

ORNL INSTRUMENT EVALUATION SUMMARY

Siemens Electronic Personal Dosimeter (EPD-N)

Description: The Siemens EPD-N is an electronic dosimeter designed to measure gamma and neutron radiation.

Ranges Tested: N/A

Report Date: September 26, 2002

General Comments:

1. Confidence intervals used to ascertain whether results are conclusive or inconclusive are determined using the 0.95 quantile of the student's t distribution (95% confidence interval).
2. Data was obtained using the dose rate display.

RADIATION RESPONSE

Probe Surface Sensitivity: N/A

Neutron Response: Each EPD-N was tested using an unmoderated and moderated Cf-252 source. Test results indicated that EPD-Ns need to be calibrated (neutron) based on expected neutron energy. Details are available in the Radiation Response Report.

Gamma Response Linearity: All three units functioned satisfactorily over the test range of 300 to 9000 mrem/hr.

Gamma Energy Response: Each unit was exposed to Co-60 and X-ray (H150 and M100) at different rates with acceptable results.

ELECTRONIC and MECHANICAL REQUIREMENTS and TESTS

Line Noise: N/A

Power Line Variations: N/A

Conducted Radio Frequency: N/A

INTERFERING RESPONSES TEST RESULTS

Radio Frequency/Microwave: Various susceptibilities were indicated throughout the exposure to RF from 100 kHz to 1000 MHz at 20 ± 2 volts/meter amplitude modulated with 1 kHz at 80%. No breakdowns were observed with most susceptibilities indicated by slightly high or low readings.

Electric Fields: Not performed.

Magnetic Fields: No susceptibilities were observed when exposed to a 10 Gauss DC field and 60 Hz (1.26 Gauss) AC field in two orientations.

Interfering Ionizing Radiations: Interference (gamma into neutron) was tested using Cs-137 at approximately 1 rem/hr. Indicated readings were from 0 to 25 mrem/hr in the neutron channel.

ENVIRONMENTAL FACTORS

Temperature: No susceptibilities were observed over the temperature test range of -10 to 50 °C (+14 to +122 °F).

Temperature Shock: All units were exposed to rapid temperature changes of 22 to -10, -10 to 22, 22 to 50, and 50 to 22 (in °C). One unit remained acceptable throughout the test. The other units went slightly low after exposure to 50 °C.

Humidity: No susceptibilities were observed when exposed to a relative humidity level of 95% (non-condensing) for twenty-four hours, and upon return to 40% for 4 hours at 30 ± 2 °C.

Vibration: No susceptibilities were indicated after exposure to harmonic loadings of 2 g applied for 15 minutes at 15 Hz in three orientations and 23 Hz also in three orientations.