

## 1. INTRODUCTION

- 1.1. Purpose – This procedure provides instructions on sampling the air for the presence of radioactive material.
- 1.2. Scope – This procedure addresses the actions necessary to obtain representative air samples.
- 1.3. Applicability – This procedure is applicable for taking of air samples to determine the activity of radioactive material in the air.

## 2. PRECAUTIONS AND LIMITATIONS

- 2.1. When taking air samples, select locations that are representative of the general air concentrations, but minimize exposure to radiation and radioactive material so that exposure is maintained as low as reasonably achievable (ALARA).
- 2.2. Be aware of environmental conditions that would preclude the use of radiation monitoring instruments such as rain, high wind, extreme temperatures (high or low), high humidity, etc.

## 3. PREREQUISITE ACTIONS

- 3.1. Training/Qualification requirements
  - 3.1.1. Training/Qualification requirements – Personnel performing this procedure should have the training and experience needed to operate radiological survey equipment and have the training required by SHEM-38. Examples of qualified individuals include, but are not limited to, health physicists, industrial hygienists, radiation protection and industrial hygiene technicians, laboratory technicians, and field monitors. Documentation of personnel qualifications (i.e. resumes, organizational training and qualification records) should be maintained.
- 3.2. Daily Health and Safety Briefing requirements
  - 3.2.1. Receive and review this procedure, along with performance documents or forms. Contact supervisor with any questions regarding performance of the procedure
- 3.3. Performance Documents

NONE
- 3.4. Required Forms

- 3.4.1. Records forms— Record sample location and air concentrations from the locations

## 3.5. Special Tools, Equipment, Parts and Supplies

- 3.5.1. Based on the type of air sample and the location, this may include:

- Air sampler (e.g., RAdECo Model H810).
- Tripod for mounting air sampler.
- Power source (generator and fuel) or access to power.
- 50 foot extension cord.
- Filter paper (2-inch).
- Filter sampler head
- Forceps.
- Planchet.
- Glassine filter envelope and resealable bag.

## 3.6. Approvals and notifications

- 3.6.1. Prior to performing surveys ensure the OSC is aware of the work that is to be performed
- 3.6.2. Notify the Radiation Safety Officer (RSO) of elevated survey results

## 4. AIR SAMPLING

- 4.1. Attach the air sampler firmly to the tripod or other mounting platform approximately 4 to 5 feet above the ground surface.
- 4.2. Place a small “x” on the exterior surface of the paper filter.
- 4.3. Select and attach the desired sampling head and install filter media. Hand tighten filter gently. Over tightening may tear the filter.
- 4.4. Position the assembled sampling system with the air intake facing the source of the suspected radioactive airborne release or resuspension.
- 4.5. The face of the sampler should be at breathing zone height, approximately 5 feet.
- 4.6. To avoid the effects of structurally induced turbulence whenever possible, the horizontal distance between the sampler and the structure should be equal to twice the height of the obstruction when possible otherwise note on sampling form.
- 4.7. Measure temperature and barometric pressure (if possible).

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- 4.8. Record all the sampling information requested in the “Air” Sample Type blocks on the Sample Control and Chain of Custody Form.
- 4.9. Follow the Quick Step Guide for collecting the air sample, except adjust sample collection volume as directed by the sampling plan.
- 4.10. When directed to collect sample based on time or sample collection route, record the ending flow rate, volume collected, and stopping time on the Sample Control Form. **(Turn off the air sampler).**
- 4.11. Put on disposable gloves.
- 4.12. Remove the sampling head.

## Filter Paper

- 4.13. Remove the filter paper carefully using forceps. (Do not tear or cut the filter paper)

For alpha airborne radioactivity determination:

- 4.14. See the Radiological point of contact for specific directions on the volume of air to collect. The volume depends on factors including instrument detection capability, radionuclide, limits, etc. Nominally, 120 cubic feet is the minimum sample to be collected.
- 4.15. Count the filter paper as determined by Figure 1 above with a Ludlum Model 2241 on the “Det 2” setting with the Ludlum Probe model 43-90. Record results on the appropriate form.
- 4.16. Wait for 30 minutes and count again. If the filter paper count rate decreases by approximately one-half, then the radioactivity is most likely due to radon and its decay daughters. If the count rate does not decrease, then proceed with steps 4.17 through 4.25, otherwise proceed to step 4.26. This indicates that a radioactive airborne condition exists and level B, or greater respiratory protection should continue to be worn in this area.
- 4.17. Place the filter paper in a glassine envelope and label the envelope with time, date, location, initials, sample number, GPS coordinates and record in the Daily Log Book.
- 4.18. Place envelope in resealable plastic bag.
- 4.19. Record this same information on the appropriate form.

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- 4.20. Place form and sample in another resealable bag to prevent contamination of the sample form or cross contamination with other samples.
- 4.21. Decontaminate forceps using clean water (if possible). Wipe dry.
- 4.22. Ensure all data is recorded on a Sample Control Form and Field Monitoring Log.
- 4.23. Prepare the sample for transport and transfer sample collection media to appropriate containers and label in accordance the chain-of-custody procedures in the Quality Assurance Manual. Record pertinent information on separate Chain-of-Custody Form for group sample transfer.
- 4.24. Ship airborne radioactivity samples to a certified lab (list of certified labs is in development) and request the following analyses:
- 4.25. Alpha spectroscopy for these actinides (i.e.  $^{234}\text{U}$ ,  $^{235}\text{U}$ ,  $^{238}\text{U}$ ,  $^{230}\text{Th}$ ,  $^{232}\text{Th}$ ,  $^{238}\text{Pu}$ ,  $^{239}\text{Pu}$ ,  $^{241}\text{Am}$ ).

For beta/gamma airborne radioactivity determination:

- 4.26. Count the filter paper as determined by Figure 1 above with a Ludlum Model 2241 on the "Det 1" setting with the Ludlum Probe model 44-9. Record results on the appropriate form.
- 4.27. Wait for 30 minutes and count again. If the filter paper count rate decreases by approximately one-half, then the radioactivity is most likely due to radon and its decay daughters. If the count rate does not decrease, then proceed with steps 4.28 through 4.35. This indicates that a radioactive airborne condition exists and level B respiratory, or greater protection should continue to be worn in this area.
- 4.28. Place the filter paper in a glassine envelope and label the envelope with time, date, location, initials, sample number, GPS coordinates and record in the Daily Log Book.
- 4.29. Place envelope in resealable plastic bag.
- 4.30. Record this same information on the appropriate form.
- 4.31. Place form and sample in another resealable bag to prevent contamination of the sample form or cross contamination with other samples.
- 4.32. Decontaminate forceps using clean water (if possible). Wipe dry.

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- 4.33. Ensure all data is recorded on a Sample Control Form and Field Monitoring Log.
- 4.34. Prepare the sample for transport and transfer sample collection media to appropriate containers and label in accordance the chain-of-custody procedures in the Quality Assurance Manual. Record pertinent information on separate Chain-of-Custody Form for group sample transfer.
- 4.35. Ship airborne radioactivity samples that are greater than twice background after 30 minute decay to a certified lab (list of certified labs is in development) and request the following analyses:
  - 4.35.1. Total strontium
  - 4.35.2. Gamma spectroscopy for  $^{60}\text{Co}$ ,  $^{137}\text{Cs}$ , and  $^{192}\text{Ir}$  ( $^{241}\text{Am}$  if possible for comparison to alpha spectroscopy). Request a Peak Search analysis as a deliverable. The stated MDA for Cs-137 should be 10 pCi.

Repeat steps 4.2 through 4.35 for additional air samples.