CERTIFICATE OF RADIOACTIVITY CALIBRATION

Carbon-14 Reference Source
NES-200A

Half-Life: 5730 ± 40 years
Lot Number: 200A072983

The activity of Carbon-14 was determined to be 0.148 microcuries on July 29, 1983.

DESCRIPTION OF THE SOURCE

The activity was deposited in a 5mm diameter active area on a 0.25mm thick stainless steel planchet, covered with a 0.90 mg/cm^2 aluminized mylar window, and sealed into the aluminum mount. The overall dimensions of the source are 3.6mm in height and 25mm in diameter. The mass of the deposit was less than 0.01mg and self-absorption was considered negligible.

DECAY SCHEME

		Intensity (%)
β_1^-	0.156 MeV maximum	100
	0.049 average	

Reference: A Handbook of Radioactivity Measurements Procedures, NCRP Report No. 58, November 1978.

METHOD OF CALIBRATION

The source was calibrated by measurement in a 2π internal proportional counter whose response for the radionuclide and geometry had been verified through the use of a secondary standard. The secondary standard was prepared from a solution whose activity was determined by liquid scintillation counting. The liquid scintillation counting efficiency had been determined using aliquots of a solution certified by the National Bureau of Standards for New England Nuclear under P.O. No. 34004.

New England Nuclear Corporation participates in a National Bureau of Standards-Atomic Industrial Forum measurement assurance program in order to insure the continuing traceability of NEN's radioassays to the NBS.

RADIOIMPURITIES

A random sampling of this production lot was examined for photon-emitting impurities with a Ge(Li) spectrometer system. The radioimpurities were determined to be <1% expressed as a percentage of the beta-ray-emission rate of Carbon-14.

ERRORS

Random Errors (99% confidence level)	
Precision of the measurement of the source	±0.44%
Precision of the measurement of the NEN secondary standard	±0.42%
Systematic Errors	
Accuracy of the NEN secondary standard (linear sum of the estimated upper limits of errors involved in its preparation)	±6.64%
Overall Error	
$[(0.44)^2 + (0.42)^2]^{\frac{1}{2}} + 6.64 =$	±7.01%