

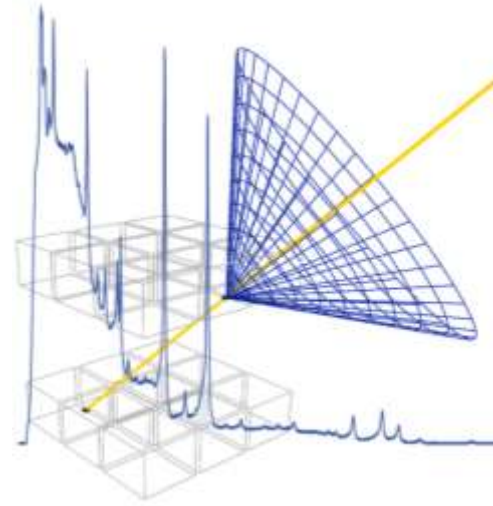
ABOUT H3D[®], INC.

H3D is changing the paradigm of radiation detection. We are privately held, market-driven, and committed to providing our customers with the highest performance and most user-friendly instruments possible.

Superior Capabilities

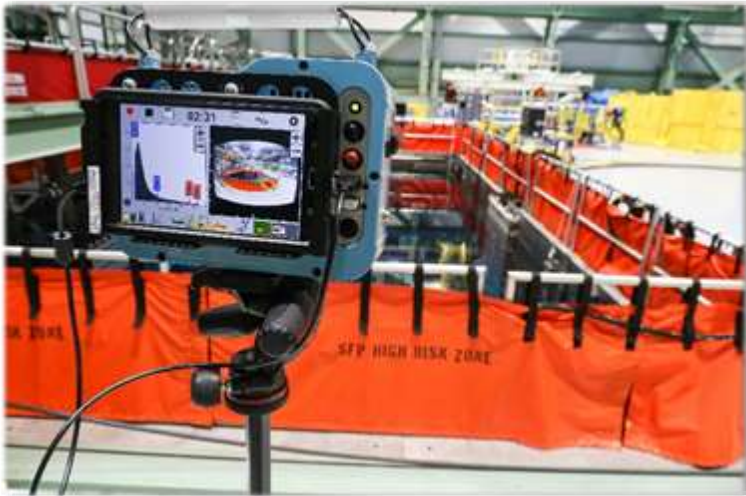
H3D offers the world's highest-performance imaging spectrometers. Quickly identifying and localizing gamma-ray sources with a single measurement, H3D is revolutionizing how measurements are performed.

- ✓ Fast startup
- ✓ Compact and lightweight
- ✓ Industry-leading energy resolution
- ✓ Able to be ruggedized
- ✓ Highly efficient imaging



Customer Focused

H3D exists to serve customer needs. With twelve highly trained Ph.D.'s and extensive experience in detector applications, we make understanding customer applications and building solutions our highest priority. Available to customers 24/7, we stand by our products.



Proven Results

A 2011 spinout from the University of Michigan, H3D products are now used in over 70% of US nuclear power plants, and we ship products to nuclear power plants and research labs around the world. H3D's products have been featured in several periodicals, including Nuclear Engineering International and Popular Science. H3D has performed sponsored research for the Defense Threat Reduction Agency, Department of Energy NA-22, and National Institutes of Health, and we have won the 2017 and 2018 SPARK FastTrack award for sustained fast revenue growth.



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For more information about our company and technology, visit www.h3dgamma.com

H3D technology is patent protected by: U.S. Pat No. 7,411,197 and U.S. Pat No. 7,692,155 under license from the University of Michigan, and U.S. Pat No. 10,032,264 and U.S. Pat No. 10,297,697.

HED

NUCLEAR POWER APPLICATIONS





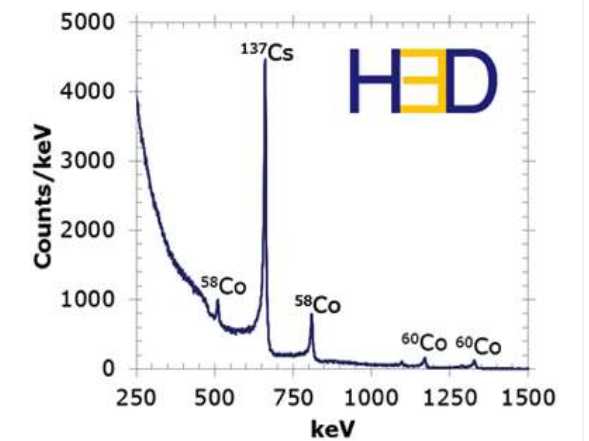
SEEING IS BELIEVING.



CHANGING THE PARADIGM OF RADIATION DETECTION

Superior Energy Resolution

H3D CZT has energy resolution comparable with HPGe detectors for maximum threat specificity and sensitivity.



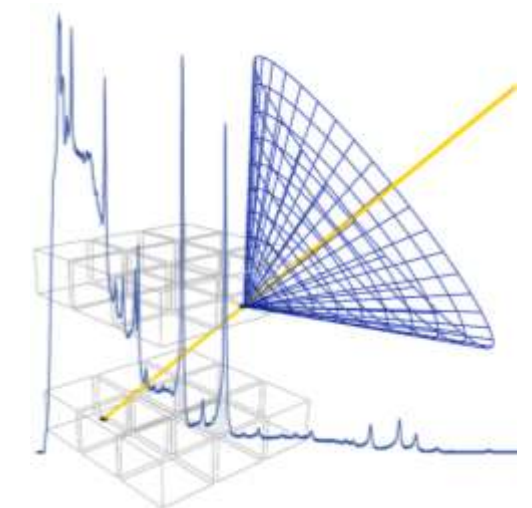
Fast Startup

Go from storage to field in under 2 minutes. No cryogenic cooling required.



Imaging

Localize sources and determine the spatial extent in a single stationary measurement.



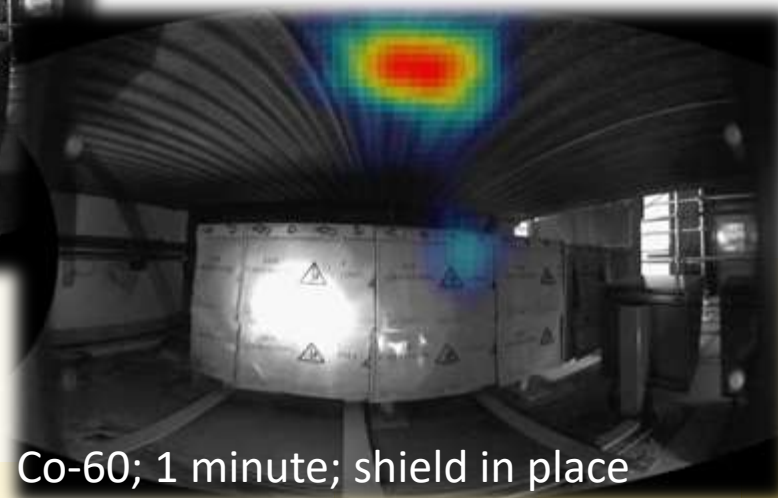
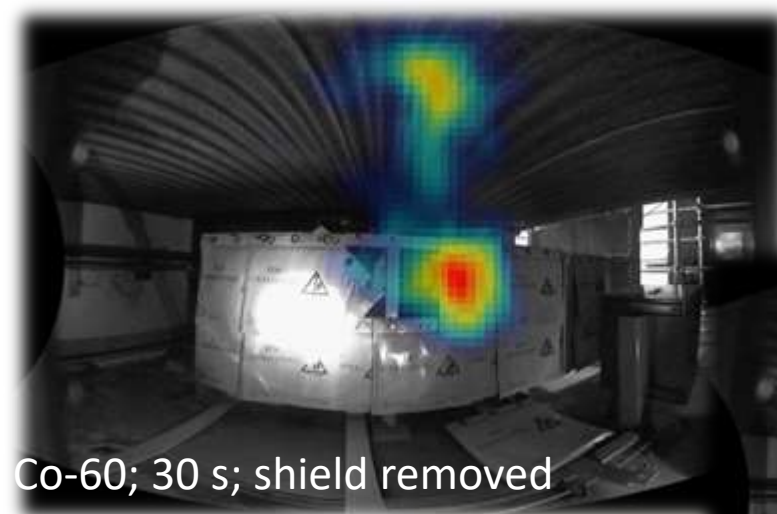
IMAGING MAKES EVERYTHING SIMPLER

Shielding Optimization



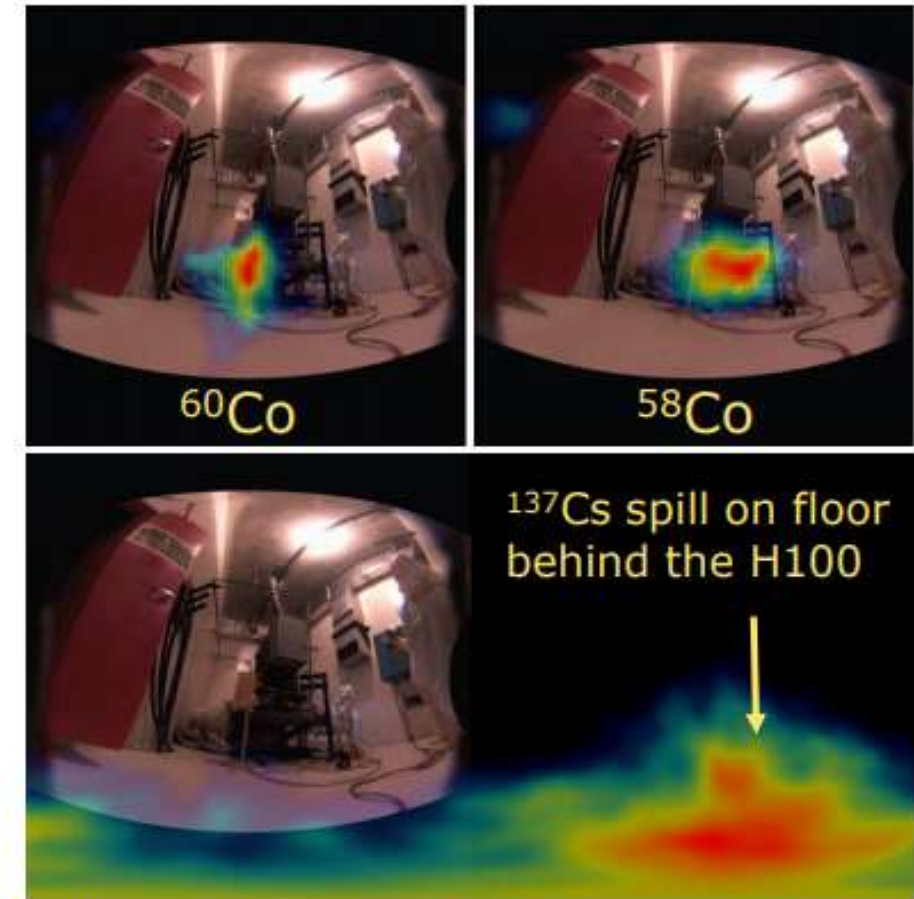
- ✓ Determine whether or not shield is effective
- ✓ Verify shield reduced radiation to safe levels

- ✓ Can verify that shield reduces dose from one source to below that from another source.



Hot Spot Characterization

- ✓ Find direction and character of sources
- ✓ Localize without exposing operator to high-radiation field



10-minute isotope-specific images of an RHR pump room in a U.S. nuclear facility, using the H100

Shipping



- ✓ Quickly locate where in container needs shielding
- ✓ Fast imaging allows easy preparation of shipments

H3D technology provides isotope-specific radiation images in all directions simultaneously

All images are of actual sources in field environments, measured with H3D detectors.

Above: A 5-minute measurement using an H400 detector is able to find a cobalt source in a shipping container

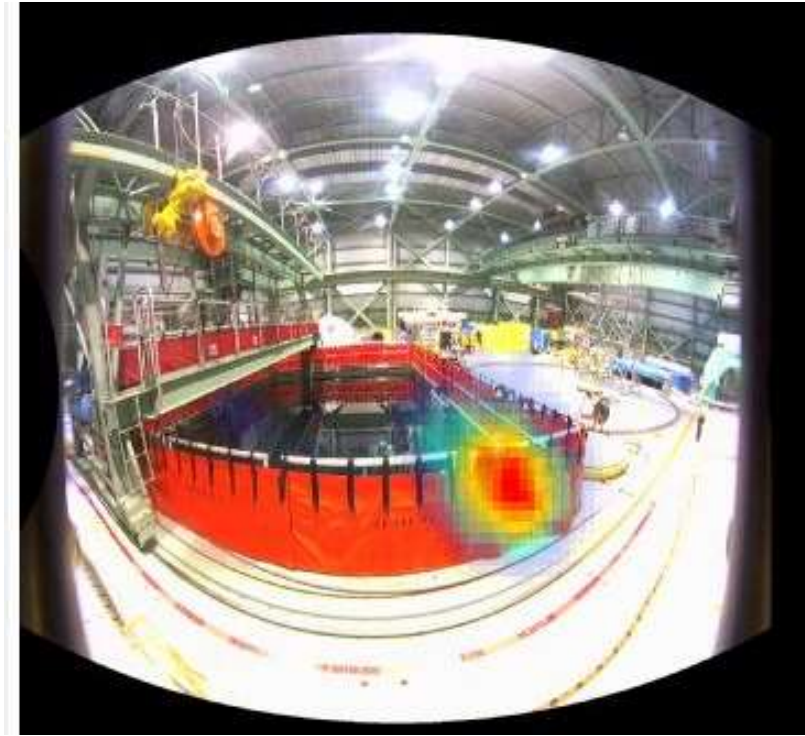
H SERIES SIMPLIFIES EVERYTHING

Monitoring Contamination in Pipe

- ✓ Easy to spot pipe buildup
- ✓ Quickly view distribution of sources along pipes

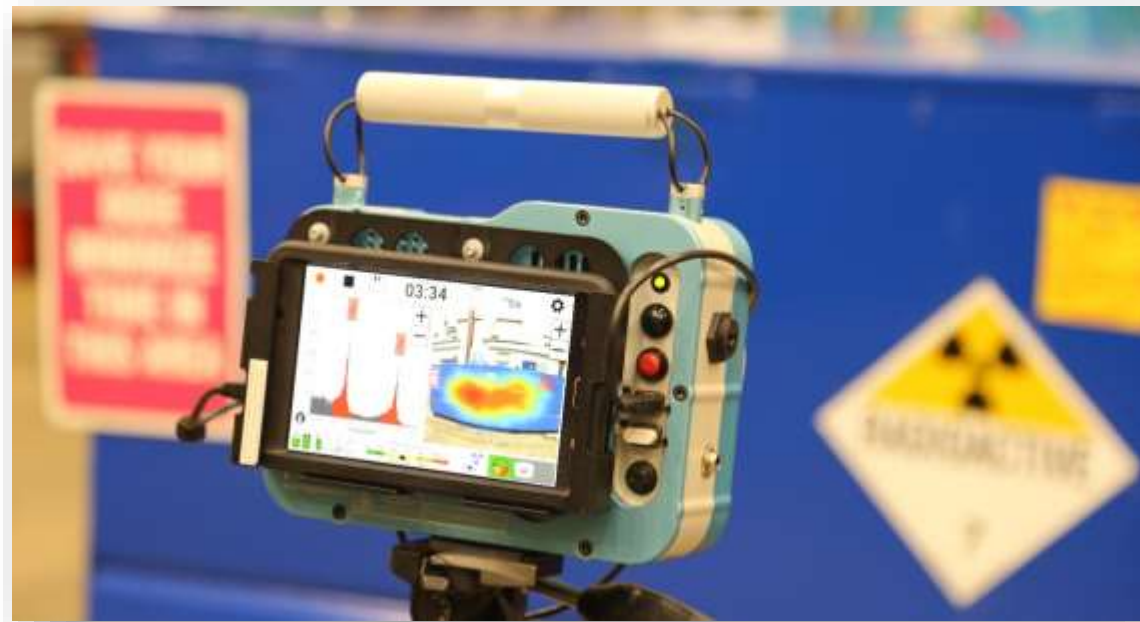


Contamination Control



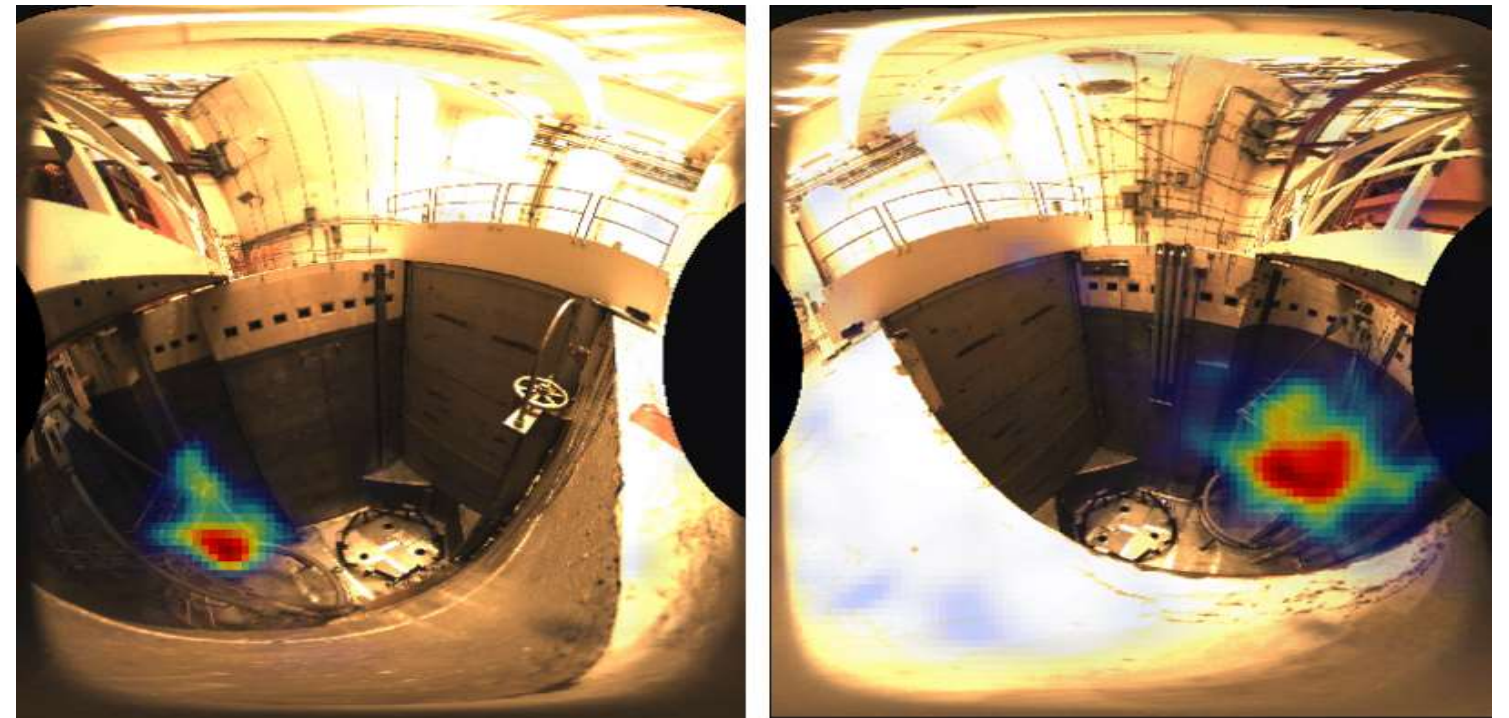
- ✓ Ensuring contamination stays in designated areas
- ✓ Characterization of contamination

Source Localization



- ✓ Rapidly find source location
- ✓ Identify and quantify source in the field

Decontamination



- ✓ Minimizes dose to workers during decontamination
- ✓ Localizes priority areas for decontamination

H SERIES SIMPLIFIES EVERYTHING

Portable

The H420 weighs under 9 pounds and operates on battery for over 5 hours. It's compact and easy to carry. When you need it, it has an integrated tripod mount.

Integrated Optical Camera

Automatically saves optical image from beginning of measurement and whenever moved. Overlays radiation image onto optical image to correlated objects.

Easy to Use

Simple user interface on removable tablet shows spectrum, isotope-specific images, and identifications.

Versatile Communication

Operate with no interface to quickly take field measurements for later analysis. Or, connect tablet or network via Wifi, Bluetooth, Ethernet, or USB.

Integrated Coded-Aperture Mask

Performs mask/anti-mask coded-aperture imaging during each measurement for fine angular resolution for low-energy sources in front of H420. Achieve SNRs of 80+.



Front

Integrated Laser Range Finder

Automatically measures and saves the distance for each measurement for easy post analysis.



Back

Simple Data Management

All data is saved on removable USB stick with N42.42 format. Post-processing software provides complete playback capabilities and databasing by measurement location.

Rugged

Add-on exoskeleton provides additional security against drops and falls.

A SERIES: THE ULTIMATE RID

Waste & Hot Spot Characterization



- ✓ Quickly characterize waste drums
- ✓ Fast identification decreases scan time

Cargo Inspection



- ✓ Ensure cargo meets shipping and receiving requirements
- ✓ Scan for radioactive contamination

Sensitive

With over 19 cm³ of pixelated CZT and energy resolution better than 1.0%, the A401 is a highly sensitive gamma-ray detector.

Alerts & Alarms

When the A400 detects something, you can see a message on the screen and colored LED lights above the screen. You can hear an audible beep, and you can feel vibration. With headphones, you can hear an announcement of the name of the isotope detected.

Site Surveys



- ✓ Locate and characterize sources inside buildings, vehicles, containers, etc.
- ✓ Assess threat level prior to entry

Integrated Neutron Tube

Detect neutrons along with locating gamma rays.

Replaceable Battery

With a battery life of 9 hours you won't have to change the battery often, but when you do, it is as simple as popping a new one in.



Portable

All these capabilities in only 5 lbs. (2.3 kg).

Connectivity

Connect to the A401 through Wifi, Bluetooth, or Ethernet to control the interface or manage data.

Meets ANSI N42.34

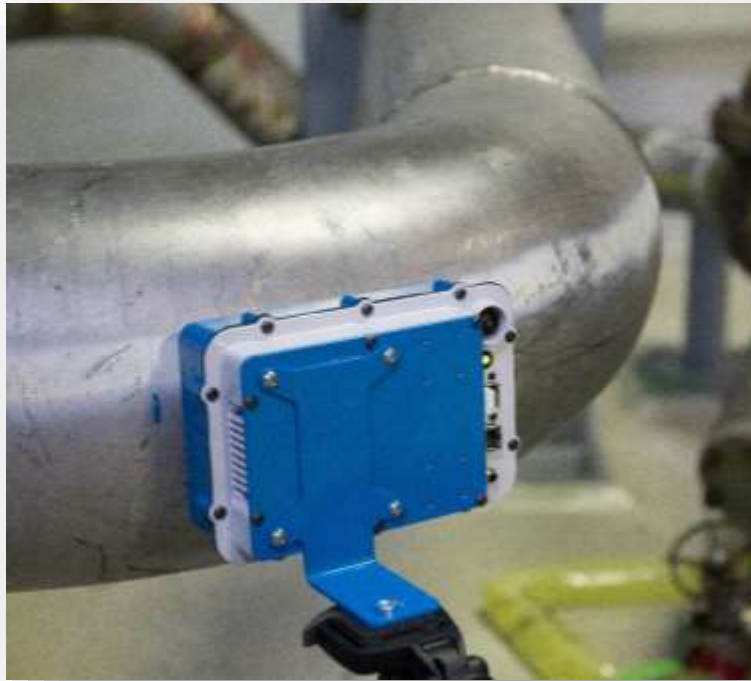
Meets all the specifications for handheld radiation detectors.

Water Tight

The A400 is IP-67 rated to survive heavy dust and submersion in water. If it gets dirty, just hose it down.

S SERIES: PERMANENT MOUNT MONITORING

Characterization of Pipe Waste



- ✓ Quickly characterize waste in pipes
- ✓ Use Visualizer post-processing to model geometries and calculate activities

- ✓ Accurately monitor isotopics in critical areas
- ✓ Perform gamma radiation spectral analysis

Real-Time Isotopic Trending



Front

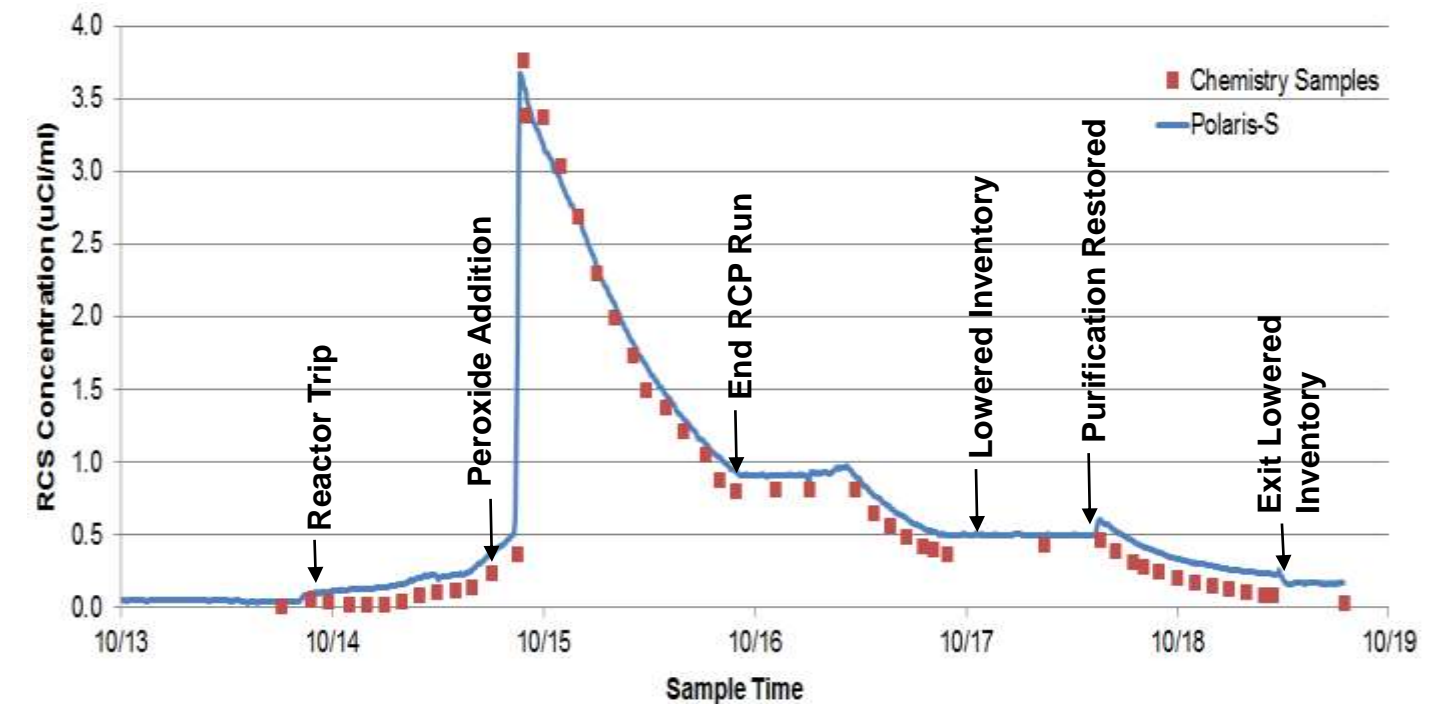


Back



Continuous Process Monitor

- ✓ Provides real-time ratios and isotopics
- ✓ Replaces need for chemistry samples



Above: Real data taken using an S400 detector at Prairie Island Nuclear Power Plant

P SERIES: COLLIMATED IMAGING SOLUTION

Waste & In-situ Characterization

- ✓ Characterize waste drums while shielding out irrelevant sources
- ✓ Block

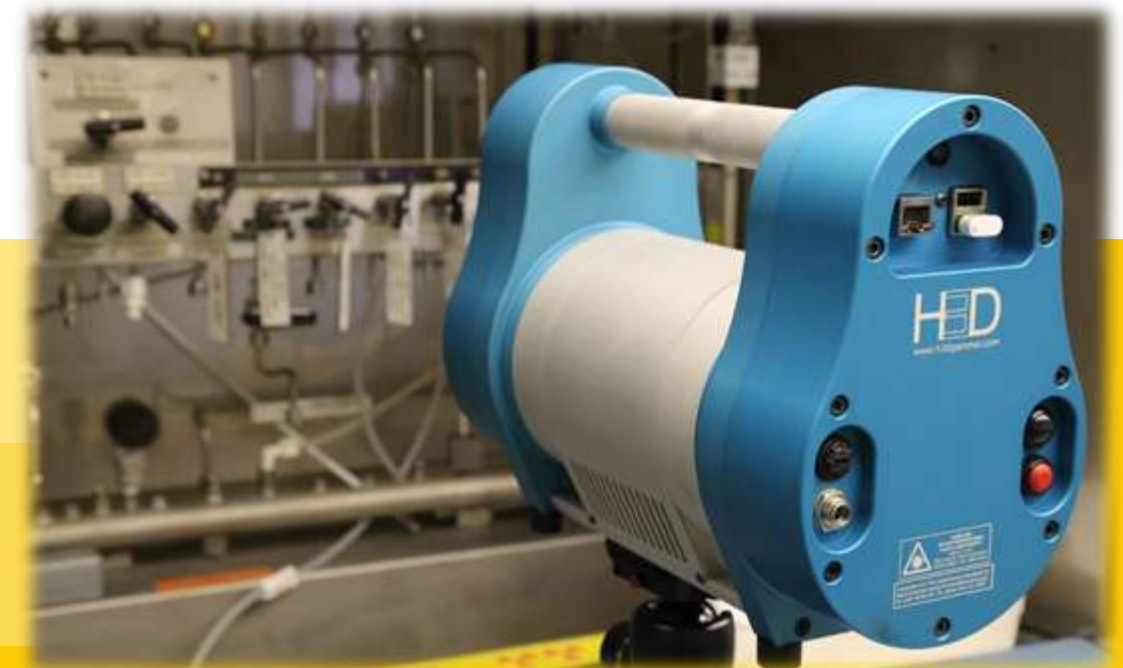
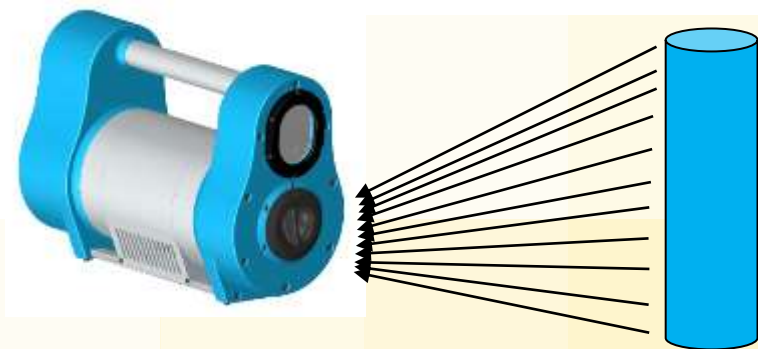


Pipe Crud Measurements



- ✓ Characterize pipe waste in high-background areas
- ✓ Use Visualizer with SourceTerm post-processing to model shielding and calculate activities

Use H3D's Visualizer software to model geometries and calculate activities



PRODUCT COMPARISON

H3D has products for nuclear power and related industries, defense and security, and medical applications. In addition, we have several products for defense applications not shown. Please contact us to develop a custom instrument for your application.



	H100	H400 Series	P100 Series	P100S Series	S100	A400	M400
Description	Imaging Spectrometer	Imaging Spectrometer	Directional Imaging Spectrometer	Directional Spectrometer	Permanent-Mount Spectrometer	Radioisotope Identification Device (RIID)	Custom Integrable Detector Module
Guaranteed Resolution (% FWHM at 662 keV)	≤1.1	≤1.1	≤1.1	≤1.1	≤1.1	≤1.0	≤1.1
Spectrometer Range	50 to 3000 keV						
Imaging Range (keV)	250 to 3000	H400: 250 to 3000 H420: 50 to 3000	250 to 3000	N/A	N/A	Localization only 100 to 3000	250 to 3000
Optical Camera & Laser Range Finder	Yes	Yes	Yes	No	No	No	No
Collimator (inches tungsten)	N/A	N/A	1.0	1.0	N/A	N/A	N/A
CZT Volume (cm ³)	6	>19	>4.5	>4.5	>4.5	>19	>19
Approximate Weight (lbs)	7	8	P100: 35	P100S: 35	7	5	1.3
Battery Life at 73 °F (hr)	>7	>6	>10	>10	>2	8	N/A
Operating Temp. Range (°F)	-4 to 122						
Ingress Protection	IP65	IP65	IP65	IP65	IP65	IP66	?