# 4. ANALYTICAL CHEMISTRY

## *4.1* OVERVIEW

During the past 40 years, EML has developed analytical procedures for the determination of specific gases, inorganic and organic constituents, and radionuclides. The procedures in this section are subdivided into three general categories: gases, organics, and radionuclides. All of the procedures have been written in a detailed manner to provide the user with sufficient information to obtain a quantitative result which is accurate, precise, free from chemical interference and contamination with specified detection capabilities. These procedures are presently used at EML to obtain data for ongoing and future research programs.

The procedures described in the gases subsection have been used primarily for the Laboratory's atmospheric tracer program. These procedures are highly specific for this application, with detection limits on the order of $10^{-15}$.

The procedures described in the organic subsection have been applied primarily to the analysis of certain organic compounds in sediment or soil. Primary emphasis has been the determination of polyaromatic hydrocarbons (PAHs) at low concentrations for pollutant history studies conducted at EML. Separation, purification, and concentration procedures are fully described, including expected analyte recovery for these matrices and sample sizes.

The last subsection is devoted to radionuclide measurements and radiochemical procedures. The radionuclide measurement techniques are described for alpha, beta, and gamma detection types of equipment. Information about background corrections, efficiency determination, and quality control methods and limits of detection are also included. The radiochemical procedures described are designed for various environmental matrices. The sample preparation portion introduces the procedure so that representative, homogeneous, and equilibrated samples are obtained. Next, separation and purification techniques are described to obtain a radiochemically pure sample.

Measurement techniques, including limits of detection, quality control or special procedural precautions are also included.

Further information about these procedures can be obtained from the individual listed as the principal contact person.