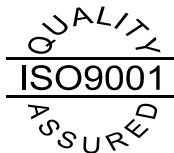


## Model 2072 - Passive Neutron DECOMMISSIONING PIECE MONITOR



### *Benefits*

- Large measurement chamber will accept size-reduced pieces having maximum dimensions:- 400mm x 671mm
- Portable chamber housed on robust trolley with locking castors for safety and stability
- Optimised for use with the chamber mounted vertically
- Provided with a top opening for ease of introduction of size reduced waste pieces
- Designed for operation in controlled area environments (free breathing zones)
- Chamber clad internally for ease of decontamination
- Provided with stand-alone workstation containing counting electronics, computer and printer
- Shielded chamber designed to operate in relatively high neutron background environments
- Can be combined with a conventional high resolution gamma-ray system for the independent determination of Pu isotopic ratios
- Can be combined with a conventional high resolution gamma-ray system for the independ-

### *Features*

- Robust Construction
- Provided with stand-alone workstation containing counting electronics, computer and printer
- 72 He-3 tubes (25mm diameter x 1metre length, 4 atmospheres fill pressure) arranged in two rows of 36 tubes
- High efficiency (~28%) for shorter measurement times
- Provides complete passive neutron assay system when used with the ANTECH AMSR 150 Neutron Coincidence / Multiplicity Counter or Time Correlation Analyser
- Can operate in conventional shift register (coincidence counting), multiplicity or totals neutron counting mode

## Description

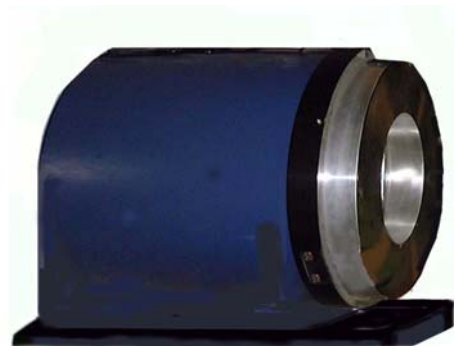
The **ANTECH Model 2072 Decommissioning Piece Monitor** is a high efficiency passive neutron counter designed for the measurement of plutonium contaminated size reduced pieces arising from the decommissioning of nuclear plant and equipment. The system can also be used to measure plutonium bearing material in storage containers.

The operation of the instrument is based on passive neutron counting of the correlated neutrons arising from spontaneous fission of the even Pu nuclides, principally Pu-240. The measurement chamber can be installed outside of any Modular Containment System or similar exclusion zone. This can be adjacent to a convenient bagging port through which size reduced pieces are introduced for measurement. A closure plug is provided for the top of the measurement chamber.

Plant measured isotopic ratios can be used by the software in order to convert  $^{240}\text{Pu}_{\text{effective}}$  mass to total Pu mass. Alternatively a suitable germanium gamma-ray detector can be conveniently installed through the base polyethylene shield plug to interrogate the sample and determine the Pu isotopic ratios independently using PC-FRAM or other isotopic code.

The neutron detection system consists of 72, He-3 tubes arranged in two concentric rings of 36 tubes embedded in a polyethylene moderator; 18 sets of 4 tubes are connected to a high voltage junction box containing an Amptek charge sensitive amplifier/discriminator circuit and connections for high voltage, low voltage and signal cables. The detectors are embedded in a polyethylene moderator, which includes a thickness of 230mm back shielding for operation in relatively high neutron background environments. The outer surface is covered in stainless steel cladding. The internal and external moderator surfaces are covered in cadmium to prevent thermalised neutrons from re-entering the sample measurement cavity.

The Decommissioning Piece Monitor can be used with either the Advanced Multiplicity Shift Register (AMSR) with INCC-32 software or the Time Correlation Analyser (TCA). In either case the system can be operated in conventional shift register coincidence counting (reals) mode (with a calibration function), the absolute multiplicity counting mode (histogram function) or totals counting mode.



ANTECH Model 2072H for horizontal operation

## Specification

- 72 He-3 detector tubes, 25.4mm x 1.0m at 4 Atm
- Detection efficiency: ~28%
- Operating Voltage: ~1650 volts
- Die-away time: ~40 $\mu$ s
- Minimum detection limit of between 10 – 50mg  $^{240}\text{Pu}_{\text{effective}}$  in coincidence (reals) mode equivalent to between ~0.2 and 1.0g total Pu (military grade)
- Weight: 400kg approx
- Footprint, including handle and frame: 110cm long x 90cm wide x 140cm high
- Electrical connections:
  - High voltage - SHV
  - 5V supply for head amps - BNC
  - Signal output - BNC
  - Mixer RS-232 output - 9 way male 'D'