

Course Title: Radiological Control Technician
Module Title: Air Sampling Equipment
Module Number: 2.18

Objectives:

- 2.18.01 Identify the factors that affect the operator's selection of a portable air sampler.
- ☞ 2.18.02 Identify the physical and operating characteristics and the limitation(s) of the Staplex and Radeco portable air samplers.
- ☞ 2.18.03 Identify the physical and operating characteristics and the limitation(s) of motor air pumps.
- ☞ 2.18.04 List the steps for a preoperational checkout of a portable air sampler.
- ☞ 2.18.05 Identify the physical and operational characteristics and the limitation(s) of beta-gamma continuous air monitors (CAMs).
- ☞ 2.18.06 Identify the physical and operating characteristics and the limitation(s) of alpha continuous air monitors (CAMs).

INTRODUCTION

As Radiological Control Technicians, one of your major concerns is preventing radiation exposure due to internal deposition of radioactive material in the body. The primary pathway for such deposits is through inhalation of microscopic particles of radionuclides suspended in the air we breathe. If we breathe air contaminated with radioactive material, some of the material will get trapped in the lungs, and then be distributed to other organs within the body. To limit such exposures, it is very important to identify how and where radioactive materials become airborne, and how to effectively sample the air to measure the concentration of the radioactive material.

Alpha emitters in a solid form with high specific activities can become airborne even when no operations are being performed. This results from the high rate of energy release in the form of the relatively massive alpha particles causing microscopic pieces of the material to break away which can become airborne. The amount that becomes airborne depends upon the total amount of material present, the specific activity and, to some degree, the chemical composition of the material. This characteristic is responsible for the rapid spread of airborne contamination when materials such as plutonium or americium are not adequately contained. Beta and gamma emitters do not normally become airborne on their own accord because the energy released per unit mass is insufficient to break away pieces of the material.

In this lesson you will gain a general overview of the operations of the most commonly used air sampling equipment used at the ICP.

References

1. Gollnick, Daniel A., "Basic Radiation Protection Technology," 2nd Edition, Pacific Radiation Corporation, Altadena, CA, 1988.
2. Moe, Harold, "Operational Health Physics Training," ANL-88-26; DOE; Argonne National Laboratory, Chicago, 1988.
3. ANSI 1997. American National Standard Radiation Protection Instrumentation Test and Calibration, Portable Survey Instruments. ANSI N323A-1997. New York, New York.
4. Various Manufacturer Technical Manuals
5. MCP-352, "Determining Radiological Air Monitoring Requirements"
6. MCP-354, "Placement of Passive Air Samplers and CAMs"
7. MCP-356, "Routine Air Monitoring Program"
8. MCP-357, "Job-Specific Air Sampling/Monitoring"
9. MCP-358, "CAM Alarm Setpoints"

2.18.01 Identify the factors that affect the operator's selection of a portable air sampler.

SELECTION FACTORS

The factors affecting the RCT's selection of portable air samplers are:

1. Type of radiation emitted by airborne contaminant in question
 - Alpha or beta-gamma
2. Physical state of airborne contaminant
 - Most air sampling is for particulate airborne contaminants. Special provisions, as described in Study Guide 2.06, must be made for sampling of vapors or gases.
3. Type and duration of job being performed.

ICP Specific Information

Availability is, of course, a limiting factor in the RCT's selection of a portable air sampler. At the ICP, the Staplex air sampler is readily available and is commonly used for grab air sampling.

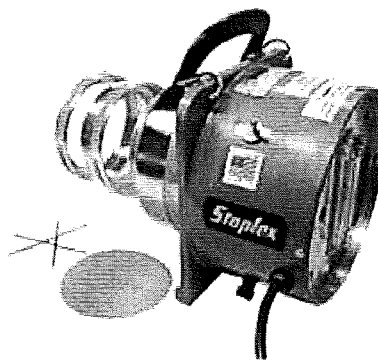
☞ 2.18.02 Identify the physical and operating characteristics and the limitation(s) of the Staplex and Radeco portable air samplers.

PHYSICAL AND OPERATING CHARACTERISTICS AND LIMITATIONS

Staplex High Volume Air Sampler

Operational characteristics

- Suction-type centrifugal air pump
- Self-cooling - Inappropriate for long-term continuous sampling
- Variable orifice flow-meter calibrated 0-70 cfm. Flow rate sticker on side is specific for appropriate collection method. Typical flow rate(s) range from 7-28 cfm



Physical characteristics

- 110-V fan motor with on-off switch. Requires external power source
- 4-inch filter holder assembly with intake screen. (ICP uses a 2-inch filter)

- MSA charcoal adaptor available
- Portable: 10 pounds

Limitations

- Inappropriate for long-term continuous sampling which could cause the sampler to over heat
- May create an airborne area due to fast moving exhaust air
- Potential "crawler" while in operation due to the high torque generated by the fan
- Do not use in explosive atmospheres

Methods of sampling

- Filtration
- Adsorption, if charcoal is used
- Impaction, if the optional Annular Kinetic impactor head is installed

Placement for surveys

- Avoid creating airborne activity through stirring up dust with sampler exhaust air void
- Tripods available
- May be hung on chain for optimum positioning

Optional Annular Kinetic Impactor Head

- Inertial Collector-Head collects large airborne particles such as plutonium without collecting coexisting particles containing radon and thoron
- Principle: Air to be sampled enters annular space at rear, makes a 180-degree turn at greased planchet, and out the center tube
- Size of particles collected can be varied by adjusting slit width and air flow velocity
- Physical characteristics. - Head replaces Staplex screened intake orifice. Lightly greased planchet placed on head intake.

ICP Specific Information

The characteristics listed above are for the Staplex sampler used with a four-inch diameter filter. At the ICP, a 47 mm (about two-inch) diameter filter is normally used. Since this filter is much smaller, air flow is significantly reduced. This reduced air flow restricts the self-cooling capacity of the Staplex, allowing it to overheat. Hazards from an overheated Staplex include thermal burns and electrical hazards. Staplex air samplers should normally be run for five to ten minutes. Do not allow a Staplex air sampler to run continuously for longer than 15 – 20 minutes.

Flow rates as used at the ICP are about 9 cfm with the ICP 47mm filter.

The four-inch diameter filter is used for emergency response organization off-site monitoring activities. It provides a much higher flow rate.

Radiological Controls instrumentation technical manuals can be accessed for reference on the ICP intranet RadCon homepage.

Radeco H809 Grab Sampler

Operational characteristics

- Equipped with rotameter air flow indicator. Rotameter consists of a "float" which is free to move up and down and a vertical tapered tube, which is larger at top than bottom and contains the float. Air flows up the tube causing float to rise. Height to which float rises is proportional to air flow rate
- Rotameters are conventionally read at the level of the float's maximum diameter, unless otherwise indicated. If in doubt about how to read a particular rotameter, check with supervision.
- Flow rate adjustable from 1 to 8 cfm
- 110-125 VAC



Physical characteristics

- Equipped with a two-stage turbine blower and one horsepower self-cooling universal type motor
- Sample head uses 47 mm particulate and iodine filters
- Instrument panel has a three-position switch - (HIGH/OFF/VARIABLE), a control knob for FLOW ADJUST, a fuse holder, and a rotameter
- Weight: 10 lbs

Limitations

- Cannot be used in explosive atmospheres
- Inappropriate for long-term continuous sampling

Methods of sampling employed

- Filtration
- Adsorption, if charcoal is used

ICP Specific Information

Radiological Controls instrumentation technical manuals can be accessed for reference on the ICP intranet RadCon homepage.

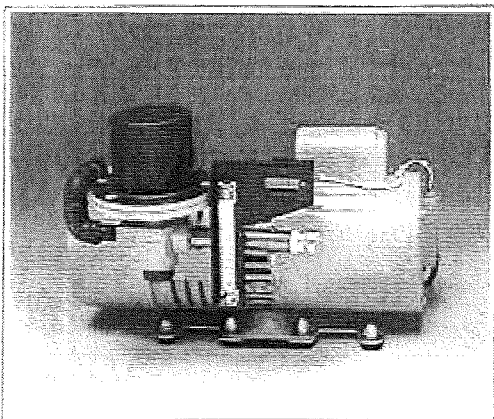
- ☞ 2.18.03 Identify the physical and operating characteristics and the limitation(s) of motor air pumps.

MOTOR AIR PUMPS

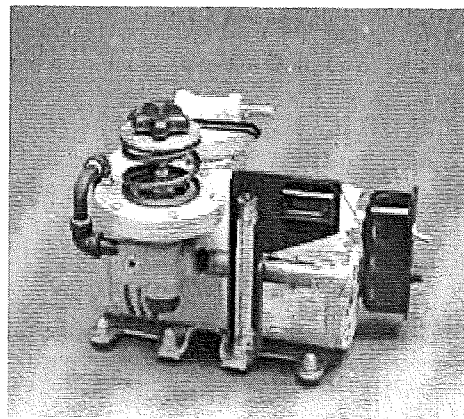
Motor air pumps are used to provide the vacuum for taking a continuous air sample. They run at low flow rates and are able to continuously run for long periods of time.

The pump will be connected to an airline that has a filter head attached. Components include a vacuum pump, motor, and airflow regulator. Optional components include a rotameter (flow-meter) and flow rate adjuster.

Motor air pumps: (shown are typical motor air pumps)



Model AVS-60A Portable Air Sampler



Model AVS-28A Portable Constant Flow Air Sampler

Operational characteristics of typical motor air pumps

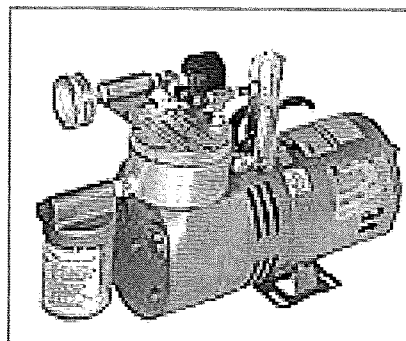
- Flow rate maintained relatively constant by regulator.
- Requires 110 V power supply.

Physical characteristics of typical motor air pumps

- Sample heads used designed to accept 2 inch diameter (47 mm) media for both particulates and iodine.
- Common components are the carbon vane pump, the constant flow air regulator, and the flow meter.
- Grounded three wire power cord is provided.

Eberline RAS-1 (Regulated Air Sampler)

- Operational characteristics - Rotameter type flow meter with a flow rate range of 0.5 to 3.5 cfm
- Physical characteristics - 'Screw in' type particulate filter holder, a 'Clamshell' type iodine filter holder, an ON/OFF power switch, weight is 30 lb



Sampling considerations

- Filter paper must cover intake screen.
- Charcoal cartridge holder must have good seal.
- Check flow rate after turning on and before turning off.
- Route exhaust of the pump outside or away from the area being sampled.

Reading a rotameter

- Rotameter consists of a "float" which is free to move up and down, and a vertical tapered tube, which is larger at top than bottom and contains the float.
- It operates using air pressure. Air flows up the tube, causing the float to rise. Height to which float rises is proportional to air flow rate.
- Rotameters are conventionally read at the highest point of maximum diameter, unless otherwise indicated.

ICP Specific Information

Eberline RAP-1

The Eberline RAP-1 (regulated air pump) is a common motor air pump used at the ICP. It has the same motor as the Eberline RAS-1 but does not have the flow-meter or filter holder.

LAPEL AIR SAMPLERS

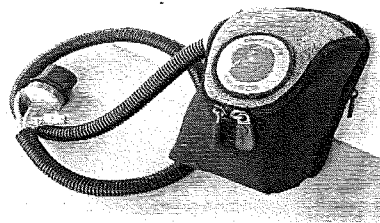
Lapel samplers are utilized at the ICP to sample the actual breathing zone of workers. They run at low flow rates and are able to continuously run for long periods of time dependant upon their battery supply.

Bladewerx Sabre BZM Lapel Sampler

Features:

The SabreBZM consists of a padded belt pack containing the electronics, battery and pump assemblies, and a detector head containing the detector, preamp, and a filter holder. An umbilical connects the detector head to the belt pack and houses the detector cable and vacuum line.

SabreBZM Operations Manual



The SabreBZM sample flow is estimated by monitoring the pump current. As the pump works harder, the pump current increases. The SabreBZM program monitors the current and converts the current into a flow. This relationship is *not* linear. As a result, a three-point flow calibration is used, with validation at a fourth flow rate.

Alarm Settings Dialog

This dialog is accessed through the Isotope page of the Instrument Options dialog. It allows configuration of the acute and chronic alarm set points for dose and concentration alarms.

Limitations:

Some PocketPC models draw relatively high current even when turned off and, depending upon the specific PocketPC model, will discharge the high capacity battery in as few as 2 days or may take as long as two weeks. It is recommended that you keep the SabreBZM plugged into its battery charger when it is not in use.

The BZM program and all configuration settings are maintained in the PocketPC.s battery-backed internal memory. Should the PocketPC battery become discharged, this information is lost and must be re-loaded.

The BZM has a wide range of capabilities to help the RCT monitor the workers breathing zone airborne concentration; expanded training will be given at facilities where the BZM is used.

SKC AirChek 2000 Pumps



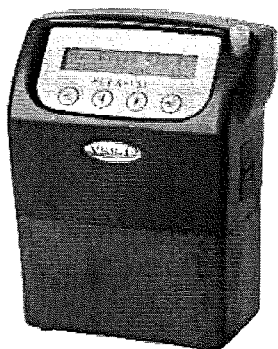
Expanded training will be given at the facilities where the SKC 2000 is used.

Features:

Programmable personal sample pump, with Ni-Cad battery.

Flow range: Constant flow 5-3,250 ml/min. Low flows from 5-500 ml/min require a low flow adapter kit.

Buck VSS-12 Lapel Air Sampler



Expanded training will be given at the facilities where the VSS-12 is used.

Features:

When used with accompanying “FastFive” charger, a fully charged battery can be attained in less than approximately 2 hours. The “FastFive” charger utilizes a high current charge rate which prevents the “memory problems” previously associated with Ni-Cad batteries.

Limitations:

The sampling pump must NOT be used in explosive atmospheres.

When used in wet environment, the sampling pump must be protected from the environment.

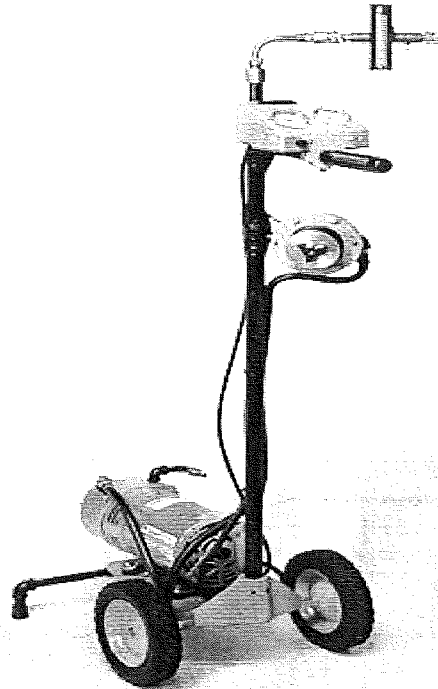
Goose Neck Air Samplers

Goose neck air samplers consist of long necked sampling tube connected to a motor air pump. The neck can be adjusted to sample air at the same height that it is breathed. These are also called giraffe air samplers.

Features

1. Telescoping sampling gooseneck permits easy adjustment to breathing zone levels.
2. Elapsed time meter and constant air flow rate permits calculation of accurate sample volume.
3. Unit mounted on wheels for easy movement.
4. Mounted air flow indicator (rotameter). The flow rate is adjustable from about 0.5 to 3.5 cfm.
5. An internal air filtering system installed between the regulator valve and the pump prevents particulates from causing excess wear of the motor air pump.

Radeco H-29A
Goose Neck Air Sampler



☞ 2.18.04 List the steps for a preoperational checkout of a portable air sampler.

PREOPERATIONAL CHECKOUT OF PORTABLE AIR SAMPLERS

ICP Specific Information

When performing a preoperational checkout of an air sampler, the RCT should:

1. Verify the air sampler has a current calibration sticker.
2. Check for physical damage
 - a. Power cord in good condition
 - b. All gaskets in place
 - c. General physical condition of housing and controls
3. Verify working condition
 - a. Verify sampler is operating properly by checking for sound (no unusual noises), sight (no smoke, no excessive sparking from motor brushes), smell (no burning), and feel (no unusual vibration, not overly hot to the touch).
 - b. Check the air flow to ensure it is pulling proper flow

- c. Ensure filters and cartridges are loaded in proper orientation to air flow prior to sampling
- d. Ensure controls on sampler are operable

☞ 2.18.05 Identify the physical and operational characteristics and the limitation(s) of beta-gamma constant air monitors (CAMs).

BETA-GAMMA CONTINUOUS AIR MONITORS (CAMs)

General Characteristics

- Continuously monitor quality of particulate beta-gamma airborne activity in selected area. A major problem is background, from both radon and ambient radiation.

Physical characteristics

- GM detector(s) are often used, usually pancake type. Some utilize one GM detector to measure activity on filter. Others utilize two GM detectors; one GM detector to measure activity on filter, and the other GM detector to measure ambient background for background subtraction. Some models use lead shielding to reduce background counts.
- Filter paper holder assembly may be in lead shield
- Strip chart recorder on older models
- Photohelic air flow meter on older models
- Possible alarms
 - High activity
 - Alert
 - Malfunction
 - Low flow

Limitations of CAMs

- Since CAMs have a low flow rate, in the event of a release of airborne radioactivity it will take a while for the activity on the filter to build up enough to alarm the CAM
- Poor response to low energy beta
- Even with the lead shielding, some ambient radiation will be seen as counts on the filter detector
- Responds to radon, thoron, and daughters which can produce a fluctuating background on recorder.
- Depending on the amount of lead shielding used, not very portable

Method of sampling

- Filtration

ICP Specific Information

Radiological Controls instrumentation technical manuals can be accessed for reference on the ICP intranet RadCon homepage.

The following information addresses some but not all of the specific CAMs used at ICP. However, CAMs not described herein will be addressed in facility-specific RCT training. General CAM operation characteristics are in a manner similar to the CAMs described here.

Eberline AMS-3 Beta Air Monitor

General Description

The AMS-3 is used to measure airborne beta activity. The filter sample and two detectors are contained inside a lead shield. The second detector is used for background subtraction, correcting the response of the AMS-3 for changes in ambient gamma radiation. Alarm features include a flashing red light and fast-ringing bell.

Specifications

Detectors: pancake Geiger-Mueller (GM) with 1.4 to 2.0 mg/cm² mica windows. The GM chambers are identical to those used in the HP-210 and HP-260 hand probes.

Shielding: Equivalent to 2 inches of lead.

Filter paper: 47 mm diameter filter paper should be used.

Range: Logarithmic scale from 10 to 100k counts per minute (cpm), count rate meter and recorder

Counting Efficiency: approximate efficiencies for the 47 mm-diameter standard plated sources are ⁹⁹Tc = 12% of 4 pi and ⁹⁰Sr-⁹⁰Y = 25% of 4 pi.

Ambient Gamma Response: approximately 200 cpm per mR/h of ⁶⁰Co. The subtraction circuit compensates for ambient gamma under normal conditions.

Operation Check

- Turn **power** switch on. The **power** indicator lamp should light and either the **Counting** or **Failure** lamp should light.
- Check the meter indication to see that background radiation is a low number. If an appreciable reading exists, it indicates that the detector is probably contaminated, is in a high gamma radiation field, or an electronic failure has occurred.

- Place a source into the detector filter holder. The meter should move upscale and stabilize. The actual reading should be the source value multiplied by the detector efficiency.
- Remove the source from the detector.

After the proper connections are made and an operational check is performed, the unit is ready for operation. Place a clean filter paper into the detector and turn on the pump. The alarm must be set to indicate if airborne contamination exists, yet not alarm on background radiation. There are two major sources of background radiation to which the detector will respond. These are:

- Naturally occurring radon daughter products in the air;
- External gamma radiation which penetrates the lead shield.

Natural background levels (from radon and thoron daughter products) vary considerably with location and weather conditions.

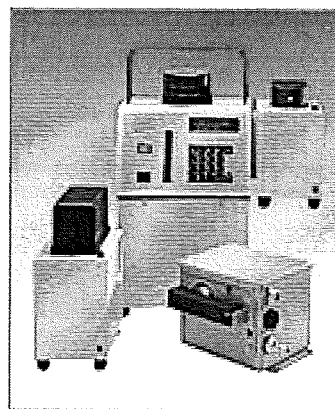
Preventive Maintenance

Always keep the instrument as dry as possible. It should never be exposed to rain, sleet, or snow or extreme temperatures. You also need to inspect the instrument for any physical damage that may have occurred.

Eberline AMS-4 Beta Particulate Monitor

Physical characteristics of the AMS-4 CAM

1. The Eberline AMS-4 CAM is a microprocessor-based radiation detection instrument designed for the detection and measurement of airborne beta emitting particulate matter.
2. It is smaller and much lighter than other beta CAMs used at the ICP. It is not as heavy because it does not have lead shielding around the detector. The problem of high ambient radiation levels is solved by sophisticated electronics.
3. It has two sealed gas-proportional detectors. One monitors the filter paper. It counts beta particles and alpha particles due to radon daughters. The other detector measures ambient gamma background.
4. Digital display
5. Sophisticated electronics
6. Alarm indication is a flashing red light and a tone rather than a fast-ringing bell.
7. The detector can be attached to the monitor or connected remotely. The remote detector head can operate up to 1000 feet away from the base unit.
8. The flow range is from 0.3 to 4 cfm. A RAP-1 motor air pump attached to the base unit pulls about 48 lpm (1.8 cfm).



Operating characteristics of the AMS-4 CAM.

1. Automatic subtraction of natural activity - The AMS-4 CAM adjusts for radon by using a separate computer-controlled threshold for alpha measurements. A proportional value of the alpha count rate is subtracted from the beta count rate.
2. Automatic subtraction of ambient gamma background (second detector)
3. DAC Calculation
 - a. The AMS-4 CAM provides direct concentration readouts (in DAC fraction and $\mu\text{Ci/cc}$) in addition to the traditional net beta count rate.
 - b. The display will show the airborne activity in DAC fraction. To do this, the CAM requires the following data: count rate, efficiency, flow rate, elapsed time, and the DAC for the isotope of concern (the Sr-90 DAC is used at the ICP). Using this data, the CAM automatically calculates the DAC fraction.
 - c. An airflow monitoring transducer measures the current flow rate through the sample head. This feature permits actual flow rates to be monitored continuously to support accurate determinations of concentrations. Additionally, an alert condition is sounded when there is a low airflow.
 - d. DAC-to-concentration unit conversion - A table of common isotopes as specified by 10 CFR Part 20 is included in the operating program to allow the user to specify the DAC-to-concentration unit conversion factor. This table also accommodates user-defined isotopic mixtures for site-specific conditions.
 - e. When the filter door is opened, counting is interrupted and the history is cleared. When the door closes, the channel counters are reset to zero and counting is restarted. When counting is restarted it takes 30 minutes (one slow alarm interval) to reach full statistical reliability.
 - f. If power is lost for more than 10 seconds, the history file is cleared.
4. Alarms – The setpoint for each of these alarms is adjustable.
 - a. Fast alarm concentration
 - b. Slow alarm concentration
 - c. Beta net count rate
 - d. Total DAC hours
5. Failure Indicators
 - a. Low flow alarm
 - b. Loss of detector signal
 - c. Failure of the real time clock
 - d. Noise (high voltage lines, etc.)

Limitations of the AMS-4 CAM.

1. Since the detector is not shielded, changes in the ambient radiation levels can cause troubles. Theoretically, ambient radiation levels, even when changing, should be subtracted out by the second detector. However, problems from false alarms due to changes in the ambient radiation levels have been reported in the field.
2. There is no strip chart. Strip charts are a handy way to review recent history and to document events. The AMS-4 CAM does log a history file, but the only way to access it is to connect the CAM to a computer or to a printer.
3. The sophisticated electronics makes some RCTs hesitant to use the CAM or quick to mistrust it.
4. When you first turn the AMS-4 CAM on, you may get a false alarm. It has to run for a few minutes to get a large enough volume of air to sample to reduce statistical fluctuations. Be sure to put in a clean filter when you first turn the CAM on.

The AMS-4 CAM display

1. During routine monitoring the display will show the following:
 - a. Green Ready light lit.
 - b. % Alarm (between 0% and 100%) – This display shows how close the instrument is to alarming. If the instrument is set to alarm at 1 DAC and the display shows 10%, the current activity level would be 0.1 DAC.
 - c. Main display shows current activity (in $\mu\text{Ci/cc}$ and in fraction of DAC).
2. Displayed Status Changes
 - a. During routine operation the AMS-4 CAM will update the display any time a status change occurs. The status change will remain posted on the display for several seconds, and then the previous information will once again be displayed.
3. In the event of a malfunction, the yellow Malfunction indicator will light and the cause of the malfunction will be displayed. Further information on the malfunction can be obtained by checking the current instrument operating status.

2.18.06 Identify the physical and operating characteristics and the limitation(s) of alpha constant air monitors (CAMs).

ALPHA CONTINUOUS AIR MONITORS (CAMs)

CAMs continuously monitor ambient air for the presence of airborne radioactive particulate contamination and can signal an evacuation alarm to personnel when a significant airborne release occurs.

The most important problem with all alpha CAMs is the detection of small amounts of contamination from alpha emitters, such as plutonium or americium, in the presence of a large background from natural radon and its daughters. These can be distinguished by pulse height analysis. Pu-239 emits a 5.15 MeV alpha. Am-241 emits a 5.47 MeV alpha. The radon daughters emit higher energy alpha particles of 5.99 MeV, 7.68 MeV, and 8.78 MeV.

Silicon semiconductor detectors are used to obtain good energy resolution. But the resolution is limited by the energy loss of the alpha particles emerging from the filter. Alphas emitted by radionuclides embedded deeper in the filter have to pass through more of the filter material than those near the surface, and therefore lose more energy. This energy loss produces a long tail on the low energy side of the peak. The low energy tail from the 5.99 MeV peak produces background in the region where the plutonium and americium would be detected. Most alpha CAMs have some method of subtracting this radon background.

ICP Specific Information

Radiological Controls instrumentation technical manuals can be accessed for reference on the ICP intranet RadCon homepage.

Eberline Alpha-6 CAM

The Alpha-6 is a continuous alpha air monitor that uses a 256-channel analyzer and a set of parameters and equations which accurately measure activity by subtracting out counts due to other radionuclides. In addition, the Alpha-6 archives historical data, checks for alarms, and responds to user commands.

The Alpha-6 is comprised of a detector assembly, a 256 channel analyzer, two 8-bit microprocessors, a dot matrix liquid crystal display, a keypad, air flow meter, two serial ports, a real-time clock, lithium battery, rotating beacon, fast-ringing bell, beeper, and external alarm and failure contacts.

By measuring the peak heights of specific isotopes, radon/thoron interference is minimized. The Alpha-6 may detect 4 DAC-hrs of Pu-239 in a typical radon/thoron background.

Detector: Solid State - Silicon semiconductor (diffused-junction type) with an area equal to 490 mm² and a diameter of 25 mm.

Counting Efficiency: Approximately 25% of 4 pi (gross count) from a plated one-inch diameter ²³⁹Pu source in a filter holder. The efficiency is about half that amount when an unmasked full diameter source is used in the large filter holder.

Air flow: The recommended flow rate is one CFM through the one inch diameter center of the filter paper. A mass airflow measurement system continuously measures flow in the range of 0.5 to 2.0 CFM with an accuracy of ±10%.

Background: The default Alpha-6 configuration is set up to measure the level of airborne ²³⁹Pu activity. The program uses an algorithm to accurately measure ²³⁹Pu in the presence of radon and thoron daughters.

Time constant: The CAM checks for both sudden and gradual increases in activity. Typical time constants are less than a minute for acute increases and about 30 minutes for gradual increases.

Alarm: There are six alarm setpoints which are defaulted to check for:

- Flow failure
- Excessive fluctuations in the background
- Sudden increase in plutonium activity
- Gradual plutonium increase
- Air flow out of limits
- Airborne Pu concentration above limit

Instrument Operation

The Alpha-6 presents the operator with two types of graphic displays. The first type is a spectrum display which presents the entire spectrum, or portions of the spectrum (called regions of interests). The second type simulates a strip chart and presents a graph of an alarm variable and its reference value versus time.

Eberline Alpha-6A

The Alpha-6A is similar to the Alpha-6 except that it is capable of:

- A variety of configurations
- PC interface for a series of CAMs
- Enhanced software options for measurement of other isotopes
- Communication ports, for hard copy printout and communication with remote devices.

SUMMARY

This lesson covered air sampling equipment in relation to types used, operational and physical characteristics, limitations, and methods of sampling. The RCT uses this information to identify and assess the hazards presented by airborne radioactivity and establish protective requirements for work performed in airborne radioactivity areas.