

## GLOSSARY

**Accessible Area** is an area that can be easily reached or obtained. In many cases an area must be physically accessible to perform a measurement. However, radioactivity may be measurable even if an area is not physically accessible. See in this glossary *measurable radioactivity*.

**Action Level** is the numerical value that causes a decision-maker to choose one of the alternative actions. In the context of MARSAME, the numerical value is the radionuclide concentration or level of radioactivity corresponding to the disposition criterion, and the alternative actions are determined by the selection of a disposition option.

**Alternative Action** is the choice between two mutually exclusive possibilities. See in this glossary *decision rule*.

**Ambient Radiation** is radiation that is currently present in the surrounding area. Ambient radiation may include natural background, intrinsic radiation from surrounding materials, intrinsic radiation from the item(s) being measured, contamination, or radiation from nearby machines (e.g., x-ray machines when operating) depending on the local conditions. Ambient radiation changes with season, time, location, weather, and other environmental conditions.

**Background Radiation** (as defined in Nuclear Regulatory Commission regulations) is radiation from cosmic sources; naturally occurring radioactive material including radon (except as a decay product of source or special nuclear material); and global fallout as it exists in the environment from the testing of nuclear explosive devices or from past nuclear accidents such as Chernobyl that contribute to background radiation and are not under the control of the licensee. “Background radiation” does not include radiation from source, byproduct or special nuclear materials regulated by the Nuclear Regulatory Commission (10 CFR 20.1003). See in this glossary *distinguishable from background*.

**Biased Measurements** are measurements performed at locations selected using professional judgment based on unusual appearance, location relative to known contamination areas, high potential for residual radioactivity, and general supplemental information. Biased measurements are not included in the statistical evaluation of survey unit data because they violate the assumption of randomly selected, independent measurements. Instead, biased measurement results are individually compared to the action levels. Biased measurements are also called judgment measurements (MARSSIM 2002).

**Calibration Function** is the function that relates the net instrument signal to activity (e.g., relates counts to disintegrations or radiations).

**Categorization** is the act of determining whether M&E are impacted or non-impacted. This is a departure from MARSSIM where this decision was included in the definition of *classification*.

**Class 1** M&E are impacted M&E that have, or had, the following: (1) highest potential for, or known, radionuclide concentration(s) or radioactivity above the action level(s); (2) highest potential for small areas of elevated radionuclide concentration(s) or radioactivity; and (3) insufficient evidence to support reclassification as Class 2 or Class 3. Such potential may be based on historical information and process knowledge, while known radionuclide

concentration(s) or radioactivity may be based on preliminary surveys. See in this glossary *Class 2*, *Class 3*, *classification*, and *impacted*.

**Class 2** M&E are impacted M&E that have, or had, the following: (1) low potential for radionuclide concentration(s) or radioactivity above the action level(s); and (2) little or no potential for small areas of elevated radionuclide concentration(s) or radioactivity. Such potential may be based on historical information, process knowledge, and preliminary surveys. See in this glossary *Class 1*, *Class 3*, *classification*, and *impacted*.

**Class 3** M&E are impacted M&E that have, or had, the following: (1) little or no potential for radionuclide concentrations(s) or radioactivity above background; and (2) insufficient evidence to support categorization as non-impacted. See in this glossary *Class 1*, *Class 2*, *classification*, *impacted*, and *non-impacted*.

**Classification** is the act or result of separating impacted M&E or survey units into one of three designated classes: Class 1, Class 2, or Class 3. Classification is the process of determining the appropriate level of survey effort based on estimates of activity levels and comparison to action levels, where the activity estimates are provided by historical information, process knowledge, and preliminary surveys. See in this glossary *Class 1*, *Class 2*, *Class 3*, and *impacted*.

**Clearance** is the removal of radiological regulatory controls from materials and equipment. Clearance is a subset of release. See in this glossary *release*, *restricted release*, and *unrestricted release*.

**Combined Standard Uncertainty** is the standard uncertainty of an output estimate calculated by combining the standard uncertainties of the input estimates. The combined standard uncertainty of  $y$  is denoted by  $u_c(y)$ . See also in this glossary *expanded uncertainty*, *input estimate*, *measurement method uncertainty*, *output estimate*, and *standard uncertainty*.

**Combined Variance** is the square of the combined standard uncertainty. The combined variance of  $y$  is denoted by  $[u_c(y)]^2$ . See in this glossary *combined standard uncertainty*.

**Concentration** is activity per unit mass or volume (e.g., Bq/kg, pCi/g, or Bq/m<sup>3</sup>) or activity per unit area (e.g., Bq/m<sup>2</sup> or dpm/100 cm<sup>2</sup>).

**Conceptual Model** is an idealized model or map of a component or area to be surveyed and the associated radionuclides or radioactivity expected to be present, and is intended to aid in describing or designing the survey. The initial conceptual model is based on the results of the initial assessment. Additional data is used to update the conceptual model iteratively throughout the development, implementation, and assessment of the disposition survey. See in this glossary *initial assessment*.

**Coverage Factor** ( $k$ ) is the value multiplied by the combined standard uncertainty  $u_c(y)$  to give the expanded uncertainty,  $U$ . See in this glossary *combined standard uncertainty* and *expanded uncertainty*.

**Coverage Probability** is the approximate probability that the reported uncertainty interval will contain the value of the measurand. See in this glossary *measurand*.

**Critical Value** in the context of radiation detection is the minimum measured value (e.g., of the instrument signal or the radionuclide concentration) required to give a specified probability that a positive (non-zero) amount of radioactivity is present in the material being measured. The critical value is the same as the critical level or decision level in publications by Currie (Currie 1968 and NRC 1984).

**Data Life Cycle** is the process of planning the survey, implementing the survey plan, and assessing the survey results prior to making a decision (MARSSIM 2002).

**Data Quality Objectives (DQOs)** are qualitative and quantitative statements derived from the DQO process that clarify [the survey] technical and quality objectives, define the appropriate type of data, and specify tolerable levels of potential decision errors that will be used as the basis for establishing the quality and quantity of data needed to support decisions (MARSSIM 2002).

**Data Quality Objectives Process** is a systematic strategic planning tool based on the scientific method that identifies and defines the type, quality, and quantity of data needed to satisfy a specific use (MARSSIM 2002). See also in this glossary *data quality objectives*.

**Data Quality Assessment (DQA)** is a scientific and statistical evaluation that determines whether data are the right type, quality and quantity to support their intended use (EPA 2006b).

**Decision Rule** is an “if...then” statement consisting of three parts: action level(s), parameter of interest, and alternative actions. A theoretical decision rule is developed early in the planning process assuming ideal data are available to support a disposition decision (see Chapter 3). An operational decision rule is developed based on the measurements that will be performed as part of the final disposition survey (see Chapter 4).

**Detection Capability** is a generic term describing the capability of a measurement process to distinguish small amounts of radioactivity from zero. It may be expressed in terms of the minimum detectable concentration. See in this glossary *minimum detectable concentration*.

**Difficult-to-Measure Radioactivity** is radioactivity that is not measurable until the M&E to be surveyed is prepared. Preparation of M&E may be relatively simple (e.g., cleaning) or more complicated (e.g., disassembly or complete destruction). Given sufficient resources, all radioactivity can be made measurable; however, it is recognized that increased survey costs can outweigh the benefit of some dispositions.

**Discrimination Limit** is the level of radioactivity selected by the members of the planning team that can be reliably distinguished from the action level. The lower bound of the gray region (LBGR) for Scenario A and the upper bound of the gray region (UBGR) for Scenario B are examples of discrimination limits. See also in this glossary *lower bound of the gray region*, *upper bound of the gray region*, *Scenario A*, and *Scenario B*.

**Disposition** is the future use, fate, or final location for something (e.g., recycle, reuse, disposal).

**Disposition Decision** is the selection among alternative actions to determine acceptable future use, fate, or final location for something (e.g., recycle, reuse, disposal)..

**Disposition Survey** is a radiological survey designed to collect information to support a disposition decision.

**Distinguishable from Background** is the radionuclide concentration or radioactivity that is statistically different from the background level of that radionuclide concentration or radioactivity in similar M&E. See in this glossary *background radiation, measurable radioactivity, minimum detectable concentration, measurement quality objectives*.

**Energy Resolution** is the quantifiable ability of a measurement method to distinguish between radiations with different energies.

**Environmental Radioactivity** is radioactivity from the environment where the M&E are located. Environmental radioactivity includes background radiation as well as inherent radioactivity and radioactivity from nearby sources.

**Evaluation Function** is a mathematical expression that allows the user to compare options and draw a conclusion or calculate a result.

**Expanded Uncertainty** is the product,  $U$ , of the combined standard uncertainty of a measured value,  $y$ , and a coverage factor,  $k$ , chosen so that the interval from  $y - U$  to  $y + U$  has a desired high probability of containing the value of the measurand. See in this glossary *combined standard uncertainty, coverage factor, and measurand*.

**Fluence** is the number of photons or particles passing through a cross-sectional area. The international standard (SI) unit for fluence is  $m^{-2}$ .

**Frequency Plot** is a chart plotting the number of data points against their measured values.

**Graded Approach** is the process of basing the level of application of managerial controls applied to an item or work according to the intended use of the results and the degree of confidence needed in the quality of the results. See in this glossary *data quality objectives process*.

**Gray Region** is the range of radionuclide concentrations or quantities between the discrimination limit and the action level, where the consequence of making a decision error is relatively minor. See in this glossary *action level, discrimination limit, lower bound of the gray region, and upper bound of the gray region*.

**Impacted** is a term applied to M&E that are not classified as non-impacted. M&E with a reasonable potential to contain radionuclide concentration(s) or radioactivity above background are considered impacted (10 CFR 50.2). See in this glossary *background radiation and non-impacted*.

**Inherent Radioactivity** is radioactivity resulting from radionuclides that are an essential constituent of the material being measured (e.g.,  $^{40}\text{K}$  in fertilizer containing potassium).

**Initial Assessment (IA)** is an investigation to collect existing information describing materials and equipment and is similar to the historical site assessment (HSA) described in MARSSIM.

**Input Quantity** is any of the quantities in a mathematical measurement model whose values are measured and used to calculate the value of another quantity, called the output variable.

**Instrument Efficiency** is the ratio between the instrument net reading and the surface emission rate of a source under given geometrical conditions (ISO 1988). For a given instrument, the

instrument efficiency depends on the energy of the radiations emitted by the source. See in this glossary *source efficiency* and *total efficiency*.

**Interdiction** is an increase in the level of radiological control or a decision not to accept control from another party. Examples of interdiction include identification of radioactive material that results in the initiation of radiological controls or identification of unauthorized movement of radioactive material.

**Interdiction Survey** is the collection of data to support an interdiction decision regarding M&E. In general, interdiction surveys are used to accept or refuse to accept control of M&E that are potentially radioactive. The goal of an interdiction survey often is to detect radioactive M&E that should be controlled. In some cases, an interdiction survey may result in the impoundment of radioactive M&E that represent an unacceptable risk to human health or the environment.

**Interference** is the presence of other radiation or radioactivity, chemicals, background noise, instrument noise, or other factors that hinders the ability to analyze for the radiation or radioactivity of interest.

**Intrinsic Radioactivity** See in this glossary *inherent radioactivity*.

**Lower Bound of the Gray Region (LBGR)** is the radionuclide concentration or level of radioactivity that corresponds with the lowest value in the range where the consequence of decision errors is relatively minor. For Scenario A, the LBGR corresponds to the discrimination limit. For Scenario B, the LBGR corresponds to the action level. See in this glossary *action level*, *discrimination limit*, *gray region*, *Scenario A*, and *Scenario B*.

**Mathematical Model** is the general characterization of a process, object, or concept in terms of mathematics, which enables the relatively simple manipulation of variables to be accomplished in order to determine how the process, object, or concept would behave in different situations.

**Materials and Equipment (M&E)** are items considered for disposition that include metals, concrete, dispersible bulk materials, tools, equipment, piping, conduit, furniture, solids, liquids, and gases in containers, etc. M&E are considered non-real property distinguishable from buildings and land, which are considered real property. See in this glossary *disposition* and *non-real property*.

**Measurand** is a particular quantity subject to measurement (ISO 1996).

**Measurement Method Uncertainty** See in this glossary *method uncertainty*.

**Measurement Quality Objectives (MQOs)** are a statement of a performance objective or requirement for a particular method performance characteristic (MARLAP 2004).

**Measurement Standard Deviation** See in this glossary *standard deviation (of measurement)*.

**Measurement Uncertainty** See in this glossary *uncertainty (of measurement)*.

**Measurable Radioactivity** is radioactivity that can be quantified using known or predicted relationships developed from historical information, process knowledge, or preliminary measurements as long as the relationships are developed, verified, and validated as specified in the *data quality objectives* (DQOs) and *measurement quality objectives* (MQOs).

**Median** is the middle value of the data set when the number of data points is odd, or the average of the two middle values when the number of data points is even.

**Method Uncertainty**,  $u_M$ , is the predicted uncertainty of the measured value that would be calculated if the method were applied to a hypothetical sample with specified concentration.

**Minimum Detectable Activity (MDA)** is the minimum detectable value of activity for a measurement. See in this glossary *minimum detectable value*.

**Minimum Detectable Concentration (MDC)** is the minimum detectable value of the radionuclide or radioactivity concentration for a measurement. See in this glossary *minimum detectable value*.

**Minimum Detectable Value** is an estimate of the smallest true value of the measurand that ensures a specified high probability,  $1 - \beta$ , of detection. This definition presupposes that an appropriate detection criterion has been specified (e.g., critical value). See in this glossary *measurand* and *critical value*.

**Minimum Quantifiable Concentration (MQC)** is the smallest value of the concentration that ensures the relative standard deviation of a measurement of M&E with that concentration does not exceed a specified value, usually 10%.

**Non-impacted** is a term applied to M&E where there is no reasonable potential to contain radionuclide concentration(s) or radioactivity above background (10 CFR 50.2). See in this glossary *background radiation* and *impacted*.

**Non-Real Property** is property that is not real property. See in this glossary *real property* and *materials and equipment (M&E)*.

**Null Hypothesis**, or baseline condition, is a tentative assumption about the true, but unknown, radionuclide concentration or level of radioactivity that can be retained or rejected based on the available evidence. When hypothesis testing is applied to disposition decisions, the data are used to select between a presumed baseline condition (the null hypothesis) and an alternate condition (the alternative hypothesis). The null hypothesis is retained until evidence demonstrates with a previously specified probability that the baseline condition is false.

**Output Quantity** is the quantity in a mathematical measurement model whose value is calculated from the measured values of other quantities in the model. See in this glossary *input quantity*.

**Planning Team** is the group of people who perform the DQO process. Members may include the decision-maker (senior manager), site manager, representatives of other data users, senior program and technical staff, someone with statistical expertise, and a quality assurance and quality control advisor (such as a QA manager) (EPA 2000a).

**Posting Plot** is a map of the survey unit with the data values entered at the measurement locations. This type of plot potentially reveals heterogeneities in the data, especially possible patches of elevated radioactivity.

**Preliminary Survey** is any survey performed prior to the disposition survey in MARSAME, and is generally performed to provide information required to support the design of the disposition survey. See also in this glossary *disposition survey*.

**Process Knowledge** is information concerning the characteristics, history of prior use, and inherent radioactivity of the materials and equipment being considered for release. Process knowledge is obtained through a review of the operations conducted in facilities or areas where materials and equipment may have been located and the processes where the materials and equipment were involved.

**Radioactive Materials** consist of any material, equipment or system component determined or suspected to contain radionuclides in excess of inherent radioactivity. Radioactive material includes activated material, sealed and unsealed sources, and substances that emit radiation. See in this glossary *inherent radioactivity*.

**Radiological Controls** are any means, method or activity (including engineered or administrative) designed to protect personnel or the environment from exposure to a radiological risk.

**Radionuclides or Radiations of Concern** are radionuclides or radiations that are present at a concentration or activity that may pose an unacceptable risk to human health or the environment. In MARSAME, the term radionuclides or radiations of concern is used to describe the radionuclides or radiations that are actually measured during the disposition survey. See also in this glossary *radionuclides or radiations of potential concern* and *disposition survey*.

**Radionuclides or Radiations of Potential Concern** are radionuclides or radiations that are identified during the initial assessment as potentially being associated with the M&E being investigated. See also in this glossary *initial assessment* and *radionuclides or radiations of concern*.

**Ratemeter** is an instrument that indicates the counting rate of an electronic counter. In the context of radiological measurements, a ratemeter displays the counting rate from a radiation detector. The averaging time for calculating the rate is determined by the time constant of the meter. See in this glossary *scaler*.

**Real Property**, in the MARSAME context, means developed or undeveloped land, fixed buildings and structures, or surface and subsurface soil remaining in place. Real property is outside the scope of MARSAME. See in this glossary *materials and equipment (M&E)* and *non-real property*.

**Recycle** is beneficial reuse of constituent materials incorporated within the M&E. A hammer that is melted down as scrap metal so the component metals can be reused is an example of recycle.

**Reference Material** is material of similar physical, radiological, and chemical characteristics as the M&E considered for disposition. Reference material provides information on the level of radioactivity that would be present if the M&E being investigated had not been radiologically impacted. See in this glossary *impacted*.

**Relative Standard Uncertainty** is the ratio of the standard uncertainty of a measured result to the result itself. The relative standard uncertainty of  $x$  may be denoted by  $u_r(x)$ . See in this glossary *standard uncertainty*.

**Release** is a reduction in the level of radiological control, or a transfer of control to another party. Release includes clearance. Examples of release (other than clearance) include recycle, reuse, disposal as waste, or transfer of control of radioactive M&E from one authorized user to another. See also in this glossary *reuse, recycle, restricted release, and clearance*.

**Release Survey** is a type of disposition survey designed to collect information to support a release decision. See also in this glossary *disposition survey and release*.

**Restricted Release** is a reduction in the level of radiological control, or transfer of control to another party, where restrictions are placed on how the released items will be used or transferred. Maintaining a tool crib in a radiologically controlled area restricts reuse of those tools to that radiologically controlled area, and tools returned to the tool crib represent a restricted release of those tools. See also in this glossary *reuse, recycle, release, and clearance*.

**Reuse** is the continued use of M&E for their original purpose(s). An example of reuse is a hammer that continues to be used as a hammer.

**Ruggedness** is the relative stability of a measurement technique's performance when small variations in method parameter values are made.

**Sampling Standard Deviation**,  $\sigma_S$ , is the theoretical true value of the variability of radionuclide concentration or radioactivity in space and time (i.e., the variation of the true but unknown concentrations from place to place and from time to time). The extent of the survey unit, the physical sizes of the measured material, and the choice of measurement locations affects the sampling standard deviation.

**Scaler** is an electronic counter that displays the aggregate of a number of signals, which usually occur too rapidly to be recorded individually. In the context of radiological measurements, a scaler records the number of counts from a radiation detector over a specified time interval. See in this glossary *ratemeter*.

**Scenario A** uses a null hypothesis that assumes the level of radioactivity associated with the M&E exceeds the action level. Scenario A is sometimes referred to as "presumed not to comply" or "presumed not clean."

**Scenario B** uses a null hypothesis that assumes the level of radioactivity associated with the M&E is less than or equal to the action level. Scenario B is sometimes referred to as "indistinguishable from background" or "presumed clean."

**Secular Equilibrium** is the condition in which the initial member of the decay series has a longer half-life than any subsequent members of the series. Secular equilibrium is achieved when the activities for all members of the decay series are equal to the activity of the precursor radionuclide.



**Segregation** is the process of separating or isolating from a main body or group. In the context of disposition surveys, segregation is based on the physical and radiological attributes of the M&E being investigated and is used to help control measurement method uncertainty.

**Sensitivity Coefficient** for an input estimate,  $x_i$ , used to calculate an output estimate,  $y = f(x_1, x_2, \dots, x_N)$ , is the value of the partial derivative,  $\partial f / \partial x_i$ , evaluated at  $i = x_1, x_2, \dots, x_N$ . The sensitivity coefficient represents the ratio of the change in  $y$  to a small change in  $x_i$ .

**Sentinel Measurement** is a biased measurement performed at a key location to provide information specific to the objectives of the *initial assessment* (IA).

**Significance Level** is, in the context of a hypothesis test, a specified upper limit for the probability of a *Type I decision error*.

**Sign Test** is a non-parametric statistical test used to evaluate radionuclide-specific disposition survey results if the radionuclide being measured is not present in background, or is present at such a small fraction of the action level as to be considered insignificant.

**Smear** is a non-quantitative test for the presence of removable radioactive materials in which the suspected surface or area is wiped with a filter paper or other substance, which is then tested for the presence of radioactivity. The surface area tested may be related to the release criterion. Smear is also referred to as a smear test, swipe, or wipe.

**Source Efficiency** is the ratio between the number of particles of a given type above a given energy emerging from the front face of a source or its window per unit time and the number of particles of the same type created or released within the source (for a thin source) or its saturation layer thickness (for a thick source) per unit time (ISO 1988). See also in this glossary *instrument efficiency* and *total efficiency*.

**Specific Activity** is the radioactivity per unit mass for a specified radionuclide.

**Specificity** is the ability of the measurement method to measure the radionuclide of concern in the presence of interferences.

**Spectrometry** is a measurement across a range of energies. The measurement of alpha particles by energy is called alpha spectrometry.

**Spectroscopy** is the measurement and analysis of electromagnetic spectra produced as the result of the emission or absorption of energy by various substances. The measurement of gamma-ray emissions from a substance is called gamma spectroscopy.

**Standard Operating Procedure (SOP)** is a written document that details the method for an operation, analysis, or action with thoroughly prescribed techniques and steps, and that is officially approved as the method for performing certain routine or repetitive tasks (MARSSIM 2002).

**Standard Deviation (of Measurement)**,  $\sigma_M$ , is a theoretical parameter describing the variability in the distribution of the measurement. See also in this glossary *uncertainty (of measurement)*.

**Standard Uncertainty** is the uncertainty of a measured value expressed as an estimated standard deviation, often called a “1-sigma” ( $1\sigma$ ) uncertainty (MARLAP 2004). The standard uncertainty of a value  $x$  is denoted by  $u(x)$ . See also in this glossary *uncertainty (of measurement)*.

**Standardized Initial Assessment** is a set of instructions or questions that are used to perform the initial assessment, usually documented in a standard operating procedure. See also in this glossary *initial assessment* and *standard operating procedure*.

**Surficial Radioactive Material** is radioactive material distributed on any of the surfaces of a solid object. Surficial radioactive material may be either removable by non-destructive means (such as casual contact, wiping, brushing, or washing) or fixed to the surface.

**Surrogate Measurement** is a measurement where one radionuclide is quantified and used to demonstrate compliance with the release criterion for additional radionuclide(s) based on known or accepted relationships between the measured radionuclide and unmeasured radionuclide(s).

**Survey Unit** for M&E is the specific lot, amount, or piece of M&E on which measurements are made to support a disposition decision concerning the same specific lot, amount, or piece of M&E.

**Total Efficiency** is the product of the instrument efficiency and the source efficiency. See in this glossary *instrument efficiency* and *source efficiency*.

**Traceability** is the “property of the result of a measurement or the value of a standard whereby it can be related to stated references, usually national or international standards, through an unbroken chain of comparisons all having stated uncertainties” (ISO 1996).

**Type I Decision Error** occurs when the null hypothesis is rejected when it is actually true. The Type I decision error rate, or significance level, is represented by  $\alpha$ . See in this glossary *null hypothesis* and *significance level*.

**Type II Decision Error** occurs when the null hypothesis is not rejected when it is actually false. The Type II decision error rate is denoted by  $\beta$ . See in this glossary *null hypothesis*.

**Uncertainty (of Measurement),  $u(x)$** , is a parameter, associated with the result of a measurement,  $x$ , that characterizes the dispersion of the values that could reasonably be attributed to the measurement of  $x$ . It is the estimated value of  $\sigma(x)$  obtained from the propagation of uncertainty. See also in this glossary *standard deviation (of measurement)*.

**Unrestricted Release** is the removal of radiological regulatory controls from materials and equipment. See in this glossary *release* and *clearance*.

**Upper Bound of the Gray Region (UBGR)** is the radionuclide concentration or level of radioactivity that corresponds with the highest value in the range where the consequence of decision errors is relatively minor. For Scenario A, the UBGR corresponds to the action level. For Scenario B, the UBGR corresponds to the discrimination limit. See in this glossary *action level*, *discrimination limit*, *gray region*, *Scenario A*, and *Scenario B*.

**Volumetric Radioactive Material** is radioactive material that is distributed throughout or within the materials or equipment being measured, as opposed to a surficial distribution. Volumetric radioactive material may be homogeneously (e.g., uniformly activated metal) or heterogeneously (e.g., activated reinforced concrete) distributed throughout the M&E.

**Wilcoxon Rank Sum (WRS) Test** is a non-parametric statistical test used to evaluate disposition survey results when the radionuclide being measured is present in background by comparing the results to measurements performed using an appropriately chosen reference material.