



JCC-31™

High Level Neutron Coincidence Counter

The JCC-31 is a versatile, high-efficiency neutron coincidence counter designed to measure the effective mass of ^{240}Pu in a wide range of plutonium-bearing materials. Developed through a technology transfer from Los Alamos National Laboratory, the JCC-31 combines precision, portability and safety features to support safeguards, waste management and nuclear material accountability.

The JCC-31 counter, based on a technology transfer from Los Alamos National Laboratory, measures the ^{240}Pu -effective mass in a sample by detecting coincidence neutrons from the spontaneous fission of plutonium. The detector can measure up to several kilograms of plutonium. The effective mass of ^{240}Pu is the mass of ^{240}Pu , which would emit the same number of spontaneous fission neutrons per second as the combined ^{238}Pu , ^{240}Pu and ^{242}Pu in the sample.

FEATURES

- ✓ Designed for passive neutron coincidence assay of plutonium
- ✓ Eighteen ^3He detectors
- ✓ Fast pre-amp electronics with greater performance
- ✓ Transportable for inspections at multiple sites
- ✓ Optional transport container for additional portability

System Components

The JCC-31 counter has a cylindrical-shaped sample cavity 41 cm high by 17 cm in diameter. It is intended to assay plutonium samples, including PuO_2 , mixed oxides ($\text{PuO}_2\text{-UO}_2$), metal carbides, fuel rods, fast critical assemblies, solution, scrap, and waste. A cadmium sleeve surrounds the sample cavity to prevent the re-entry of thermalized neutrons into the sample, which could induce fission in the sample and adversely affect the results. Outside the cadmium sleeve is a ring of high-density polyethylene with eighteen ^3He tubes placed in the polyethylene.

JCC-31 HIGH LEVEL NEUTRON COINCIDENCE COUNTER

The tubes are divided into six groups of three with each group wired together and connected to Amplifier/Discriminator circuit board. The six pre-amps are mounted inside a sealed junction box. LED indicator lights are placed externally on the junction box to indicate proper operation of each pre-amp board channel. Electrical connections between the JCC-31 counter and the JSR-15™ unit include +5 V and HV. The combination of signals will be combined into a logical OR.

A cadmium sleeve wrapped around the outside of the JCC-31 counter provides radiation protection for personnel as well as background reduction.

A JSR-15 Neutron Analysis Shift Register, a computer and analysis software are required for coincidence counting but are not included with the JCC-31 counter.

SPECIFICATIONS

Performance:

- HV Setting: 1680 V
- Gate Setting: 64 μ s
- Die-Away Time: 42 μ s
- Nominal Detector Efficiency: 17.8%

Physical:

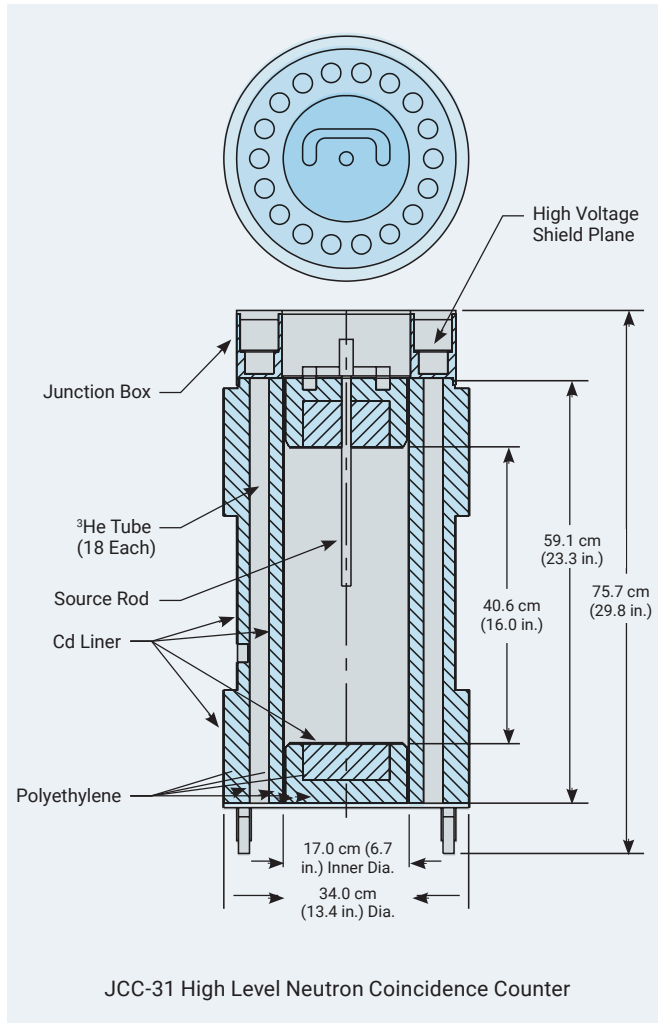
- Size: 73.7 x 34 cm (29.7 x 13.4 in) H (including wheels) x Dia
- Weight: 55 kg (121 lb)
- Sample Cavity Size: 40.6 x 17.0 cm (16.0 x 6.7 in) H x Dia
- ^3He Tubes: 18
- ^3He Rings: 1
- ^3He Active Length: 50.8 x 2.54 cm (20 x 1 in) L x Dia
- Cladding: Aluminum

Options:

- Transport container
- One ^{252}Cf neutron source with source strength of 5×10^4 neutrons/second for making routine normalization measurements. An aluminum source rod that reproduces the position of the source is included with the counter

REFERENCE:

1. Menlove, H.O. and Krick, M. (1979). The High-Level Neutron Coincidence Counter (HLNCC): User's Manual. Report LA-7779-M. Los Alamos, New Mexico: Los Alamos National Laboratory.



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