

## **OBJECTIVE 24: POST-EMERGENCY SAMPLING**

### **OBJECTIVE**

Demonstrate the use of equipment and procedures for the collection and transportation of samples from areas that received deposition from the airborne plume.

### **INTENT**

This objective is derived from NUREG-0654 which provides that OROs should have the capability to assess the actual or potential magnitude and locations of radiological hazards in the ingestion emergency planning zone (EPZ) and for relocation, re-entry and return measures. (See evaluation criteria from Planning Standards H., I., J., and N.) Provisions contained in these evaluation criteria are expanded and clarified in FEMA Guidance Memorandum (GM) IN-1, The Ingestion Exposure Pathway.

This objective focuses on the collection of field environmental samples for laboratory analyses that are essential for decisions on protection of the public from contaminated food and water and direct radiation from deposited materials. Because of the long half-lives of certain radionuclides (e.g., cesium, and strontium), contamination that occurs during the emergency phase of the accident may continue to pose a high risk to the public for months or years. Laboratory analyses of environmental samples are essential for evaluating this risk.

Ingestion pathway samples should be secured from agricultural products and water. Samples in support of relocation and return should be secured from soil, vegetation, and other surfaces in areas that received radioactive ground deposition.

Demonstration of this objective focuses on the equipment and procedures used to collect samples in the field and to prepare these samples for transportation to a laboratory for analyses.

Collection of plume pathway samples is covered in Objective 8, Field Radiological Monitoring - Airborne Radioiodine and Particulate Activity Monitoring. Laboratory operations and procedures for measuring and analyzing samples are covered in Objective 25, Laboratory Operations.

## **OBJECTIVE 24: POST-EMERGENCY SAMPLING DEMONSTRATION CRITERIA**

### NUREG

### CRITERION

- I.8.  
J.11.**                    **1. Each team demonstrates necessary equipment and procedures to properly collect samples.**

### **Explanation**

Sampling teams should demonstrate the availability of equipment to collect samples of vegetation, snow, water, milk, meat, poultry, stored animal feed, soil, or other items important to the ingestion exposure pathway. Samples should be taken in areas within the ingestion EPZ where the radioactive material was deposited from the plume. The use of a low-range portable survey instrument, preferably a micro R meter, should be demonstrated for identifying these areas. It is important to also take samples outside the plume deposition area in order to determine the locations of food and water that have concentrations of radioactive materials that are lower than the protective action guides (PAG). The radiation instrument will also be used to detect the radiation level of each sample so that laboratory personnel can label sample containers to demonstrate contamination control at the laboratory.

Since the instrument(s) will be used for measuring very low levels of gamma radiation as well as checking for contamination, they should have been calibrated within the previous 12 months. They should also be accompanied by a radioactive check-source that can be used as a single point calibration check in the field. In many cases, these check-sources are attached to the instrument (e.g., the CD V-700). Each instrument should be labeled with the date of the last calibration, the proper reading (or range of readings) for the check source accompanying or attached to the instrument, and any correction factors that need to be used to correct the readings. Sampling teams should use the instrument(s) to read the check source, compare the actual reading to the proper reading, and perform a battery or operability check to demonstrate proper operation of the instrument(s).

To avoid sending highly contaminated samples to the laboratory, samples should not be collected from areas where the gamma exposure rate from deposited materials is greater than one milliroentgen per hour (mR/hr) at waist level. However, there is always the possibility that collected samples may be cross contaminated from radioactive material on the hands of individuals collecting the samples or on the tools used for collecting the samples. Sampling teams should demonstrate methods for avoiding this problem, for example, using clean gloves for each sample, using clean wipes to remove any remaining contamination from the sample collecting tools after each sample, and avoiding the contamination of the exterior of sample containers.

## **OBJECTIVE 24: POST-EMERGENCY SAMPLING**

Field samples in support of decisions on food and water controls should be properly logged and labeled with time, date, location, radiation level, and name of individual taking the sample. Samples taken in support of decisions on relocation should also provide this information along with information on the size of the area included in the sample.

### **Extent of Play**

Under this criterion, the sampling teams should demonstrate all sample collection procedures as well as procedures for preventing cross contamination. The particular types of samples to be collected and the areas from which they are collected may be determined in advance. Prior agreement should be secured concerning any sample to be taken from private property, such as from a farm or food-processing plant.

### NUREG

### CRITERION

**I.8., H.12.,  
J.11.**

**2. Samples are promptly transported to a central point  
or to an appropriate laboratory for analyses.**

### **Explanation**

Responsible OROs should identify the laboratory(ies) to which specific samples will be taken. OROs should demonstrate the capability to analyze and estimate current turn-around-time of laboratories in making determinations as to which laboratory will be sent which samples. OROs should demonstrate the capability to handle intermediate transportation and, when needed, temporary storage of samples. OROs should demonstrate the capability to document and maintain complete birth-to-death records on samples. Responsible OROs should demonstrate the capability to transport samples to a designated central point or appropriate laboratory for analyses.

## **OBJECTIVE 24: POST-EMERGENCY SAMPLING**

### **Extent of Play**

Under this criterion, all activities related to sample transportation, storage and record maintenance and documentation, should be performed as they would be in an actual emergency. In the event that the organization collects a large number of samples in the field (Demonstration Criterion 1), these activities may be performed for a representative number of samples. An acceptable representative number should be determined by the FEMA Regional Assistance Committee (RAC) Chair. All arrangements necessary to accommodate exercise play and demonstration of these procedures should be made by the responsible parties with the RAC Chair before the exercise and identified in the extent-of-play agreement.

### NUREG

### CRITERION

#### **N.1.a.**

- 3. All activities described in the demonstration criteria for this objective are carried out in accordance with the plan, unless deviations are provided for in the extent-of-play agreement.**

### **Explanation**

Responsible OROs should demonstrate the capability to follow policies, implement procedures, and utilize equipment and facilities contained in the plans. OROs should demonstrate that they can follow sequences outlined in the various procedures and perform specified activities, as necessary.

### **Extent of Play**

Under this criterion, all activities should be carried out as specified in the plan, unless deviation from the plan is provided for in the extent-of-play agreement.

## **CLARIFICATION OF TERMS**

The following definitions describe the limited meaning of terms in the context of the Exercise Evaluation Methodology and may vary from the technical definition for all circumstances.

**Check source** refers to a radioisotope with a relatively fixed activity level used to determine the responsiveness of survey instruments.

**Emergency phase** refers to the initial phase of response actions, during which actions are taken in response to a threat of release or a release in progress.

## **OBJECTIVE 24: POST-EMERGENCY SAMPLING**

**Exposure rate** refers to the amount of gamma radiation that a individual would receive in one hour as measured in air (typically expressed in units of milliroentgens per hour or Roentgens per hour).

**Half-life** refers to the time required for a particular quantity of a radionuclide to reduce the rate at which it emits radiation by one half.

**Isotope** refers to one of two or more atoms of an element which have the same number of protons in the nucleus but a different number of neutrons. Some isotopes of a particular element may be radioactive while the others are not.

**Measuring** refers to counting to detect radiation levels or determining other parameters, such as the energy of radiation or physical characteristics of samples, such as the volume of an air sample.

**Micro R meter** refers to a portable radiation instrument capable of measuring levels of gamma exposure rate in the range of natural background gamma radiation which is usually in the range of 8 to 12 micro-Roentgens per hour.

**Monitoring** refers to checking radiation levels, usually by counting ambient radiation.

**Radionuclide** refers to a radioactive isotope of a particular element.

**Recovery** refers to the process of reducing radiation exposure rates and concentrations in the environment to acceptable levels for unconditional occupancy or use after the emergency phase of a radiological emergency.

**Re-entry** refers to temporary entry of individuals into a restricted zone under controlled conditions.

**Relocation** refers to a protective action, taken in the post-emergency phase, through which individuals not evacuated during the emergency phase are asked to vacate a contaminated area to avoid chronic radiation exposure from deposited radioactive material.

**Sampling** refers to collecting specimens of materials at field locations.