



Radiation measurement and security instruments

Industrial radiation protection for your personnel, facility and business

Monitoring is important

- There are thousands of radioactive sources no longer being used
- Sources can end up in the scrap metals stream
- Significant contamination can occur leading to personnel health risks and costly remediation

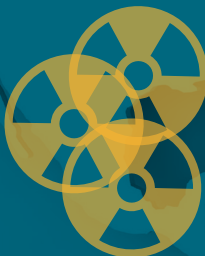
Canton, Ohio, 2004, Cs-137, \$30 M cost of melting



Cadiz, Spain, 1998, Cs-137, \$26 M



Ciudad Juarez, Mexico, 1983,
Co-60, 1 dead, 4 exposed



Jewitt, Texas, 2005,
Cs-137, approx. \$7 M

Hueypoxtle, Mexico, 2013, Co-60, Assumed lethal dose




Goiana, Brazil, 1987, Cs-137, 4 dead, 250 exposed

International Atomic Energy Agency (IAEA) is aware of, on average,
150 or so “events”/year involving scrap metal



Our experience, equipment and expertise can mitigate the risk that contaminated materials will affect you, your facility or your business. From portal and conveyor belt monitors to personal radiation detectors, we have you covered.



Outokumpu, Finland, 2018,
Am-241 sources melted,
4 exposed, approx. \$5M

1 cost of melting

Mayapuri, India, 2010, Co-60, 1 dead, 8 exposed



Samut Prakarn, Thailand, 2000 Co-60, 3 dead, 10 exposed

A stainless processing facility found 145 nuclear items in scrap in 2011 and 200 in 2010, and more than 120 shipments



of contaminated goods were denied U.S. entry between 2003 and 2008. Items such as decorative tissue box holders, metal tea tins, cheese graters, elevator floor numbering buttons, rebar, patio furniture, shovel blades, fashion belts, etc. have been discovered manufactured from Co-60 contamination metal.

A Cs-137 source was melted at steel mill, vaporized and contaminated the bag house dust.

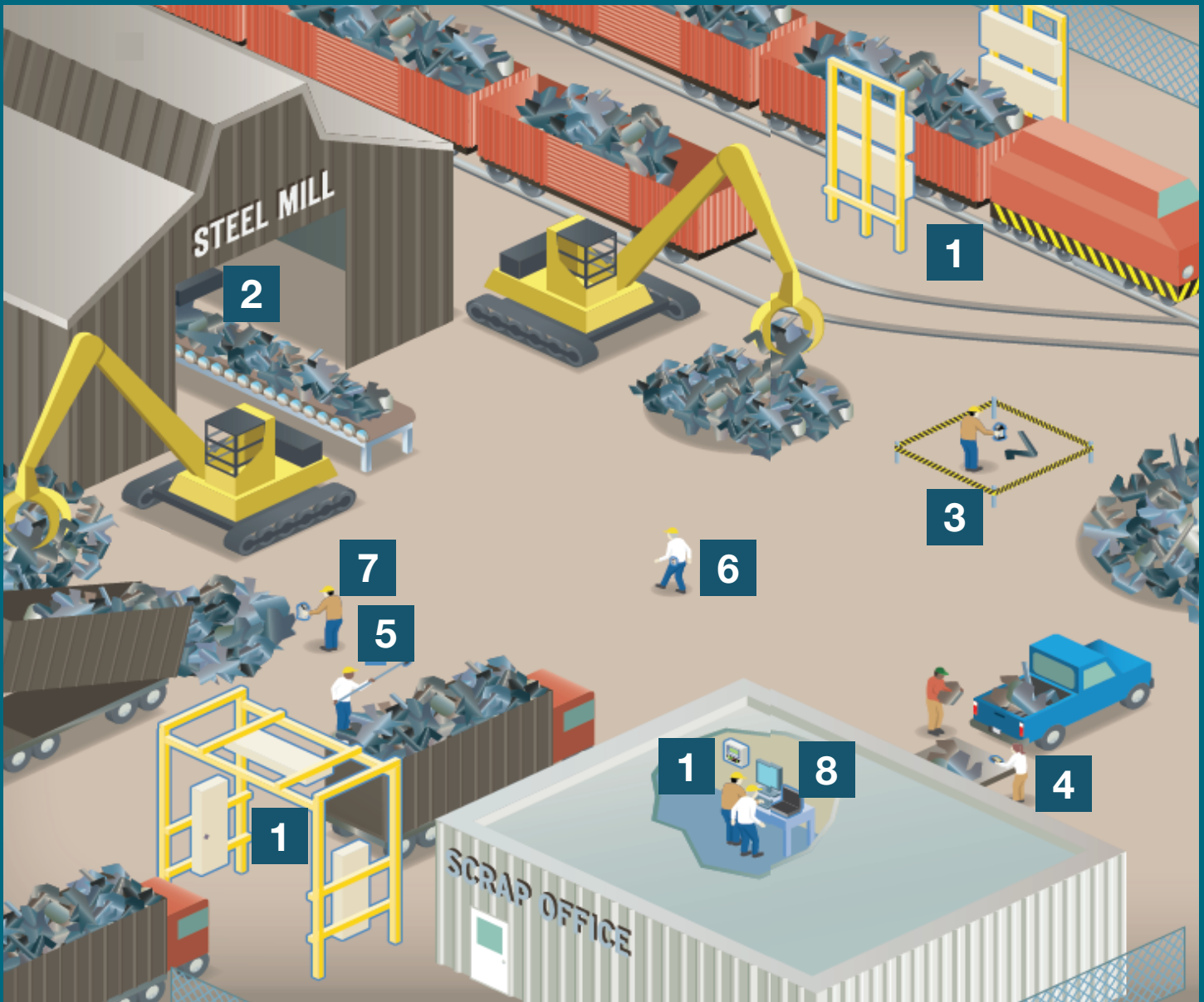


The emission system was shut down, causing contaminated flue dust to back up into the secondary bag house. It took three weeks and an estimated \$25 million to clean up. In two separate incidents, 500,000 lbs. and 1.4 million lbs. of low level radioactive dust were produced and required specialized disposal.

The number of "orphan sources" (found or abandoned sealed radioactive items that lack identifying marks) being discovered in scrap metal yards is increasing.



8 Reasons metal processors need radiation detection



- Radioactive sources can frequently show up at recycling facilities.
- These sources threaten works and can end up in recycled material, threatening consumers.
- Multiple points of inspection are needed – from vehicles entering to various steps in the process.

We have identified 8 key places to consider when looking to protect your facility and the public from radiation threats.

- 1 Truck and Railcar Monitoring** Use Radiation Portal Monitoring systems for truck and railcar monitoring. **ASM IV Series monitoring system**
- 2 Charge Bucket, Conveyor, Platform Scales or Dust Collection** Ensure process monitoring systems are configurable for conveyor, platform scales or system dust collection. **ASM IV Charge Bucket monitoring system**
- 3 Secondary Inspection** Use the sensitive and fast responding **RadEye NBR High Sensitivity Gamma Radiation Monitor** to verify the radioactive find and assess if of natural or artificial (man-made) origin. Alternatively, or in addition use the ruggedized **RIIDEyeX Handheld Radioactive Isotope Identifier** to provide fast and real time identification and analysis.
- 4 Combination Detection** Belt-worn radioactive gamma isotope identification and neutron indication. **RadEye SPRD Spectroscopic Personal Radiation Detector**
- 5 Search and Find Applications** Portable Personal Radiation Detectors provide sensitive and fast detection of gamma radiation with accurate dose rate measurements. **RadEye PRD4 Personal Radiation Detector**
- 6 Gamma Neutron Paging** Use a monitor that combines gamma sensitivity and energy compensated dose rate measurement with separate, high sensitivity neutron response and alarm threshold. **RadEye GN+ Gamma Radiation monitor**
- 7 Accurate Identification of Source** Quickly locate radioactive materials with the most sensitive hand-held instrument featuring fast discrimination between man-made artificial sources and natural radiation. **RadEye NBR**
- 8 Documentation** Utilize software for documenting scans performed. **RadEye Safety Kit and Viewpoint Enterprise Remote Monitoring System**

Experience

We have been in the radiation detection and measurement business since 1949. We have been providing large scale radiation detection systems to the metal recycling and metal production industries for over 30 years, designing and installing our first scrap metal monitor in 1987. We pioneered and refined the science behind detecting and resolving the low level radioactive signal from orphaned sources of radiation buried in scrap metal. And since the terrorist events of 9/11, our portal monitoring and portables technologies have been at the forefront of radiation threat detection at ports, borders and regional locations around the world.



ASM IV Series monitoring system testing at Oak Ridge National Laboratory



Portal Life-Cycle Evaluation and Demonstration System in Oakwood Village, Ohio

Equipment

History has shown time and time again that no single radiation detection instrument/ installation can guarantee protection and traceability at any single point of the material handling process. Multiple points of inspection help overcome the problems of too little time, too great a distance and too much shielding that will be surely be encountered at any one inspection point.

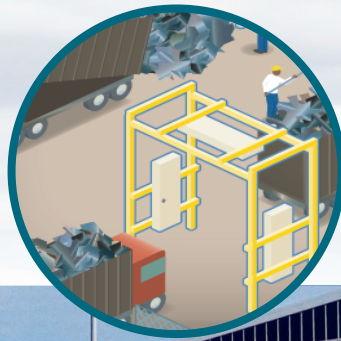
The breadth of our product offering is unparalleled in the industry; everything from simple electronic dosimeters to radiation detection portal systems, from hand held gamma spectroscopic instruments to advanced spectroscopic portal systems.

System/Instrument application chart

System	Page	Portal monitor	Material monitor	Personal monitor
ASM IV Series automatic scrap monitoring systems	7	X	X	
RIIDEye Series handheld radiation isotope identifier	14		X	
RadEye SPRD	15		X	
RadEye NBR System	15		X	X
RadEye GN+	15			X
RadEye PRD4	16			X
RadEye safety kit	17			X
Lutetium test adapters	18	X	X	X
ViewPoint Enterprise	Back	X	X	X



ASM IV Series monitoring system




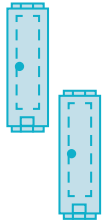
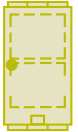
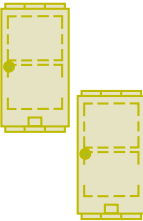
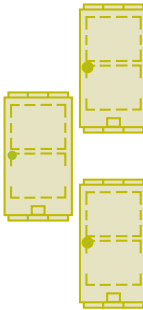

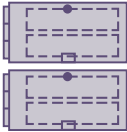
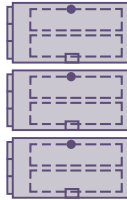
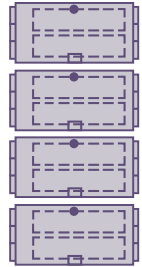
Detect and deter radioactive threat items at the door and in your process. Our Thermo Scientific™ ASM IV portal monitoring system designs are the result of superior science supported by a wealth of experience in industrial applications. Our practical approach provides unparalleled performance with simple, clear, concise and actionable information to the operator. Our portal monitoring systems are configurable, offering solutions to meet, budget, application and performance requirements.

Radiation Detector Modules

Single

Enhanced

Dual

								
ASM IV 3KE 48" (1219 mm) vertical coverage 15" (381 mm) detector dwell	ASM IV 6KV 96" (2438 mm) vertical coverage 15" (381 mm) detector dwell	ASM IV 6KE 51" (1295 mm) vertical coverage 33" (838 mm) detector dwell	ASM IV 12KV 102" (2591 mm) vertical coverage 33" (838 mm) detector dwell	ASM IV 18KV 153" (3886 mm) vertical coverage 33" (838 mm) detector dwell	ASM IV 6KD 33" (838 mm) vertical coverage 48" (1219 mm) detector dwell	ASM IV 12KD 69" (1753 mm) vertical coverage 48" (1219 mm) detector dwell	ASM IV 18KD 105" (2667 mm) vertical coverage 48" (1219 mm) detector dwell	ASM IV 24KD 141" (3581 mm) vertical coverage 48" (1219 mm) detector dwell

Sensitivity and vertical coverage increases

Integrated System Design

Encompassing years of experience in harsh industrial environments, the latest industrial hardened ASM design, has proven to excel in rugged and difficult environments.

- Combines optimized detector design
- Virtually no false alarms with industry-proven peak detection algorithms
- Superior monitoring sensitivity
- Fully Networkable

Robust, Reliable, Real-Time Operation

- Rugged industrial PC based System Control Unit; no commercial PC's, no mechanical hard drives or cooling fans to fail
- 100% solid state hard drives
- Imbedded LINUX operating system and our latest "12 Series" electronics platform; no need for Windows™ upgrades/maintenance

Flexible Configurations and Optimized Detector Designs for the Application

Optimized detector sizes, as a result of independent study of data and real-world testing, yield best sensitivity. While larger volume individual detectors, may provide a slight cost savings, they decrease performance by having proportionally larger background values which directly impact signal to noise ratios and figure of merit. This essentially makes finding the needle (source signal) in the haystack (background signal) more difficult due to the haystack being larger. The use of multiple, smaller volume detectors provide vertical "resolution" over the vertical coverage area, by providing more independent detector zones that allow for significant increases in performance when compared to single, large detectors.

- Best in class vertical coverage
- Best in class vertical resolution

Algorithm Design for the Application

- Proven, unsurpassed Dynamic Background Suppression and Vehicle Profiling algorithm
- Fastest dynamic scanning interval coupled with optimized detector width provides best in class horizontal resolution



Vehicle and cargo application matrix

Many factors come into play in determining what system may be most appropriate; material to be scanned, vehicle types, vertical coverage requirements, sensitivity, cost, etc. Use the matrix as a starting point to guide you in determining a range of models that may best match your needs.

Thermo Scientific ASM IV Part #/ Configs.;	ASM IV 3KE	ASM IV 4KEO	ASM IV 6KV	ASM IV 6KD	ASM IV 6KE	
Small Vehicles; Cars, Pickup Trucks	★★★					
Garbage Trucks	★★★	★★★				
Roll-Off Containers (<i>Solid Waste</i>)	★★★	★★★				
Roll-Off Containers (<i>Scrap Metal</i>)	★ - -	★★ -	★★ -		★★★	
Triaxle Dump Trucks (<i>Solid Waste</i>)	★★★	★★★				
Triaxle Dump Trucks (<i>Scrap Metal</i>)	★ - -	★★ -	★★ -		★★★	
Semi Dump Trailers (<i>Solid Waste</i>)	★★★	★★★				
Semi Dump Trailers (<i>Scrap Metal</i>)	★ - -	★★ -	★★ -		★★★	
Semi Box Trailers (<i>Solid Waste</i>)	★★★	★★★				
Semi Box Trailers (<i>Scrap Metal</i>)	★ - -	★★ -	★★ -		★★★	
Large Scrap Haulers (<i>Euclids/Terex</i>)	- - -	- - -	- - -	★ - -	★★ -	
Rail Cars (<i>Standard Gondolas</i>)	- - -	- - -	- - -	★★★	★★ -	
High Sided Rail Cars	- - -	- - -	- - -	- - -	- - -	
ASM Dimensions						
Radiation Detection Modules (RDM)	2	3	4	2	2	
Top quantity of scintillators	2	3	4	4	4	
Number of RDM per side	1	1	2	1	1	
Number of RDM overhead	0	1	0	0	0	
Horizontal Dwell PVT Width - inch (mm)	15 (381)	15 (381)	15 (381)	48 (1219)	33 (838)	
Vertical Resolution PVT Height - inch (mm)	48 (1219)	48 (1219)	48 (1219)	15 (381)	24 (610)	
PVT Volume/System - inch ³ (l)	2,880 (47)	4,320 (71)	5,760 (94)	5,760 (94)	6,336 (104)	
PVT Vertical Coverage - inch (mm)	48 (1219)	48 (1219)	96 (2438)	30 (762)	48 (1219)	
ASM IV System Application Selector Guide - inch (mm) <i>Please note that consultation with our expert staff is recommended to ensure that where a mix of vehicle types or sizes is possible that the most appropriate system is selected.</i>	48" (1219) load height smaller trucks lower density scrap	48" (1219) load height enhanced with overhead detector	96" (2438) load height trucks lower density scrap	33" (838) load height enhanced vertical and horizontal resolution high density scrap	51" (1295) load height standard trucks higher density scrap	

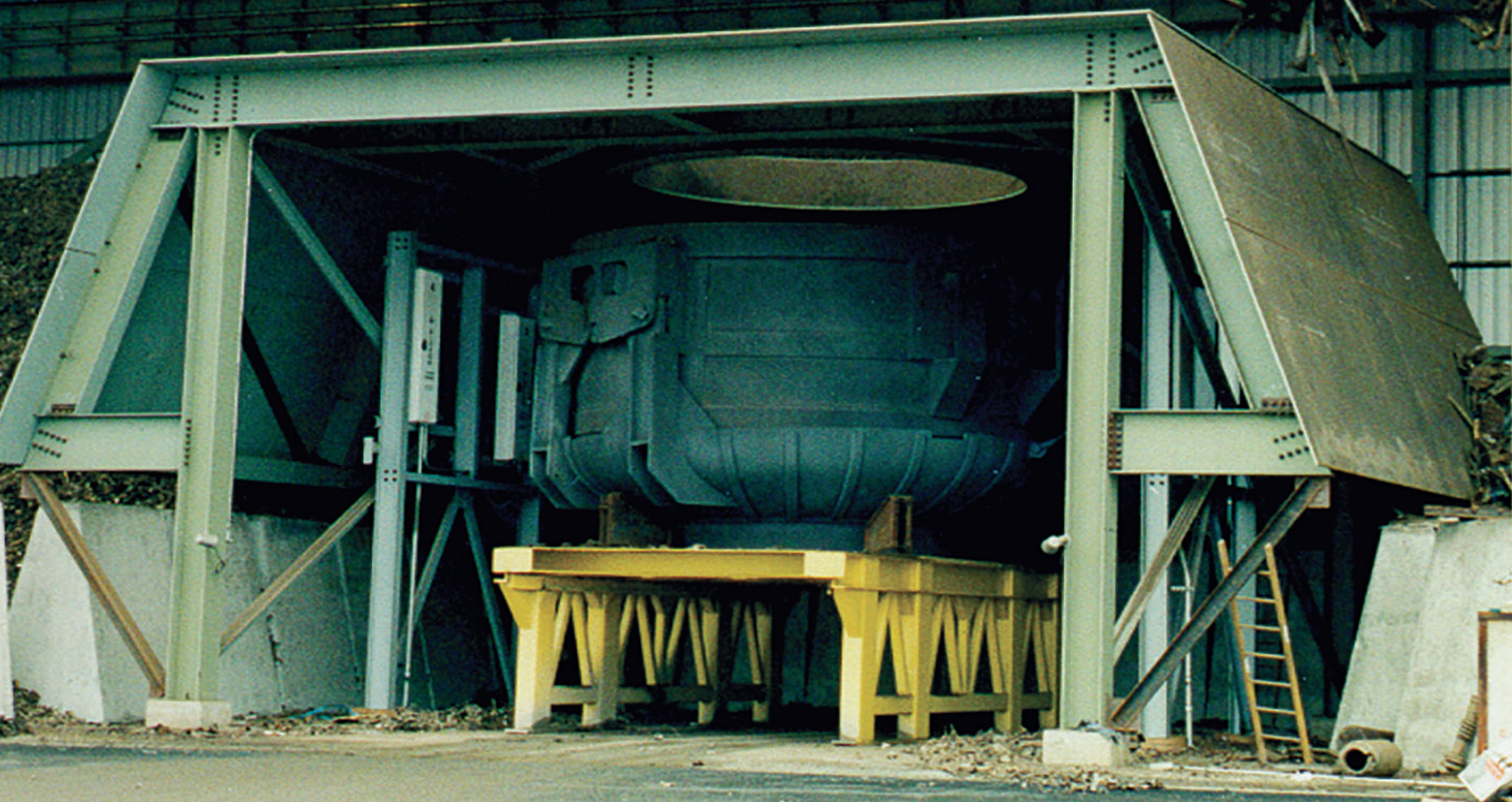
★★★ Best

★★ - Better

★ - Good

- - - Not Recommended

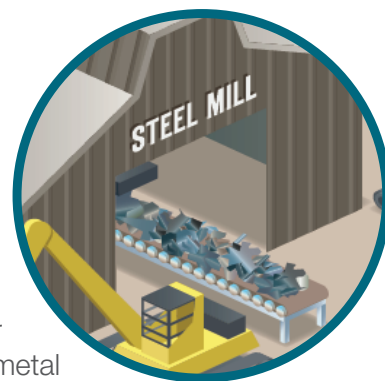
	ASM IV 9KEO	ASM IV 12KD	ASM IV 12KV	ASM IV 18KD	ASM IV 18KV	ASM IV 18KDO	ASM IV 21KDO	ASM IV 24KD
	★★★★							
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	■ ■ ■	★ ■ ■	★ ■ ■	★★★ ■	★★★ ■	■ ■ ■	■ ■ ■	★★★★
	3	4	4	6	6	6	7	8
	6	8	8	12	12	12	14	16
	1	2	2	3	3	2	3	4
	1	0	0	0	0	2	1	0
	33 (838)	48 (1219)	33 (838)	48 (1219)	33 (838)	48 (1219)	48 (1219)	48 (1219)
	24 (610)	15 (381)	24 (610)	15 (381)	24 (610)	15 (381)	15 (381)	15 (381)
	9,504 (156)	11,520 (189)	12,672 (208)	17,280 (283)	19,008 (311)	17,280 (283)	20,160 (283)	23,040 (378)
	48 (1219)	60 (1524)	96 (2438)	90 (2286)	144 (3658)	60 (1524)	90 (2286)	120 (3048)
	51" (1295) load height enhanced with overhead detector	69" (1753) load height enhanced vertical resolution and horizontal dwell high density scrap	102" (2591) load height standard trucks higher density scrap	105" (2667) load height enhanced vertical resolution and horizontal dwell high density scrap	153" (3886) load height standard trucks higher density scrap	69" (1753) load height enhanced with overhead detector	105" (2667) load height enhanced with overhead detector	141" (3581) load height enhanced with overhead detector



ASM IV Series charge bucket monitoring systems

Customized detector placement allows the monitoring of the charge bucket or charging pan loading process, by looking at individual magnet loads of scrap metal as they are loaded into bucket or pan.

This application takes advantage of the background suppression provided by the large bucket or pan, as well as the minimal amount of shielding surrounding a potential source in each magnet load compared to when that same source is located in an entire rail car or truck trailer.



Safety-Guard Series II System

The Safety-Guard Series II system, when equipped with neutron detectors, offers optimized detection of Am-241 and neutron sources in the material recycling stream.

Our industry-leading "Natural Background Reduction" (NBR) technology offers significant gains in detection sensitivity, while lowering false alarms due to naturally radioactive materials of no consequence or concern. Large area, premium-grade scintillation detectors provide 24/7 maximum detection to any objects or vehicles passing by.

The advanced Safety-Guard Series II radiation detection system utilizes a modular design. To optimize your measurement needs, up to eight 25 liter gamma & neutron detectors may be linked to a system controller.

Quickly identify the exact isotope and precise location of radioactive material to quickly initiate a plan of action

- Clear, bright and easy to read, full spectrum color coded display
- A range of configurations and modular versions ensure you have the optimal instrument for your facility
- Available external removable gamma detector
- Reduced false IDs and improved detection sensitivities
- Environmentally sealed exceeds IP65 rating and drop resistant to 5 feet





Thermo Scientific RadEye SPRD spectroscopic personal radiation detector

RIID Capability in the palm of your hand

- Compact, rugged and reliable
- Worn on belt for constant monitoring
- 150 hours from 2 AAA batteries
- Phone app available with real time indications on multiple connected phones
- Quickly share time indications on a smart phone or tablet



Thermo Scientific RadEye NBR High Sensitivity Gamma Radiation Monitor

The most sensitive handheld detector featuring fast discrimination between artificial and natural radiation

- Ideal for detection of shielded sources
- Alarm on small traces of artificial gamma radiation
- One-hand operation



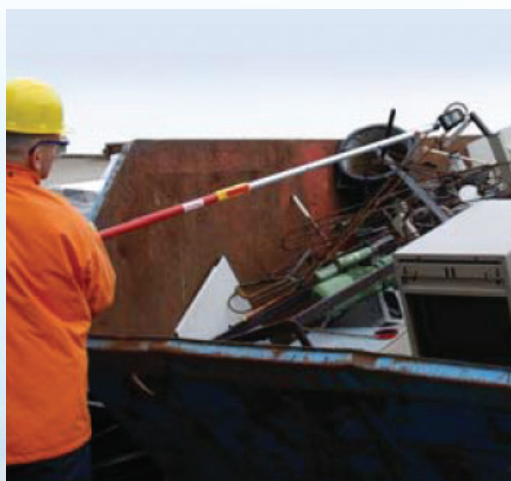
Thermo Scientific RadEye GN+ Gamma Neutron Pager

Early warning of harmful nuclear materials

- Compact, rugged and reliable
- Very high neutron and gamma sensitivity.
- Immediate classification of gamma source (Artificial/NORM).
- Energy compensated gamma dose rate.
- Dual gamma/neutron display.
- No false neutron alarms for even intense gamma sources.

Thermo Scientific RadEye PRD4 personal radiation detector
Detect and locate orphaned sources or problematic NORM related sources in scrap yard

- Small and easy to use
- Fully automated self-diagnosis minimizes required maintenance
- Functions easily accessed even while wearing gloves
- Available extension poles allow you to access hard to reach areas



Telescopic
extension pole



Kits and accessories

Safety kit

Accessory for Thermo Scientific RadEye PRD4/PRD-ER4

Contents of the RadEye PRD Safety Kit

- 1 High sensitivity gamma pager
 - 2 Holster for the RadEye PRD
 - 3 Universal RadEye PRD4 “snap in” adapter
 - 4 RadEye PRD Test Adapter (natural lutetium oxide)
 - 5 Short handle for “snap in” of the universal RadEye PRD adapter
 - 6 USB to the RadEye PRD’s IR port adapter cable
 - 7 RadEye PRD desktop stand with mounting support of the adapter cable
 - 8 Special application-specific software and handbook
- **Appropriate RadEye ordered separately



RadEye Safety Kit

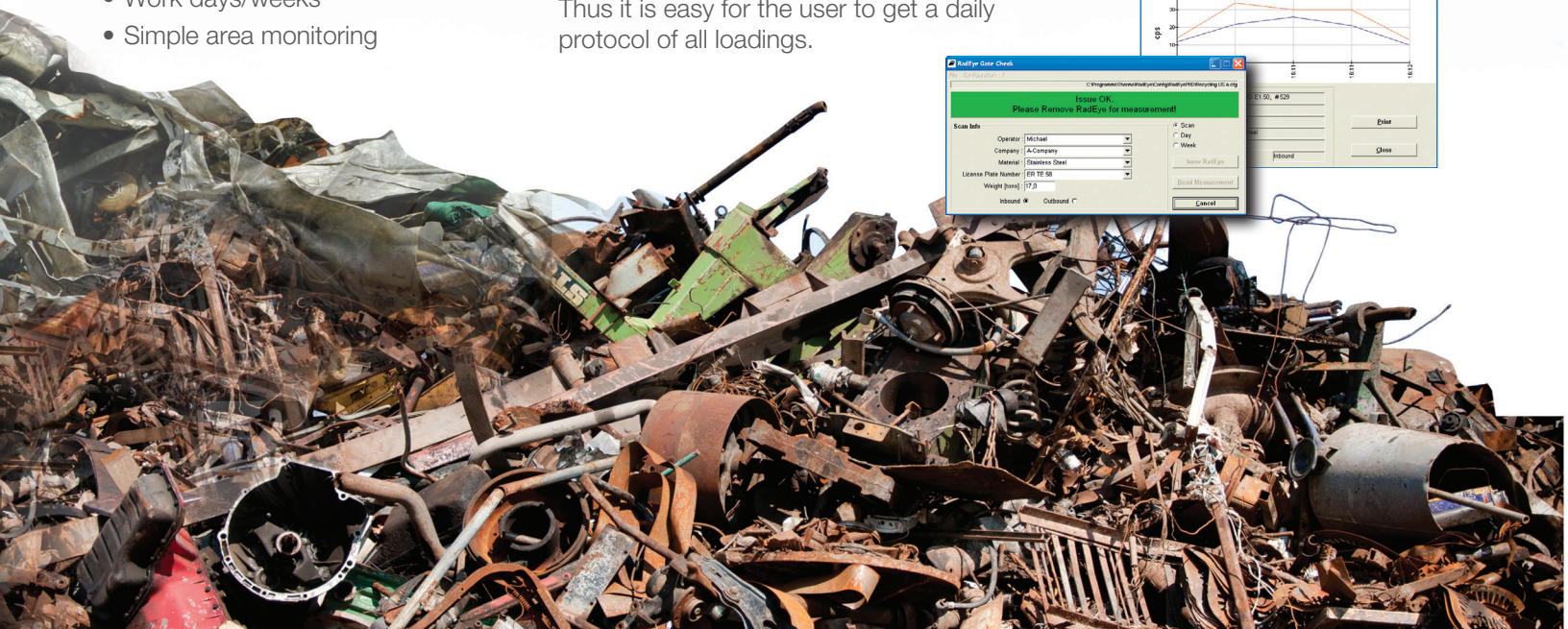
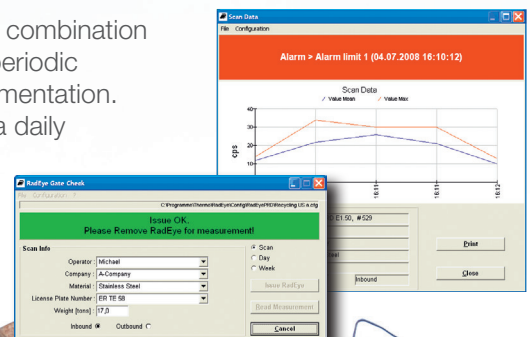
Scanning for contamination is assurance of quality

If the RadEye PRD4 is used for the manual scanning of vehicles, then the application-specific RadEye Software documents via printing of the scanning protocol that no radiation was found in the inspected load. Additional information such as “Company,” “Material,” “Weight,” etc. may be entered and stored or printed with the measurement values.

Recording and documentation

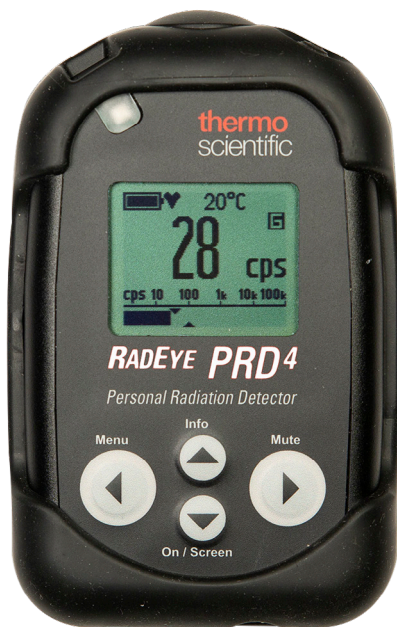
- Vehicle surface scans
- Work days/weeks
- Simple area monitoring

The software “GateCheck.exe,” in combination with a RadEye, provides precise periodic measurement sampling and documentation. Thus it is easy for the user to get a daily protocol of all loadings.



Lutetium (Lu 176) Test Adapters

- Lu-176 is an exempt source. No license required.
- A 3.7E10 year half-life means:
 - no need for error-prone half-life corrections
 - no need for reoccurring purchase of the (decayed) check sources
- Provides a highly reproducible and uniform activity content of 50 Bq/g (1.3 nCi/g)
- The design of a special shape enclosures and high density Lu₂O₃ ceramics minimizes the required activity for small size detectors
- Ideal to test the low energy efficiency of portal detectors; Three peak energies at 300KeV and below, closely resemble the compton scattered energies of lead shielded Cs-137 and Co-60 further attenuated by scrap metal loads

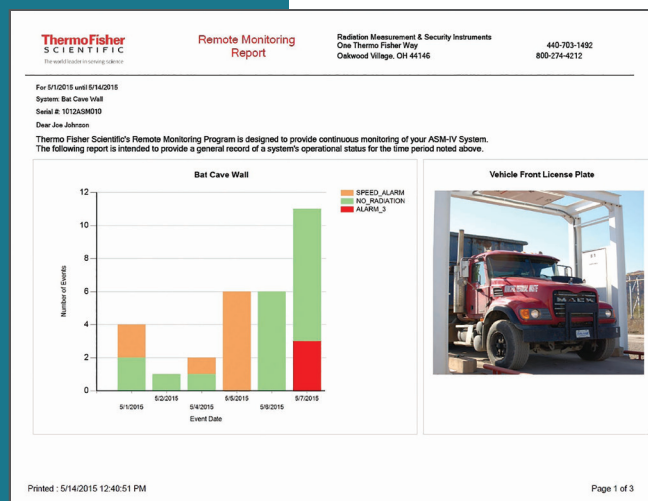


Lutetium (Lu 176)
Test Adapters

Thermo Scientific ViewPoint Enterprise System

The intelligent integration of hardware and software, the Thermo Scientific™ ViewPoint™ Enterprise system is built around three major components, Sensors, Communications, and Decision Analysis.

- Sensors compatible with ViewPoint include the ASMIV and SGSII Portal Monitoring Systems, the RadEye family of Detection Instruments, and dozens of other Radiation Detection Products.
- Communications encompasses wireless and networked means of transferring information rapidly from sensors to the ViewPoint system.
- Decision Analysis is the powerful array of software tools that allow ViewPoint to remotely monitor, graph, and display data, as well as triggering alarms. Centralized Decision Analysis allows management and response personnel to make effective and rapid decisions when alarms occur.



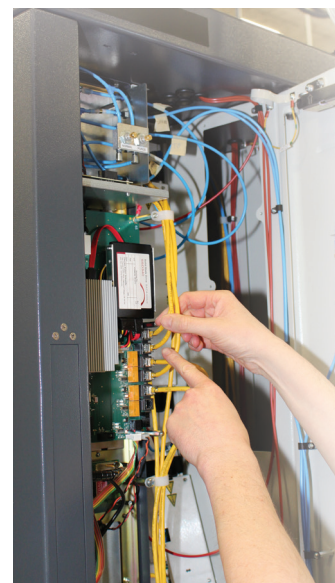
Extended warranties and service plans

Configure your extended warranty, preventative maintenance, calibration and commissioning and start up services plan and enjoy peace of mind.

We provide a wide array of instrument upgrades and certified original equipment manufacturer services designed to help you optimize the performance of your radiation equipment. Select from a wide variety of global radiation detection equipment service, training, calibration, and parts supply to maximize the productivity of your assets while managing the high costs of unplanned maintenance and repair throughout the lifecycle of your products.

Access a professional, qualified team that includes an integrated customer service group, technical support team and factory-certified depot repair and regional field service teams. Discover how you can maximize your investment with radiation detection and measurement instrument services.

Visit thermofisher.com/radiationservice to learn more, or call **800-274-4212** and select option 1 to configure the ideal services solution for your business needs.



Learn more at thermofisher.com/radiationmeasurement

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