

# **ORTEC<sup>®</sup>**

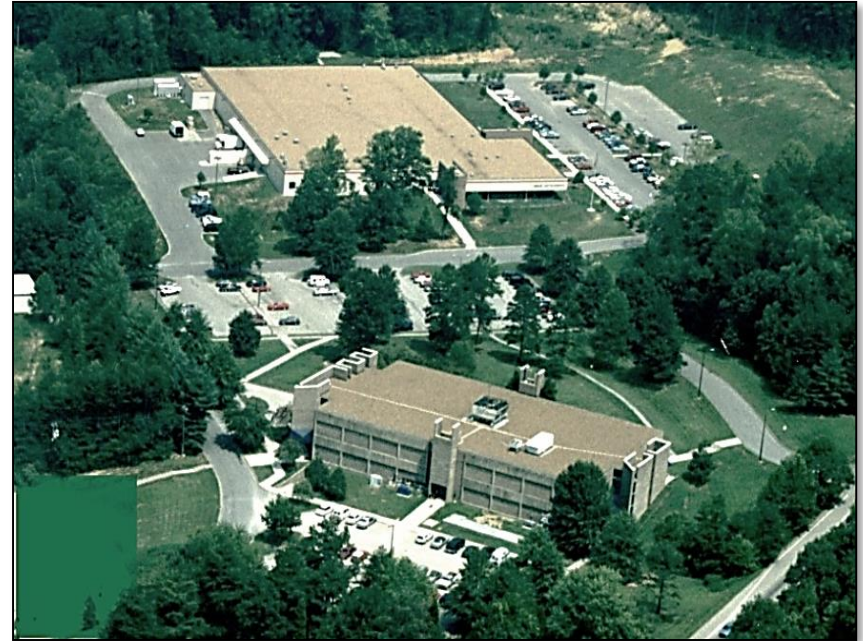
## **AMETEK<sup>®</sup>**



## **DAVIDE SACCHI**

ORTEC was founded in 1960 by researchers from Oak Ridge National Labs to commercialize charged particle detectors

- **Headquarters:** Oak Ridge, TN with global sales and service offices
- **Employees:** 300+ worldwide
- **Core focus:** Ionizing radiation detection, identification and analysis instruments and systems
- **Ownership:** AMETEK, Inc., a leading global manufacturer of electronic instruments and electromechanical devices.

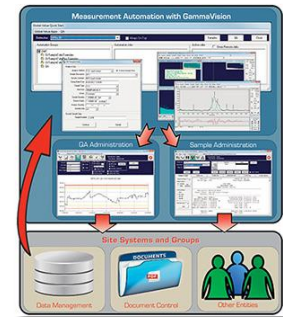
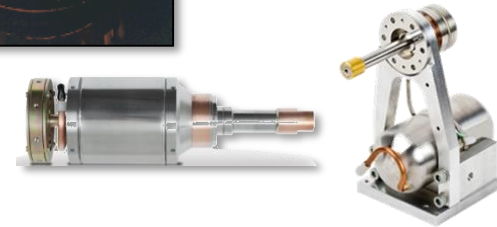
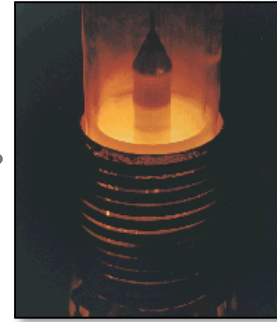






*Over 30 years of experience in Diagnostics, Nuclear Science  
and Environmental Protection*

- **High Purity Germanium Crystal Mfg.**
  - Purest industrial substance in the world
  - $\sim 1 \times 10^{10}$  atoms/cc of impurity or better (out of about  $1.2 \times 10^{23}$  atoms/cc total)
- **Cryocooling Technologies**
  - Vertically intergraded design and manufacturing of Stirling coolers
- **Specialized Electronics**
  - Highly specialized for nuclear, corrosion and materials analysis
- **Analysis Software**
  - Comprehensive offerings for integrated hardware control, data analysis and visual display
- **Integrated System Applications**
  - Focused expertise to assess and configure or customize targeted solutions to meet your needs



# Key Technology: HPGe Detector LN2 and Electromechanical Cooling Systems



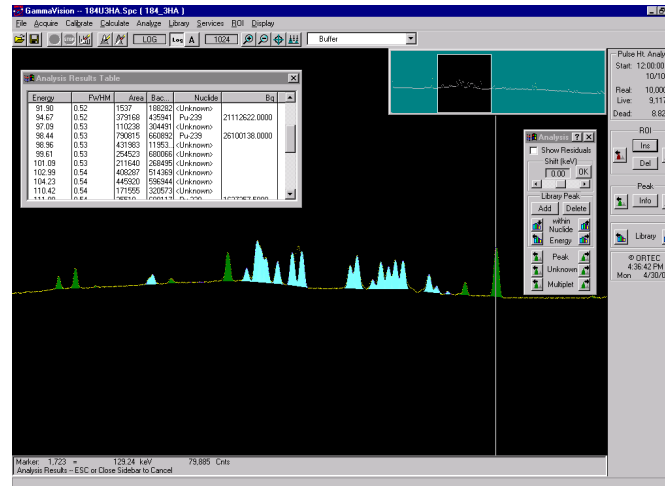
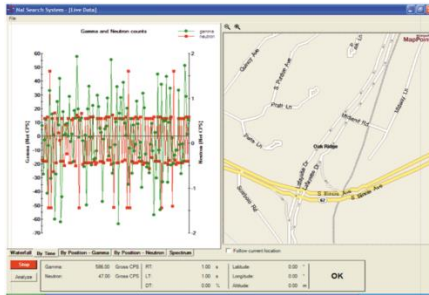
## Key Technology: Electronic Products

Signal processing electronics  
for radiation detector  
systems and fast timing  
systems



## Key Technology: Software

High degree of collaboration with national laboratories for state of the art analysis methods.



ORTEC Analysis Software for :

- Gamma Spectroscopy
- Alpha Spectroscopy
- Waste Assay
- Safeguards
- Whole Body Counting
- Homeland Security

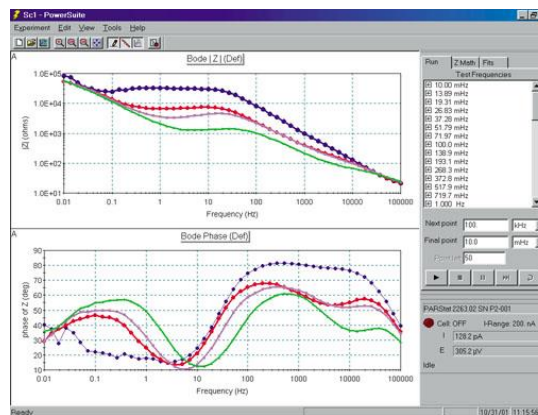
ID Mode Elapsed Time: 24 sec  
Battery Avail: 113 min

Neutron Count Rate = 0 cps

Dose Rate = 0.67 uSv/h

Found Industrial(1)  
Suspect NORM(1)  
Found Nuclear Uranium

Intense Restart Search  
Save Pause Back

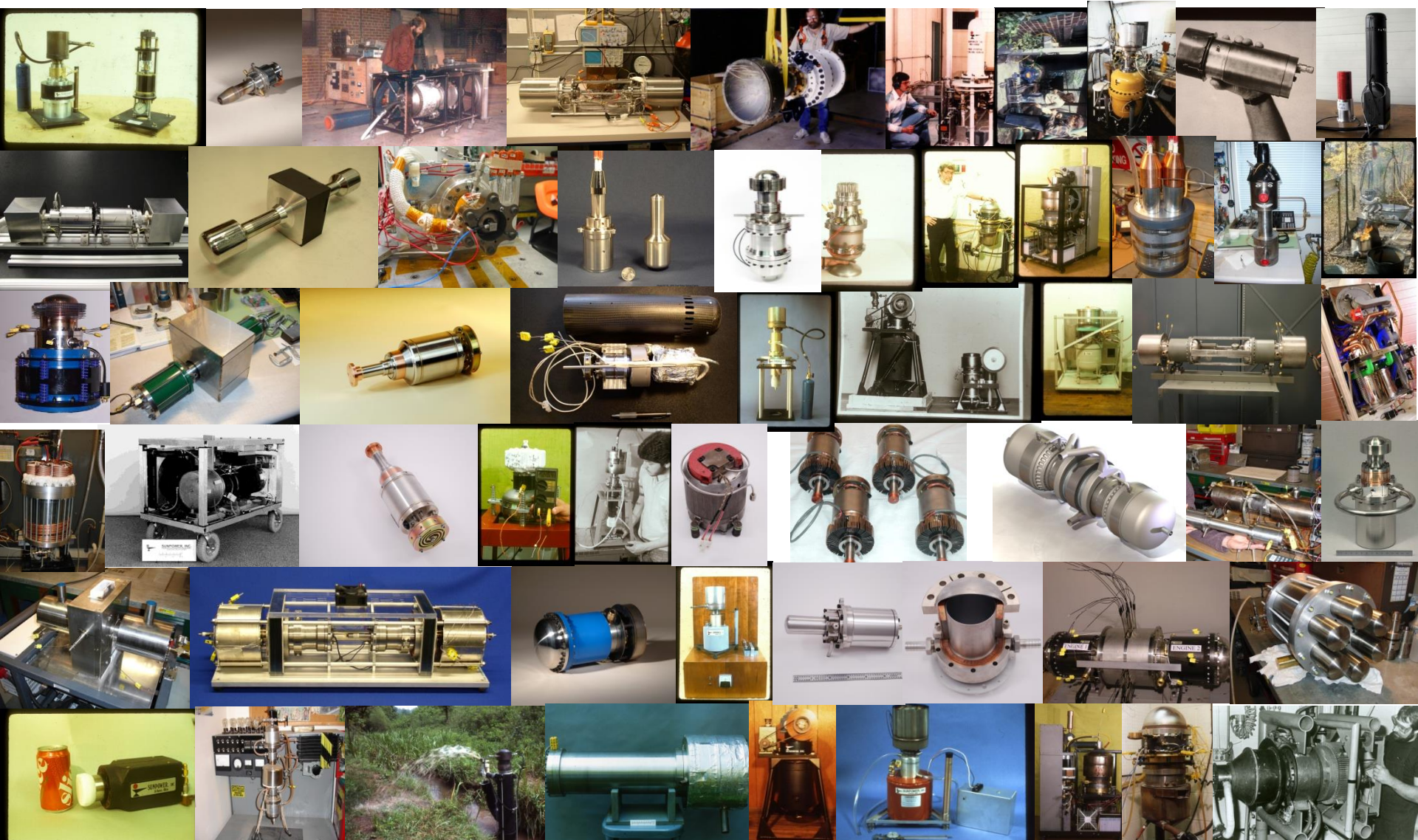




# AMETEK

# SUNPOWER®

# ORTEC®



- Micro-trans-Spec/ Micro-UF6
  - 13% efficiency P-type detector, weighs 7kg
- Trans-Spec-DX-100T
  - 45% efficiency P-type detector, weighs 11kg
- Trans-Spec-N **(New)**
  - 50% efficiency N-type detector, weighs 11kg
- IDM-200-V **(New)**
  - 50% efficiency P-type large area detector, weighs 18kg



# Stationary/Transportable Coolers

**ORTEC**<sup>®</sup>

## ■ X-COOLER-III

- *Pop-Top compatibility*
- *All attitude detector/cold-head*

## ■ LDM-1

- *Complete Spectrometry Solution*
- *All attitude operation / includes stand*

## ■ MOBIUS (released July 2013)

- *LN<sub>2</sub> recycler*
- *> 2 years between LN<sub>2</sub> fills*

## ■ ICS

**(Vacuum Hardened released September 2014;  
PopTop released November 2016)**

- *Integrated Stirling cooler*
- *All attitude operation*
- *LN<sub>2</sub> equivalent energy resolution above 100 keV*



# And finally – Our Website

# ORTEC®

**ORTEC** AMETEK  
ADVANCED MEASUREMENT TECHNOLOGY

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Research and Education

## Research and Education

ORTEC supports teaching laboratories across a wide range of disciplines.

[Read More >](#)

## ORTEC AT A GLANCE

ORTEC is an industry leader in the design and manufacture of ionizing radiation detectors, nuclear instrumentation, analysis software, and integrated systems. Our technologies, products, and services are instrumental in materials analysis for radiological content. Key industry segments include nuclear power, nuclear security and materials safeguard, academia and research, environmental management, and health physics.

## RECENT NEWS



ORTEC introduces ICS-P4 Integrated Cryocooling System for HPGe PopTop Detectors  
ORTEC Products Group has released the ICS-P4, adding a new model to its highly successful Integrated Cryocooling System product line. The ICS-P4 extends liquid nitrogen (LN2)-free cooling to PopTop® High-Purity Germanium (HPGe) detectors, while simultaneously delivering premium detector resolution and high reliability.

## PRODUCT SPOTLIGHT



**ICS**  
The most advanced electro-mechanical cooler for High Purity Germanium detectors is now compatible with PopTop detectors. New PopTop detectors benefit from LN<sub>2</sub>-like resolution performance above 100keV energy and only 10% resolution degradation below 100keV. ICS-P4 uses numerous field proven ICS features and components offering more than double the lifetime of older cryocooler technologies.



**ANGLE V4**  
The latest version of ANGLE advanced efficiency calculation software for High Purity Germanium and Sodium Iodide detectors includes multi-language support, geometry correction files, and XML file formats.

**ORTEC** AMETEK  
ADVANCED MEASUREMENT TECHNOLOGY

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## HPGe Radiation Detector Types and How to Choose

Introduction to HPGe Radiation Detector Types and How to Choose

GEM P-type Coaxial High Purity Germanium (HPGe) Radiation Detectors

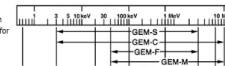
PROFILE GEM P-type Coaxial and Semi-Planar HPGe Radiation Detectors

Gamma-X (GX) N-type High Purity Germanium (HPGe) Coaxial Radiation Detectors  
GWL (Well) P-type Reverse Coaxial Radiation Detectors  
GLP Series Planar HPGe Low Energy Radiation Detectors

Application Specific Radiation Detectors  
Special Radiation Detectors

## PROFILE GEM P-type Coaxial and Semi-Planar HPGe Radiation Detectors

ORTEC PROFILE Series of P-Type High Purity Germanium (HPGe) detectors match the crystal dimension to your application for optimal counting geometry and results.



PROFILE GEM Series detectors feature:

- Stable, thin front contact.
- Standard carbon fiber, or optional Beryllium window
- Efficiencies to 150%, higher on request.
- Excellent energy resolution and peak symmetry.
- Specified crystal dimensions in Profile models.
- SMART bias options.
- Health Environment option.
- Low background carbon fiber endcap options.
- PLUS preamplifier option for ultra-high-rate applications.
- Extensive configuration flexibility, PopTop, Streamline and mechanically cooled options.

Literature	+
More Information	-

- "Application-Matched" P-type HPGe Detectors, optimized for specific sample types, gamma energy ranges and measurement geometries.
- Know how your new HPGe detector will perform before you buy it!
- Best absolute efficiency for the given IEEE standard relative efficiency in your counting geometry.
- Stable thin front contact, no front dead layer growth if stored warm (PROFILE GEM S, SP, and C Series).
- Warranted Crystal Dimensions ensure measurement performance.
- Reproducible dimensions mean reproducible performance... no surprises.
- Full range of PopTop Crystals and options.

The ORTEC PROFILE Series of P-type High Purity Germanium (HPGe) detectors offers specific crystal dimensions from which you can choose the best solution in YOUR application. Nominal relative efficiency specifications are provided in order to help relate relative efficiency to terms of crystal dimensions. The resolution is measured according to the IEEE standard. If a particular PROFILE series detector is available from the ORTEC detector stocklist, then the ACTUAL MEASURED specifications may be inspected before purchase.

### F-Series PROFILE GEM Detectors

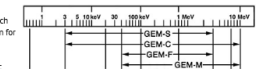
F-Series PROFILE detectors employ "over-square" (diameter > length) coaxial structures. This crystal geometry is often referred to as semi-planar structure. For a given relative (IEEE) efficiency, the F-Series represents the "best use" of germanium material producing the maximum absolute counting efficiency for an endcap or "close geometry" extended samples, such as:

- Point sources on-endcap
- Filter paper samples on-endcap
- Samples presented in bottles and pots on-endcap
- Bio-assay applications (e.g., Lung monitoring)
- Waste drum monitoring

In addition, the over-square geometry helps improve low-energy resolution by reduced crystal capacitance.

## PROFILE GEM P-type Coaxial and Semi-Planar HPGe Radiation Detectors

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- Stable, thin front contact.
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- Low background carbon fiber endcap options.
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- Extensive configuration flexibility, PopTop, Streamline and mechanically cooled options.

Literature	-
PROFILE Series GEM HPGe Radiation Detector Configuration Guide	+
PROFILE S and C Series GEM HPGe Radiation Detectors	+
PROFILE SP Series GEM HPGe Radiation Detectors	+
Overview of Semiconductor Photon Detectors	+
Review of the Physics of Semiconductor Detectors	+
More Information	+
Options	+
Ordering Information	+

Suggestions and feedback on the new website will be appreciated

**AMETEK®**



**Next Generation Advanced HPGe RIID**



# Caratteristiche di Detective-X

Customer Requests / Input	Detective-X
Lighter Weight & Smaller Form Factor	✓
Longer Battery Life & hot swappable batteries	✓
More Reliable Stirling Cooler	✓
Larger HPGe Crystal for Better Sensitivity	✓
Non He-3 Neutron Detector	✓
RJ 45 Internet Connectivity	✓
Better ID's for Shielded & Masked Sources	✓
Mobile Phone Interconnectivity	✓

## ▀ Performance Product

- *Will Meet N42.34 2016 Standards (Gamma and Neutron)*
- **>40% efficiency** *HPGe Detector (vs 13% Micro-Detective)*
- *Highly Efficient Li6/ZnS Neutron Detector meets new N42.34*
- *Extremely Reliable Cryogenic Cooler*
- *Extremely Rugged Shock Absorbing Enclosure*
- *Water/Dust Proof (IP65)*
- *-20C to +50C Operation*
- *8 to 10 Hour Battery Life*
- *New software with wireless reach back capabilities*

# DISPLAY

**ORTEC**<sup>®</sup>

Remote Desktop - 10.7.51.32

**Settings** 6/30/2016 8:21:20 PM  
Battery Time: 550 min  
Status: Cooling Phase 1

$\gamma$  Dose Rate = 0.00  $\mu$ Sv/h  
 $\gamma$  Count Rate = 0 cps

**Detector Temp High**

Dead Time	0.0%	Bias Voltage	OFF
Detector Temp	145.00 (ERR)	+12V	12.00 (OK)
Body Temp	31.00 (OK)	-12V	-11.80 (OK)
Cold Tip Temp	124.00 (ERR)	+3.3V	3.30 (OK)
GM1 CPS	0	Cooler Drive	10.92 (OK)
GM2 CPS	0	Gain Stabilizer	-38.40%
Fan Speed	2925 (RPM)		

Back

*State of Health*

*ID Mode*

Remote Desktop - 169.192.3.2

**ID Mode** 7/5/2016 10:37:58 PM  
Battery Time: 530 min  
Status: READY  
Elapsed Time: 00:00:18

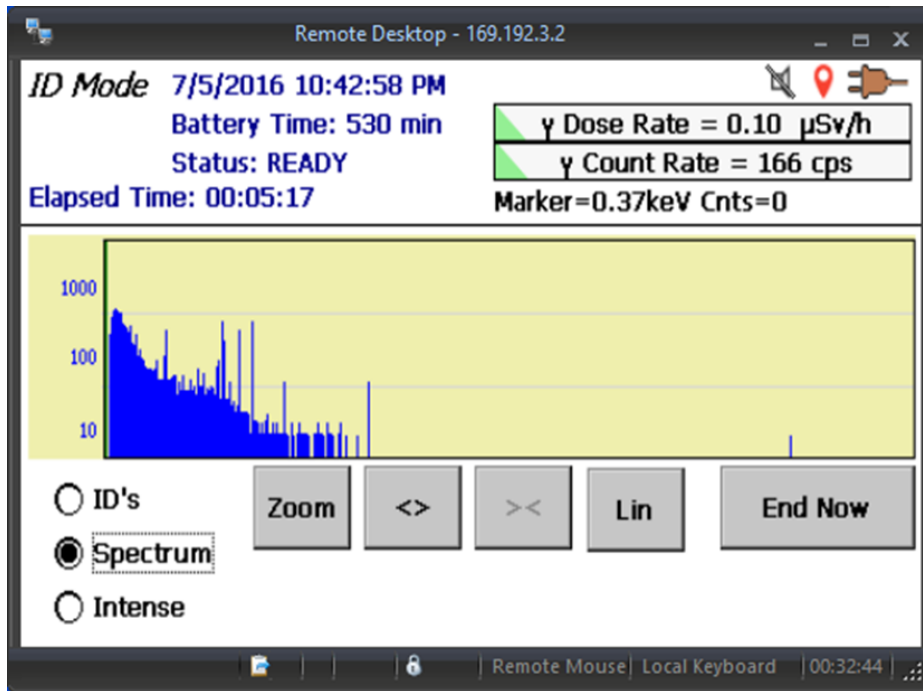
$\gamma$  Dose Rate = 0.10  $\mu$ Sv/h  
 $\gamma$  Count Rate = 117 cps

I	Co-60	Ind.	4.5
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ID's  
 Spectrum  
 Intense

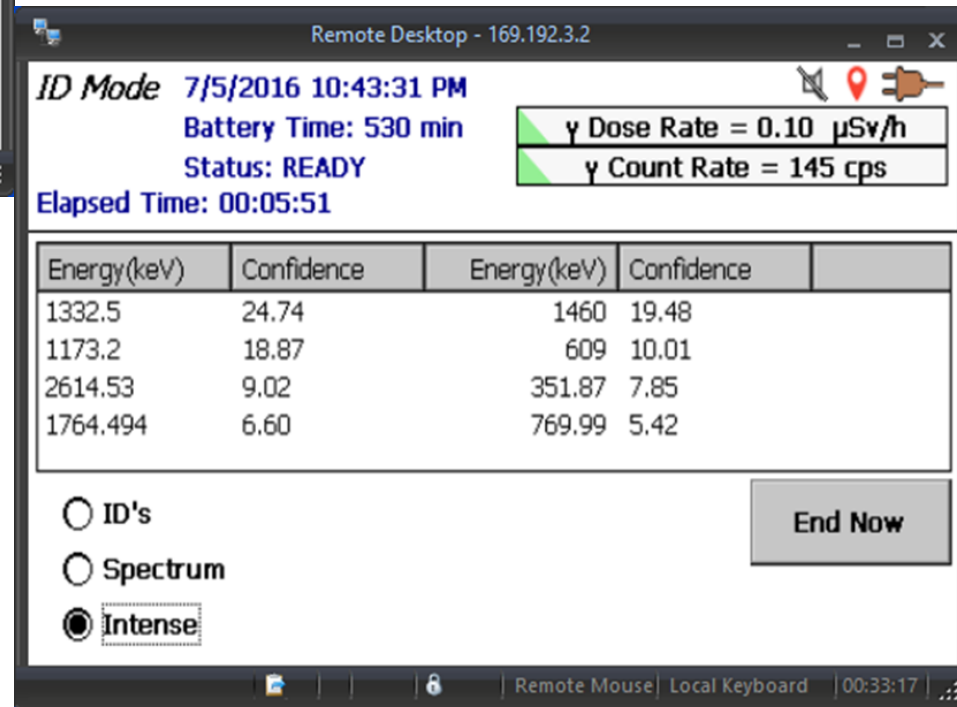
End Now





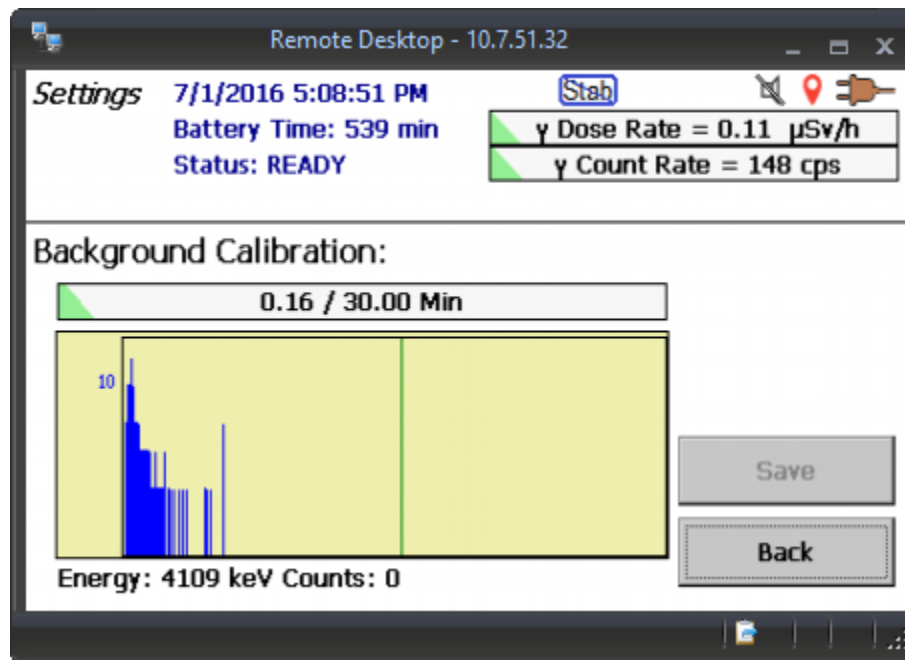
*Spectrum mode*

*Intense Mode*

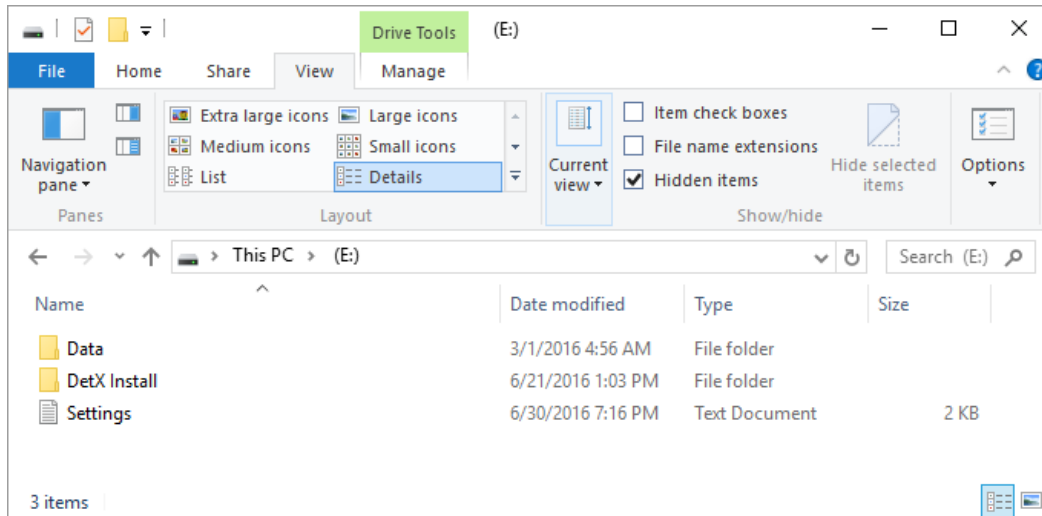


# Energy Calibration procedure

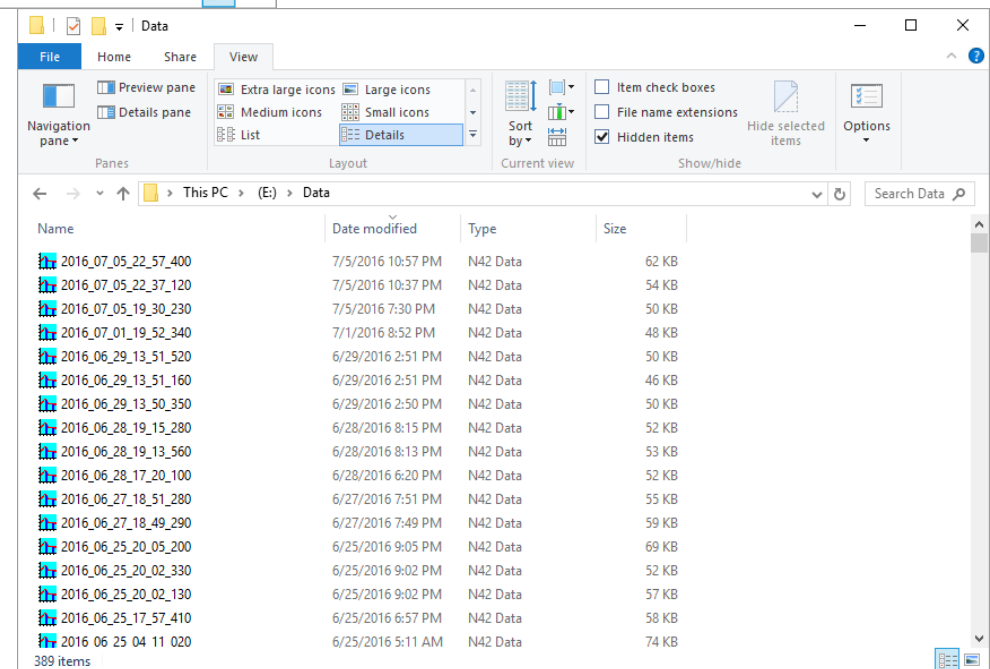
- ▀ Background acquisition and spectrum storage.
- ▀ Energy Calibration with a reference source.
- ▀ K-40 online stabilization during operation.



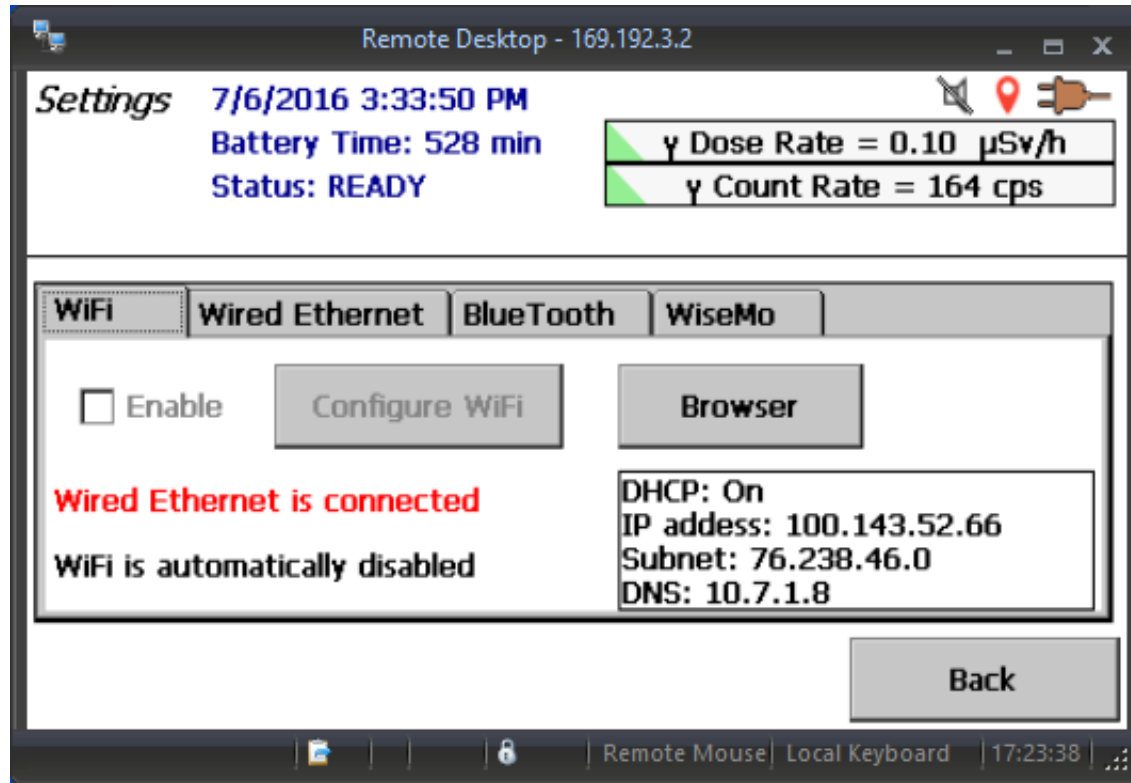
# Data transfer



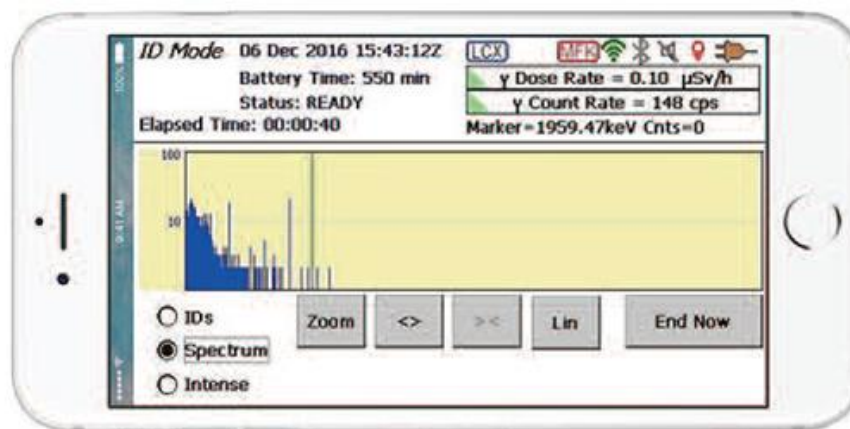
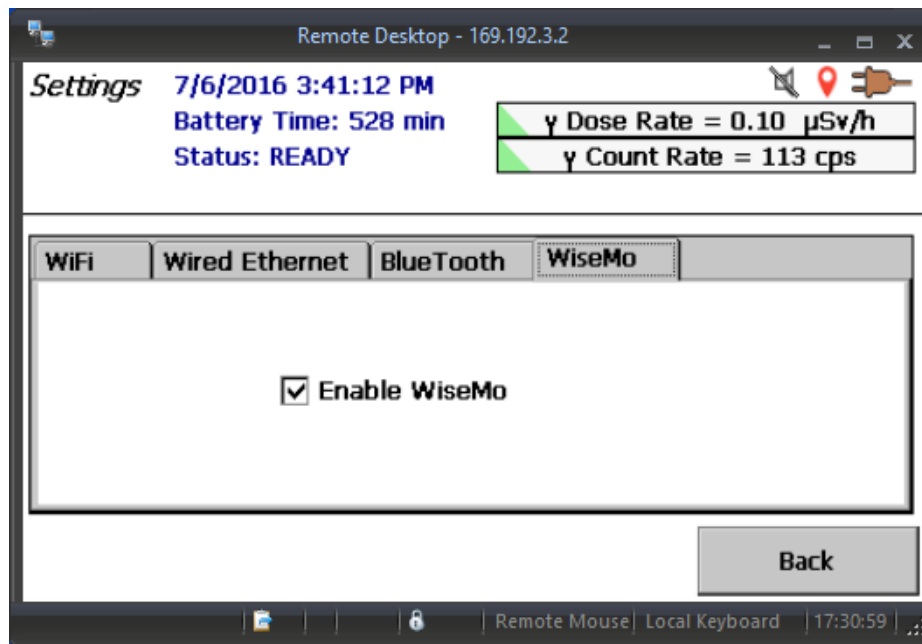
## USB Port



# Ethernet - WiFi - Bluetooth connection **ORTEC**<sup>®</sup>



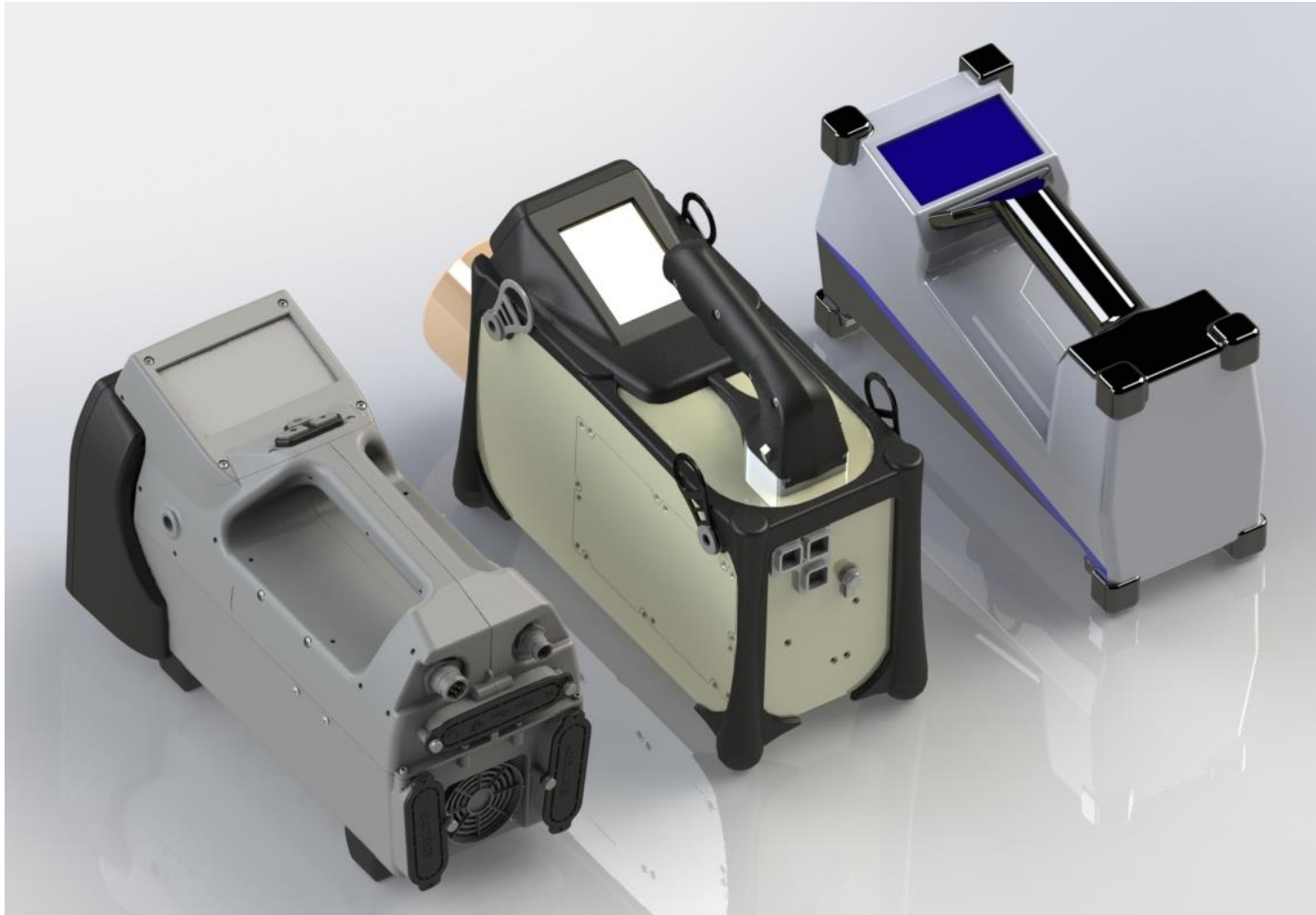
# Mobile Phone connection



# Relative Size Comparisons

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**ORTEC**<sup>®</sup>





**High Performance Low-Medium resolution RIIID**

***RADEAGLE is the fastest, most accurate, and lightest handheld radioisotope identification device in its class with the fewest false alarms.***

Combining a large<sup>(1)</sup>, high sensitivity<sup>(2,3)</sup>, NaI(Tl) crystal with an intelligent algorithm, RADEAGLE can correctly ID up to six isotopes simultaneously, even in complex shielded or masked scenarios in under 30 seconds.

At ~2500g, the RADEAGLE is the lightest of all NaI(Tl), high performance RIIDs, and incorporates a simple touchpad user interface and intuitive, multi-functional software. The RADEAGLE's simplistic operation enables even novice users to be fully capable of performing sophisticated ID measurements.



(1) 3.0" (76.2mm) x 1.0" (25.4mm)

(2) > 2500 cps per uSv/h @ 662keV <sup>137</sup>Cs

(3) < 7.2% FWHM @ 662keV <sup>137</sup>Cs



## Total Life Cycle Costs Include:

- **Upfront Capital Costs**
- **Calibration Costs**
  - *No Calibration Costs with RadEagle (saves \$3-4K /yr or every two years).*
- **Maintenance Costs**
  - *Minimal maintenance costs and ability to repair units in house*
- **False Alarm Costs**
  - *False Positives require costly responses from multiple government agencies*
  - *False Negative cost would be inconceivable.*

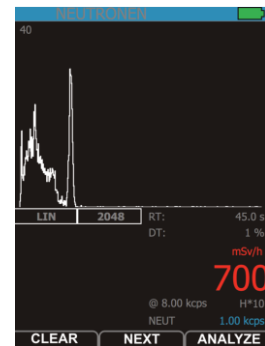
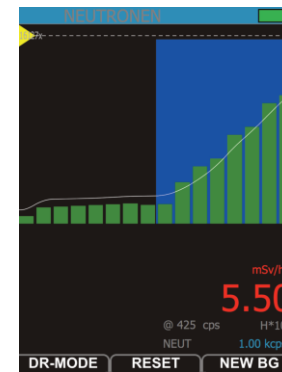
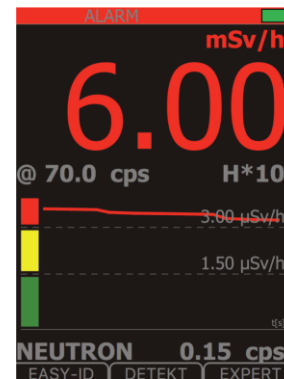


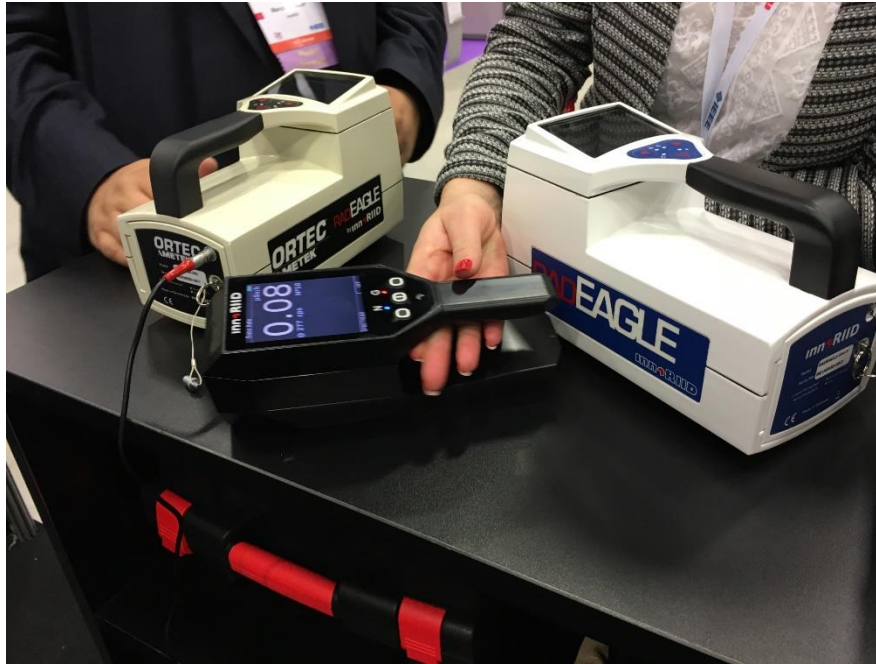
**RadEagle is lowest Total Life Cycle Cost Option**

ORTEC®



**AMETEK®**  
ADVANCED MEASUREMENT TECHNOLOGY





- New Low-Medium resolution RIID
- Full range of detector options – NaI, LaBr, CeBr
- Compact size, very low weight

# Relative Size Comparisons RADEAGLET, RADEAGLE, and Micro-Detective



**Thanks for your attention !**