env Monitor

AIR SAMPLING MODE

Filter papers: used to measure the radioactivity of airborne particulate matter, including ^{137}Cs

Iodine cartridges: designed to capture ^{131}I, which is present both in particulate and gaseous forms

^{137}Cs AND ^{131}I MONITORING

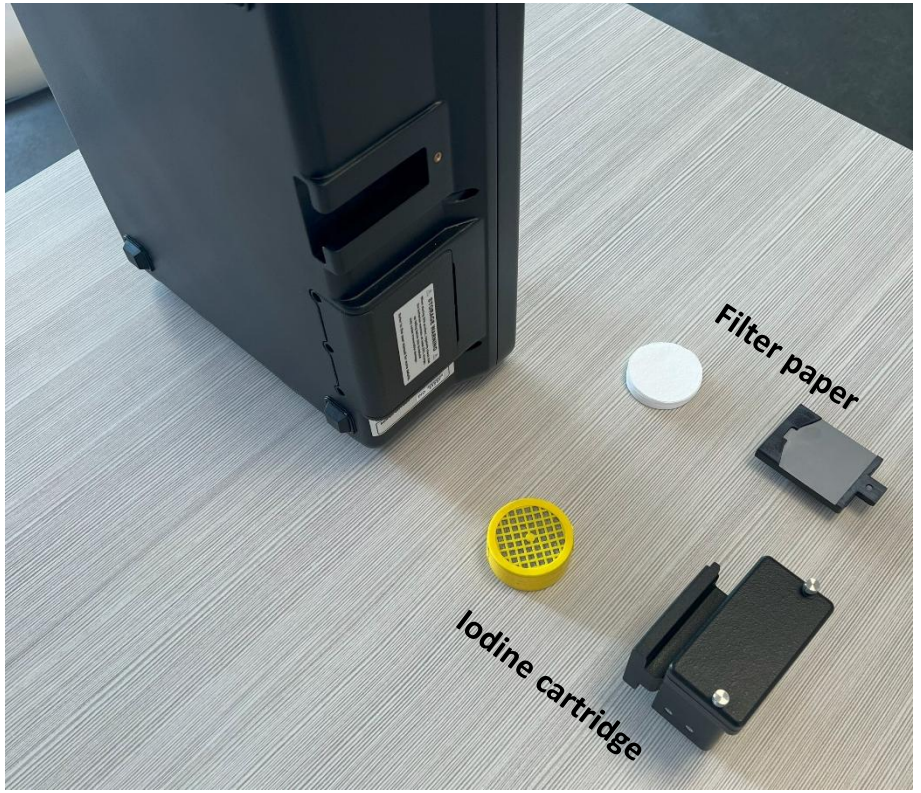
^{137}Cs contributes to **long-term environmental contamination**

^{131}I presents **short-term health risks**, especially to thyroid

DIRECT ACTIVITY MEASUREMENT

Following a nuclear fallout, **quantitative measurement of airborne radionuclides is vital**

The fixed and well-defined measurement geometry ensures accurate results



FOOD & ENVIRONMENTAL MONITOR

Assessment of radiological activity in **soil, water, and food** following suspected contamination in an **emergency scenario**

SNIPER-GN: Iodine Cartridges MDA

MEASUREMENT OF MINIMUM DETECTABLE ACTIVITY (MDA) WITH IODINE CARTRIDGES

Conducted one air sampling measurements with an air sampling time of 5 minutes, along with a blank control measurement using a cartridge not exposed to air sampling.

SNIPER-GN measurement time set to 5 minutes.

Sampling Time (minutes)	MDA (Bq)	Air Volume (L)	MDA Concentration (Bq/L)
0 (Blank)	26 ± 3	//	//
5	24 ± 3	360 ± 4	0,067 ± 0,007

Absolute MDA consistent between the blank and sampled cartridge, confirming no detectable activity in the sampled air.

MDA Concentration represents the detection limit under the given sampling and measurement conditions

Conclusion

Gamma ID

Reliable when net gamma CPS > 60

Neutron ID

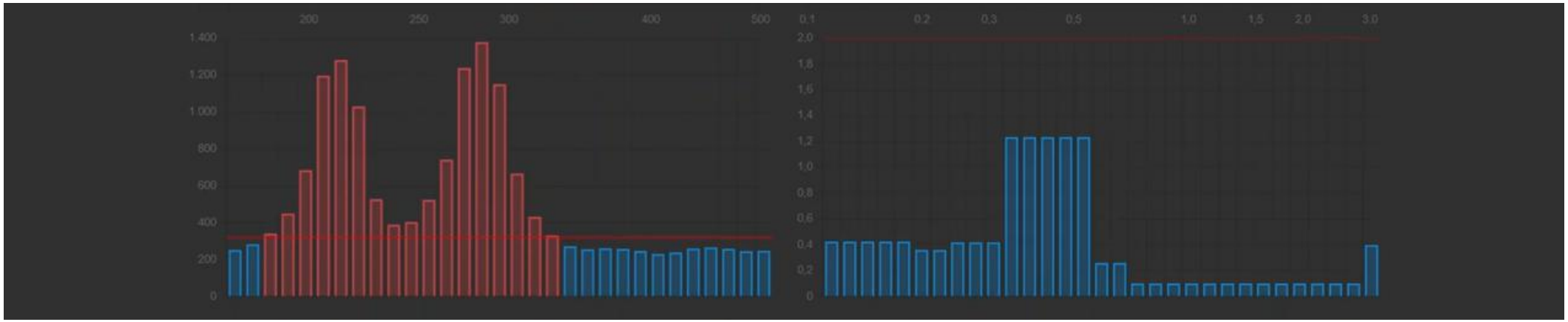
1 CPS sufficient for Pu detection in 1 min

Limitations

Am-241 sometimes misidentified as Cs-137

Performance

Meets and exceeds ANSI reference standards



THANK YOU!

SCAN ME

Follow us on linkedin

INTERNATIONAL SUMMER SCHOOL 2025