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Rad Elec Inc. Jan. 6, 1997

Lorin R. Stieff
Vice President

(7)

July 7, '97

Dear Mr. S. McGuire
Mr. G Power

Attached as some comments on the MARSSIM. This is an excellent manual and our comments are addressed to the treatment and possible application of electret ion chambers to D and D activities. We hop that they will be useful.

Sincerely
Lorin R Stieff

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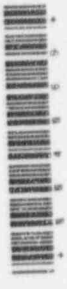

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Rad Elec Inc.
Radon and Radiation Monitors

LORIN R. STIEFF
Vice President

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Section 6.3 Radiation Detection Instrumentation

Line 355-356. At beginning of sentence add "**Traditional**" radiation instruments..... Add the following sentences " **There is an additional class of instruments that consists of passive, integrating detectors and associated reading/analyzing instruments. The integrated ionization is read using a laboratory or hand held reader. This class includes TLDs and electret ion chambers (EIC). Because these detectors are passive and can be exposed for relatively long periods of time, they can provide better sensitivity for measuring low activity levels such as free release limits or for continuing surveillance. The ability to read and present data on site is a useful feature and such systems are comparable to direct reading instruments."**

6.3.1 Radiation Detectors

Add

6.3.1.4 Passive, Integrating electret Ionization Chambers

The electret ion chamber consists of a very stable electret(a charged Teflon® disk) mounted inside a small chamber made of electrically conducting plastic. The ions produced inside this air filled chamber are collected onto the electret, causing a reduction of its surface charge. The reduction in charge is a function of the total ionization during a specific monitoring period and the specific chamber volume. This change in voltage is measured with a surface potential voltmeter.

6.3.3 Detector Applications

Line 413 Replace the word "**three**" with the word "**four**"
Line 414 After 1)gas filled insert "**2)ionization chamber(non pressurized air)**" and change)2 to "**)3**" and)3 to "**)4**".

Table 6.1 Radiation detectors with Application to Alpha Surveys

After line 430. insert
under **Detector Type**

"**Passive, integrating
electret ion chmbr.**

(non-pressurized air)"

Under **Detector Description**

<0.8 mg cm^{-2} window, also windowless, window area 50-180 cm^2 chamber vol. 50 -1000ml

Under **Application**

contamination on surfaces, in pipes and in soils

under **Remarks**

useable in high humidity and temp.

Table 6.2 Radiation Detectors with applications to Beta Surveys

Under **Detector Type**

"Passive, integrating electret ion chmbr. (non-pressurized air)"

Under **Detector Description**

7 mg cm^{-2} window thickness, also windowless, window area 50-180 cm^2 chamber vol. 50 -1000ml

Under **Application**

low energy beta including ^3H contamination on surfaces, in pipes

under **Remarks**

useable in high

humidity and temp.

Table 6.3 Radiation Detectors with Application to Gamma Surveys

Between line 468 and 469 insert

Under **Detector Type**
**"Passive, integrating
electret ion chmbr.
(non-pressurized air)"**

under **Detector Description**
**10 to 1000 ml, window
thickness 7 mg cm^{-2} ,
energy response +/-810**

and under **Application**
**tissue equivalent,down to 30 KeV,
with 7 mg cm^{-2} window, x-rays down
to 5 Kev**

under **Remarks**

**useable in high
humidity and temp.**

6.6.1 Direct Radon Measurements

Line 1271 The sentence beginning on this line should read **"Most passive monitors rely on diffusion of the ambient radon in the air into the chamber to establish an equilibrium between the concentrations of radon in the air and in the chamber. Active monitors....."**

Line 1276 The sentence beginning "Other monitors..." should read **"EIC monitors measure the ionization produced by the decay of radon in the air within the chamber by directly collecting the ions produced inside the chamber."**

6.6.1.1 Integrating Methods for Radon Measurement

Line 1288 The phrase "Teflon electrets" should be replaced by the generic phrase **"electret ion chamber"** or **"EIC"**.

6.6.3 Radon Flux Measurements

Line 1338 The sentence beginning "One method that has been used.." should be replaced by **"The two methods that have been used for measuring radon flux are briefly described here."**

Line 1342 Delete **"to three"**

Line 1355 At the end of this sentence, the following new paragraph should be added:

An alterrative method for making passive radon flux measurements has been developed recently using EIC. This EIC technology has been widely used for indoor radon measurements. The passive EIC procedure is similar to the procedures used with large area activated charcoal canisters. In order to provide the data for the background corrections an additional passive monitor is located side by side on a radon impermeable membrane. This data is used to calculate the net radon flux. The Florida State Bureau of Radiation Protection has compared the results from measurements of several phosphogypsum flux beds using the charcoal canisters and EICs and has shown that the two methods give comparable results. The passive method seems to have overcome some of the limitations encountered in the use of charcoal. The measurement periods can be extended from hours to several days in order to obtain a better average, if needed. EIC flux monitors are not affected by the environmental parameters such as temperature, humidity and air flow. Sensitivities are comparable to the charcoal method but unlike charcoal, Epics do not become saturated by humidity. It is possible to make intermediate readings, if needed. In view of the low cost of the EPIC reading/analyzing equipment, the cost per measurement can be as much as $50 lower than the charcoal method with additional savings in time.