ABSTRACT

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A new system has been developed for conducting indoor surface contamination surveys of building surfaces and components. The system uses off-the-shelf radiological instrumentation linked to a fan laser positioning system to record the count rates and associated x, y, z coordinates of radioactive emissions from surfaces such as walls and floors. The data are logged by a hand held PDA and then downloaded onto a computer. The data can then be managed and displayed using applications such as ArcView GIS or AutoCAD.

The system has been designed to conform to MARSSIM requirements by allowing a survey unit to be 100 percent scanned with visual display of data, the statistical parameters associated with the data can be determined from the software application capabilities, a grid system can be established with coordinates of the sampling points determined and downloaded into the system, the system then guides the user to the sampling point, and an integrated count measurement may be made at each location with automatic recording of the value and coordinates.

Three configurations of the system currently exist. One or more backpack and single detector units may be used in the survey area to conduct surveys in difficult to access areas or perform long-term integrated radiation measurements. A wall scanning unit consists of a computer controlled lift that moves an array of up to eight detectors up and down a vertical wall surface at a defined speed. Outputs from each of the detectors, along with the (x, y, and z) coordinates, are automatically recorded at user set time intervals. The array, computer-controlled motor, and base can also be configured into a floor scanning unit. Data are automatically collected without regard to direction of travel or path.

The positions of the detectors are automatically determined by a sensor and associated electronics on the detector. The position sensor must have line of site to at least two infrared lasers that are positioned around the work area. The position coordinates have sub-centimeter accuracy.

The radiological instrumentation uses dual-channel ratemeter/scalers coupled to either an alpha/beta dual phosphor scintillation detector or a gas proportional detector. The ratemeter/scaler has adjustable threshold settings for both the alpha and beta channels and an adjustable window for the beta channel. The system allows for the input of a scaling factor for each ratemeter/scaler - detector combination to apply efficiency and/or area corrections to the alpha and beta output readings.

This system is believed to overcome all of the problems with the few existing systems that currently exist today since absolutely no data processing of the raw data is required. The automatic recording of data reduces human error and allows high quality data presentations to be made efficiently. Labor savings of 70 and 90 percent are evident when using the single unit and multiple units, respectively when compared to conventional manual surveys.