

COUNTER CALIBRATION PROCEDURE

Counter Identification No. 23

Counter Description Packard Gamma Well Counter

with Automatic Sample Changer

Calibration for Specific Nuclide(s)

Standard Nuclide(s) Nuclide(s) of Interest

Procedure Date September 22, 1980

Approved by *Richard C. Fr*

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1.0 Standard Solution Preparation

The undiluted radioactive standard solution(s) used must comply with "Specifications for Radioactive Reference Standards".

The solution(s) used should be quantitatively diluted to give a final concentration resulting in approximately 1000 cpm in the >30 keV channel. The corresponding concentration(s) can be calculated using the efficiencies given in Table 1. The total solution volume should be 10 ml or greater if a dilution is made. If suitable an EPA standard can be used directly.

2.0 Standard Source Preparation

Pipet 1.0 ml of the standard solution into the bottom of a 1 cm diam x 7.5 cm test tube. If any droplets adhere to the side of a tube tilt and rotate the tube to cause the droplet to add to the main volume of solution.

Carefully insert the tube into the usual 1.5 cm diam x 15 cm test tube. This is best accomplished by tilting the tubes about 60 degrees from perpendicular, inserting the inner tube and then slowly righting the tubes. The same technique as above should be used if a droplet splashes onto the side of a tube.

After the sample has been counted, pipet 0.5 ml of distilled water into the tube and swirl to mix. This should be repeated after the next count so that total volumes of 1.0, 1.5 and 2.0 have been counted.

3.0 Counting

Count each time with 1 channel set at >30 keV and the other set for the main photopeak (see Table 1). Count each tube 3 times and accumulate at least 10000 counts in the photopeak channel for each tube. This should take about 60 minutes per tube.

Count the check source(s) for the same amount of time as the standard sources.

4.0 Data Reduction

Using the net cpm in each channel and the known radioactivity content calculate the efficiencies for each volume as cpm/dpm.

The efficiencies at 2.0 ml should agree with those in Table 1 within 10%. Any greater difference should be investigated and resolved before the counter is used for the nuclide in question.

Record the net cpm of the check source used.

TABLE 1

Nuclide -----	Effic. >30 keV -----	Channel -----	Effic. in Channel -----
Mn-54	.28	760-900	.083
Cs-137	.31 .26(>60)	607-717	.095
Cs-134	.55	720-890	.075
I-131	.45	310-410	.24
Co-60	.42	550-680 720-900	.083 .048
Co-58	.36	720-900 550-680	.086 .0072
Fe-59	.26	500-680	.059
Zn-65	.13	500-610	.030



Dr. Richard C. Fix: Manager, Environmental Sciences

Dr. Fix is responsible for the design, development and implementation of the environmental surveys performed by Interex. He is presently responsible for the ongoing programs being performed for various utilities.

Prior to joining Interex, Dr. Fix had participated as a scientist and consultant on numerous environmental monitoring programs, including those for the Dresden nuclear power station, the Hallam reactor, and the Plum Brook test facility. He has provided expert consultation in the techniques of measuring environmental radioactivity and radiation and interpreting gamma spectra utilizing techniques particularly applicable to the low signal-to background ratio most frequently encountered with environmental samples. He has been extremely successful in the adaptation and modification of chemical procedures to be utilized on various environmental sample media.

Dr. Fix has been directly responsible for designing and implementation of the total radiological environmental monitoring programs at both Boston Edison Company's Pilgrim Station and Northeast Utilities' Millstone Point Station. Specific tasks at these locations have included: program design, selection of sampling sites, development of sampling procedures, on-site training of sample collectors, development of sample identification systems, etc..

He has a B.S. degree from the University of Wisconsin and a Ph.D. from Massachusetts Institute of Technology.

Dr. Fix has been involved in the area of radiological monitoring for over 20 years and is experienced in every facet of environmental survey programs.

Mr. Joseph Lentini: Counting Facility

Mr. Lentini is responsible for the operation of the Interex counting facility including sample scheduling, counting, initial data review, and routine maintenance. He also does initial calculation of data to ensure proper decay, grow-in, and maintains the counter standard and background control charts.

Mr. Lentini received a B.S. Degree from the University of Massachusetts.