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EBERLINE RO3A'S - CONTACT DOSE RATES

Table 2(a) - Actual and Calculated Contact β Dose Rates for 3 Eberline Instruments

Source	#1 mR/hr	#2 mR/hr	#3 mR/hr	Calculated β mRad/hr
U-238	58.0	55.0	63.2	223
Co-60	153.0	156.8	163.7	280
Sr-90	49.0	47.2	52.2	70

Table 2(b) - Factor Differences

Source	#1	#2	#3	Average
U-238	3.84	4.05	3.53	3.80
Co-60	1.82	1.79	1.71	1.77
Sr-90	1.43	1.48	1.34	1.42
Average	2.36	2.44	2.19	2.33
Variance	+.03	+.11	-.14	

VICTOREEN "CUTIE PIE" - CONTACT DOSE RATES

Table 1(a) - Actual Reading vs. Calculated FO6 6 Victoreen Instruments

Source	#1 mR/hr	#2 mR/hr	#3 mR/hr	#4 mR/hr	#5 mR/hr	#6 mR/hr	Calculated β mRad/hr
U-238	35.3	27.2	29.3	31.9	29.4	34.0	223
Co-60	79.2	73.7	72.0	115	55.0	96.5	280
Sr-90	33.5	26.5	29.0	31.4	24.5	33.3	70

Table 1(b) - Factor Differences

Source	#1	#2	#3	#4	#5	#6	Average
U-238	6.32	8.20	7.61	6.99	7.58	6.56	7.21
Co-60	3.54	3.80	3.89	2.43	5.09	2.90	3.61
Sr-90	2.08	2.60	2.41	2.22	2.86	2.10	2.37
Average	3.98	4.89	4.64	3.88	5.18	3.85	4.40
Variance	-.42	+.49	+.24	-.52	+.78	-.55	

The major beta emitting isotope encountered in the plant is Co-60. Therefore, if a Victoreen C.P. is being used for B dose rate setting, a factor difference of 3.61 should be used. To be on the conservative side, we would use a factor difference of 5.00 w-en using a Victoreen C.P. for setting B dose rates.

EBERLINE RO3A

Tables 2(a) and 2(b) are analogous to Tables 1(a) and 1(b) respectively. Tables 2(a) and 2(b) apply to Eberline RO3A instruments.

Table 2(b) indicates that, for a Co-60 Beta source, a factor difference of 1.77 should be used and for Sr-90 a factor difference of 1.42 should be used.

To be conservative, we would use a factor difference of 2.00 when using an Eberline RO3A to set Beta dose rates.

Finally, if we compare the variances of the Eberline RO3A to those of the Victoreen, we see that the Eberlines are superior for measuring Beta dose rates (regardless of the Beta source).

CONCLUSION

(a) Use a factor difference of 5.00 when using a Victoreen C.P. to establish Beta dose rates.

(b) Use a factor difference of 2.00 when using an Eberline RO3A to establish Beta dose rates.

(c) Whenever possible, use an Eberline instrument instead of a Victoreen to establish Beta dose rates. The Eberline instruments are much more accurate.

PWS:abs

CC: R. Shimshak
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IP-52 P. Shafer

JANUARY 5, 1981

TO: H. P. TECHNICIANS

FROM: P. W. SHAFER, LACBWR RADIATION PROTECTION ENGINEER

SUBJECT: BETA DOSE EQUIVALENT RATE CORRECTION FACTORS FOR THE EBERLINE RO3AS AND THE VICTOREEN MODEL 740F "CUTIE PIE"

A test was performed on 6 Victoreen C.P.s and 3 Eberline RO3AS. Contact B dose rates for a U-238 source, a Co-60 source, and a Sr-90 source were calculated from theory. Actual dose rates, as measured by each instrument, were then taken at contact with each of the sources. The calculated dose rates were then compared to those determined by the instruments. In addition, the differences in readings among the survey instruments were compared.

Table 1(a) and 1(b) show the results obtained with the Victoreen C.P.s. Table 2(a) and 2(b) show results for the Eberline RO-3AS.

VICTOREEN "CUTIE PIE" 740F

Table 1(a) shows the actual B dose rates as measured by the 6 Victoreen instruments tested for each B source (U-238, Co-60, and Sr-90).

In order to understand Table 1(b), which is the important one, let us take an example:

For instrument #3 the factor difference for a U-238 source is 7.61.

$$7.61 = \frac{\text{Calculated Dose Rate (See Table 1(a)}}{\text{Actual Measured Dose Rate (From Table 1(a)}}$$

For a Co-60 source, the factor difference is 3.89 and for a Sr-90 source, the factor difference is 2.37. The average factor difference is 4.40.

Column 8 listes the averages horizontally. For a U-238 source, for example the average factor difference for all C.P.s is 7.21.

The averages in Column 8, when averaged together give 4.40 and the average in row 4, when averaged together also give 4.40. Therefore, the average factor difference for all Victoreen C.P.s and for all sources is 4.40.

The variance is just the difference between 4.40 and the average factor difference for each instrument. The larger the variance, the less accurate the instrument.