3. RADIATION MEASUREMENTS

3.1 OVERVIEW

Since about 1950, the Environmental Measurements Laboratory has carried out major research programs directed at the study of ionizing radiation and natural and man-made radionuclides in the working and in the public environment. Among these studies have been: (1) the long-term investigation of the atmospheric distribution and ground deposition of radionuclides from global fallout generated by nuclear weapons tests; (2) the evaluation of the radiation exposure of human populations from these nuclides as well as those deposited locally by the Nevada weapons tests, those released from nuclear facilities (including the reactor accidents at Three Mile Island and Chernobyl), and those normally present from natural sources; and (3) the determination of radiation worker exposures at particle accelerators, nuclear reactors, and other nuclear facilities. An important component of these studies has been the development and improvement of techniques for low-level radiation measurement and data interpretation. In the following sections, five highly generic measurement systems are described that have been developed and/or refined at EML, and that have found wide application in environmental radiation studies. In each case, an essential part of the system is the methodology associated with detector calibration, measurement procedure(s), and data analysis and interpretation. The indicated references provide additional details and examples of applications for the interested reader.