

ORNL INSTRUMENT EVALUATION SUMMARY

Eberline RO-20

Description: The RO-20 is a five-range portable instrument that utilizes a vented ion chamber to measure beta-gamma radiation. The ranges are 5 mR/hr (0 - 5 mR/hr), 50 mR/hr (0 - 50 mR/hr), 500 mR/hr (0 - 500 mR/hr), 5 R/hr (0 - 5 R/hr), and 50 R/hr (0 - 50 R/hr).

Ranges Evaluated: 5 and 50 mR/hr

Summary Date: November 1, 1995

General Comments:

1. When originally evaluated, all instruments were extremely erratic on the 5 mR/hr range. The manufacturer was notified and indicated that there was not any damping on the meter movement. This has been revised and may be available on recently produced models.
2. The model was susceptible to temperature changes that may be caused by a thermistor installed on the ion chamber circuit. This was investigated by Eberline. The RO-20 will be re-evaluated when the new version is available.
3. Interfering radiation testing was performed on one range only.

INTERFERING RESPONSES TEST RESULTS

Radio Frequency Fields: Acceptable on each range tested for the frequency scan of 0.3 to 35 MHz at 50 volts/meter, and at 140 MHz at 50 volts/meter.

Microwave Fields: Acceptable on each range tested at 2.45 GHz (2.0 watts/meter²). The 5 mR/hr range was unacceptable at 915 MHz (0.4 watts/meter²).

Electric Fields: Acceptable on each range tested when exposed to electrostatic (5000 volts/meter), and 60 and 400 Hz at 100 volts/meter.

Magnetic Fields: Acceptable on each range tested when exposed to 10 Gauss.

Interfering Ionizing Radiations: Each instrument tested responded in mR/hr at a rate $\leq 6\%$ of the 1 Rem/hr neutron field from an unmoderated $^{238}\text{PuBe}$ source. The manufacturer's limits are $\approx 8\%$ for fast neutron fields.

ENVIRONMENTAL FACTORS

Temperature: Mean responses were acceptable over the test range of $-10\text{ }^{\circ}\text{C}$ to $+50\text{ }^{\circ}\text{C}$ ($14\text{ }^{\circ}\text{F}$ to $122\text{ }^{\circ}\text{F}$). See note 1 for information on the 5 mR/hr range.

Temperature Shock: Acceptable for all temperature combinations on the 50 mR/hr range. Susceptible to temperature changes from $22\text{ }^{\circ}\text{C}$ to $-10\text{ }^{\circ}\text{C}$ on the 5 mR/hr range.

Humidity: Acceptable over the test range of 40 % to 95 % relative humidity.

Ambient Pressure: Mean results were acceptable over the test range of 525 mmHg to 795 mmHg (20.66 inHg to 31.3 inHg). See note 1 for information regarding the 5 mR/hr range.

Vibration: All instruments had acceptable results after exposure to 15 Hz and 28 Hz, each at an amplitude of 2 G, in three orientations relative to the vibration surface.