# SECTION 9.0

# INTEGRATED SURVEY PROCEDURES

## SECTION 9.1

## BACKGROUND MEASUREMENTS AND SAMPLING

1.0 Purpose

To describe the considerations for performing measurements of background direct radiation levels and for collecting samples of media to analyze for background radionuclide concentrations.

2.0 Responsibility

- The site coordinator is responsible for selecting locations for background determinations and assuring that this procedure is implemented.

- Survey team personnel are responsible for following this procedure while collecting background samples and measuring background radiation levels.

3.0 Procedures

3.1 Locations

3.1.1 Outdoor

3.1.1.1 Background samples may be collected from a representative, non-impacted on-site background reference area. The approach to use will be provided in the site-specific survey plan.

3.1.1.2 A minimum of five samples and/or measurements should be obtained; the specific number of locations will be defined in the site-specific survey plan.

3.1.1.3 Locations should be undisturbed by radioactivity from the candidate site or other anthropogenic sources (e.g., fertilizers containing elevated concentrations of uranium and potassium and building materials with high natural levels of uranium and thorium).

3.1.2 Indoor

3.1.2.1 Locations should be undisturbed by contamination, but may include influences determined to be naturally occurring in building materials.

3.1.2.2 If the background determined at the time of calibration is not representative of site conditions, or different areas on-site have influences causing backgrounds to vary, then site/area specific backgrounds should be determined. See Section 5 for procedures.

3.2 Background Measurements

3.2.1 Measure the external gamma exposure rate at 1 m above the ground surface using a pressurized ionization chamber (PIC) or micro-rem meter (see Section 7.5).

3.2.2 As appropriate for the specific site, measure the alpha and beta background count rates—a minimum of ten-one minute counts—for the various construction materials encountered. These backgrounds should be performed in an area of similar construction but unaffected by radioactive material use (see Sections 7.3 through 7.4).

**NOTE**: In high gamma background areas, it may be necessary to distinguish between the beta and gamma background components. This may be accomplished with a plexiglass or other suitable material beta shield that is placed over the detector. Measurements are then made with the detector in both the shielded and unshielded configuration. The beta and gamma component may then be determined based on the difference between the two measurements. Refer to Section 7.4.

3.3 Background Sampling

3.3.1 Collect a sample (approximately 1 kg) of soil. Soil sampling procedures are described in Sections 8.1 and 8.2.

3.3.2 When possible, a water sample (3.8 liters) should be collected from surface sources upstream from the site of concern. Water sampling procedures are described in Section 8.4. Sediment samples if required, should also be collected at locations where surface water is obtained (see Section 8.3).

3.3.3 Collect samples of other environmental media (e.g., air and vegetation) that are appropriate based on the samples to be collected on-site.

3.3.4 Collect samples of building materials, if necessary, to determine the extent of naturally occurring radioactivity present (see Section 8.8).