IonSens®: Pipe Alpha Pipe Monitor

- Accurate and efficient measurement of the internal and external surfaces of cut pipe and scaffolding poles for alpha contamination.
- Short measurement times allow high throughput of pipe work.
- Classification of material as Free Release or LLW.
- Ability to reclassify TRU / PCM waste as LLW after suitable pipe decontamination.
- Well proven non-intrusive measurement technique.
- HEPA filter incorporated to prevent possible spread of contamination.
- Accommodates wide range of pipe lengths and diameters.
- Automatic background and standardisation measurements performed to maintain instrument accuracy.
- Modular design to facilitate replacement of contaminated components.
- Measurement service option can be provided by our highly trained personnel.

Features

- Classifies metallic pipe work with the following dimensions :
  Length: 1 to 6 metres.
  Diameter: 50 to 150mm
- Modular design allows for :
  Ease of maintenance.
  Replacement of components.
  Ease of decontamination.
  Transportability.
  Accessibility.
  Future system upgrades.
- In-built standardisation source maintains instrument accuracy. Robust design for industrial environment.
- User friendly Windows™ based software.
- Near real time analysis and display of contamination levels in pipe work.
- Maintenance functions.
- Archived measurement data.

Applications

IonSens™ facilitates the efficient and reliable monitoring of cut pipe or scaffolding poles for alpha contamination, thus permitting the categorisation of the material as either low level waste (LLW) or free release. This will enable the operator to reuse, or dispose of the material in the most efficient and cost effective manner.
IonSens™ would normally be used by plant operators or decommissioning teams who need to classify and discharge alpha contaminated material for final disposal.
At present alpha contaminated material is monitored using techniques which are sensitive to alpha particles directly. Due to the short range of alpha particles in air these detectors need to be positioned close to the potential source of

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contamination, to achieve consistent results. This is a severe limiting factor when attempting to monitor the internal surfaces of pipe work. IonSens™ overcomes these limitations by remote detection of the ions produced by alpha particle interactions in the air. This provides an operator with an immediate cost effective solution to the classification of a wide variety of pipe work prior to final disposal.

System Configuration

The basic configuration comprises the following main modules :

Air inlet module:
Air is drawn into the main measurement module through an air inlet filter. This removes particulate and dust, as well as removing ions from the outside environment.
A source can be exposed to provide standardisation of the system.

Measurement module:
The modular system allows insertion of 1, 2 or 3 two metre modules dependent on the maximum length of pipe to be measured.
All pipes are placed in these air tight measurement modules.
A cradle system ensures that all pipe diameters are held centrally in the chamber.

Detection Head module:
This module contains the ion detector and the following system hardware:

- HEPA filter
- Fan unit.
- Data processing electronics.
- Iris seal.
- Control PC.

System Operation

During initialisation IonSens™ performs a variety of diagnostic routines to confirm the correct operation of the instrument hardware.
During a routine measurement pipes are loaded into the measurement chamber by the operator who then initiates the measurement sequence from the control PC. The total alpha contamination is first measured, and compared against the free release classification criteria specified by the operator. If the criteria are met the sequence terminates. Otherwise the iris seal is closed around the pipe to allow an internal surface activity measurement, after which the following data is displayed :

1. Total activity: Bq
2. External Activity: Bq.
3. Internal activity: Bq.
4. Pipe classification.

All measurement data are stored on the PC hard disk, and if desired, cross-referenced to a unique serial number which the operator may enter at the beginning of each pipe measurement.

Calibration

At regular intervals the operator is prompted to perform a background measurement. Both environmental conditions and contamination of the instrument contribute to the background result. If this is above a preset limit IonSens™ will inhibit any further pipe measurements. The instrument also prompts the operator to perform a standardisation measurement at regular intervals.
These measurements confirm the correct operability of the instrument hardware, as well as providing correction data to increase accuracy in the main pipe measurement routine. An invalid standardisation again inhibits further pipe measurements.

Software and Electronics

The software runs under Microsoft Windows™ NT, and is written to provide the operator with a familiar and user friendly interface.
The software includes comprehensive error handling functions and diagnostic facilities to aid system maintenance. Password protection is provided to allow controlled access to system manager functions such as system constants.

Operator Interface

All measurement and control functions are controlled by the operator from the PC based control system. The software guides the operator through background, standardisation and pipe measurements. Pipe measurements are only allowed to proceed if IonSens™ has valid background and standardisation results, and all diagnostic checks are satisfactory.
The real time display shows system status and during pipe measurements, time remaining and instantaneous activity data.

Performance specification

Measurement Time :	300 sec
Limit of Detection :	15 Bq (6σ confidence level)
Free Release Classification Accuracy (U.K.):	At 120 Bq false negative rate better than 1 in 10,000

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