VeryFuel

Liquid Scintillator Based, Fast Neutron Detector for Fresh Fuel

VeryFuel is a liquid-scintillator-based fast-neutron detector and non-destructive assay tool for verification of modern fresh fuel assemblies. Its standard geometry fits PWR and WWER1000 fuel assemblies and includes 12 EJ-309 cells arranged on three detection panels, each with an individual HV channel and flash ADC readout. An integrated DAQ system with modular digital electronics and embedded PC collects raw waveforms, cell addresses and timestamps, while processing determines 235U content per unit length. For 17×17 PWR assemblies, statistical uncertainty below 1% is achieved in 15 min.

Overview

Product Highlights

- Fits the profile of the fuel assemblies for PWR and WWER1000 reactors.
- 12 cells of EJ-309 liquid scintillator arranged on three detection panels biased by individual HV channels and read out by individual flash ADC
- Statistical uncertainty on the 235U enrichment in 17×17 PWR lower than 1% with 15 min acquisition time
- Easy set-up of the instrument in-field with minimal cabling and connection complexity
- Detector assembly and DAQ system with modular digital electronics, embedded PC and data processing software included
- Collects neutron coincidences from induced nuclear reactions at much higher rate compared to presently available systems detecting thermal neutrons
- Measure weakly effected by burnable poisons rods
- Collect, transfer and store raw data including waveforms, cell number/address and time stamps

Product Description

The VeryFuel is an Non Destructive Assay (NDA) tool for verification of modern fresh fuel assemblies. The VeryFuel has the capability to measure the 235U content per unit of length with unprecedented speed and much lower systematic uncertainty in presence of burnable poisons. The detectors and data analysis was developed by the IAEA and Member States Support Programs.

The VeryFuel utilises low-hazard liquid scintillation detectors and an integrated data acquisition system to measure coincident fast neutrons from induced nuclear fissions.
The standard geometric configuration fits the profile of the fuel assemblies for PWR and WWER1000 reactors.

CAEN SyS provided the VeryFuel to the International Atomic Energy Agency (IAEA) as the Fast Neutron Collar (FNCL) and its user requirements have been defined in the safeguards operational divisions.

The reduced coincidence gate and low accidental neutron coincidences allow the operator to employ high activity neutron source for active interrogation. Subsequently, measurement times for the same level of precision can be greatly reduced.

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Ordering Information (continued)

The VeryFuel comprises a detector assembly and a DAQ system with modular digital electronics, embedded PC and data processing software.

The detectors and data analysis was developed by the IAEA and Member States Support Programs.
The software allows the user to configure the data acquisition through an intuitive graphical user interface and shows the result of the real time data processing.

ORDERING CODE	DESCRIPTION
WSD7750DXA12	SD7750D – VeryFuel 12ch FNCL Data Acquisition System

1. Ordering codes and descriptions are reproduced from the product record. Availability is confirmed at order entry.

Related Products

Sniper-GN — Special Nuclear material Portable identifier

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