

# ORNL

## INSTRUMENT EVALUATION SUMMARY

### Eberline Model E-600 with a Neutron Rem Detector (NRD)

**Description:** The Eberline E-600 is a microprocessor-based multi-function radiation instrument designed to operate with a wide range of probes. Tests were performed with two E-600s connected to NRDs.

**Ranges Evaluated:** Digital Ratemeter, mRem/hr

**Report Date:** July 1, 1997

#### 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. The E-600 was set up at the factory for response times of 3, 15, and 40 seconds (slow, med, and fast). When data was collected using the slow response time, unusual readings were observed. Dose equivalent rate response excursions were observed that would eventually return to within tolerance. This could be attributed to the averaging techniques used by the E-600. The response times have been re-set to 5, 10, and 15 seconds for the field evaluation.

#### RADIATION RESPONSE

**Probe Surface Sensitivity:** N/A

#### ELECTRONIC and MECHANICAL REQUIREMENTS and TESTS

**Line Noise:** N/A

#### INTERFERING RESPONSES TEST RESULTS

**Radio Frequency/Microwave:** When exposed to 140, 915 and 2450 MHz fields at 20 (+10,-0) volts/meter, no susceptibilities were observed. Susceptibilities were indicated at various frequencies during the scan from 100 kHz to 1000 MHz at 20 (+10,-0) volts/meter. Observations included high responses and loss of display. Specific results and frequencies are available upon request.

**Electric Fields:** Not performed.

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

**Interfering Ionizing Radiations:** Not performed.

## ENVIRONMENTAL FACTORS

**Temperature:** Each E-600/NRD had acceptable mean results when exposed to temperatures from -10 to 50 °C (+14 to 122 °F). Confidence interval values were out-of-tolerance at different points throughout the test. Additional information is available upon request.

**Temperature Shock:** The instrument will be re-tested due to excursion (see note 2) type readings. Results obtained from the initial test indicate that no substantial susceptibilities exist when exposed to rapid temperature changes from 22 to -10, -10 to 22, 22 to 50, and 50 to 22 (°C).

**Humidity:** Each E-600/NRD had acceptable mean results when exposed to a relative humidity level of 95% (non-condensing) for eight hours, and upon return to 40% for 4 hours at  $22 \pm 2$  °C. Confidence interval values were out-of-tolerance at different points throughout the test. Additional information is available upon request.

**Vibration:** Each E-600/NRD 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.

Reviewed By: \_\_\_\_\_

Date: \_\_\_\_\_