ADAMS Accession no. ML2120A396

Katanic, Janine

From: Troy Curnutt <nukemdude@gmail.com>
Sent: Thursday, May 13, 2021 8:24 PM
To: Katanic, Janine
Subject: [External_Sender] Troy Curnutt Consulting Leak Test Procedure
Attachments: Model Leak Test Program 5-12-2021.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Janine, it was great to talk to you on Tuesday. Your inspection revealed a weak Sealed Source Leak Test policy and procedure, although following my commitment.
Please see attached documentation that has been inserted into my policy and procedures.

Thank you for your time
Troy Curnutt
Troy Curnutt Consulting
3003 Lois Lane
Pocatello, ID 83201

Model Leak Test Program

Training

Before allowing an individual to perform leak testing, the licensee must ensure that he or she has sufficient classroom and on-the-job training to show competency in performing leak testing and sample analysis independently. Classroom training may be in the form of lecture, online, video, hands-on, or self-study and should cover the following subject areas:

- principles and practices of radiation protection
- radioactivity measurements, monitoring techniques, and instrument use
- mathematics and calculations used for measuring radioactivity
- biological effects of radiation Appropriate on-the-job-training consists of
- observing authorized personnel collecting and analyzing leak test samples
- collecting and analyzing leak test samples under the supervision, and in the physical presence of, an individual authorized to perform leak testing and sample analysis

Facilities and Equipment

- To ensure achieving the required sensitivity of measurements, analyze leak tests in a low-background area.
- Use a calibrated and operable survey instrument to check leak-test samples for gross contamination before they are analyzed.
- Analyze the leak-test sample using an instrument that is appropriate for the type of radiation to be measured [e.g., NaI(Tl) well-counter system for gamma emitters, liquid scintillation counters for beta emitters, and gas-flow proportional counters for alpha emitters].
- If the sensitivity of the counting system is unknown, the MDA should be determined. The minimum detectable activity (MDA) may be determined using the following formula:

$$MDA = \frac{2.71 + 4.65\sqrt{bkg \times t}}{t \times E}$$

where MDA = minimum detectable activity in disintegrations per minute (dpm)
bkg = background count rate in counts per minute (cpm)
t = background counting time in minutes
E = detector efficiency in counts per disintegration

For example: where bkg = 200 cpm
E = 0.1 counts per disintegration (10 percent efficient)
t = 2 minutes

$$MDA = \frac{2.71 + 4.65\sqrt{200 \text{ cpm} \times 2 \text{ minutes}}}{2 \times 0.1} = \frac{2.71 + 4.65\sqrt{400}}{0.2}$$

$$= \frac{2.71 + 4.65\sqrt{(20)}}{0.2} = \frac{2.71 + 93}{0.2} = \frac{95.71}{0.2}$$

$$= \frac{478.55 \text{ disintegrations}}{\text{Minute}}$$

$$\text{Becquerels(Bq)} = \frac{1 \text{ disintegrations}}{\text{Minute}}$$

$$MDA = \frac{478.55 \text{ disintegration}}{\text{minutes}} \times \frac{\text{minute}}{60 \text{ seconds}} = 7.976 \text{ Bq}$$

Note: The MDA equation shown assumes that counting times for the background measurement and for the sample will be equal. MDA equations for nonequal counting times, as well as derivations of equations and discussions of limitations, can be found in "Decommissioning Health Physics—A Handbook for MARSSIM Users," Eric W. Abelquist, published by Taylor & Francis Group, 2001.

Frequency for Conducting Leak Tests of Sealed Sources Leak tests will be conducted at the frequency specified in the respective Sealed Source and Device registration certificate. If a sealed source is not registered, leak tests should be conducted at 6-month intervals, unless a different interval is established during the licensing process. Leak testing of sealed sources may be required by license condition.

Leak Testing Kits Leak-test kits will contain

- for example, swabs, alcohol wipes, absorbent-tipped sticks, that are to be used to make the wipes on the specified sources or devices
- for example, envelopes, vials, where the leak-test sample will be placed after the sample has been taken
- step-by-step instructions for safe use of the particular kit (these instructions will be specific to the types of devices/sealed sources that the kit is designed)
- procedures for shipping the sample for analysis
- a label that contains the following information:
  - — customer's (or Company) name
  - — license number
  - — date leak test was taken
  - — source or device (by manufacturer, model number, nuclide and activity)
  - — the name of the individual who performed the leak test

Procedure for Performing Leak Testing and Analysis

- For each sealed source to be tested, list identifying information such as the manufacturer, model number, sealed source serial number, radionuclides, and activity of the sealed source.
- Use a radiation survey meter to monitor exposure.
- Prepare a separate wipe sample (e.g., cotton swab or filter paper) for each source.
- Number each wipe to correlate with identifying information for each source.
- Wipe the most accessible area where contamination would accumulate if the sealed source were leaking, but do not wipe the surface of a plated or foil source (see manufacturer's instructions).
- Select an instrument that is sensitive enough to detect 185 Bq [0.005 microcuries] of the radionuclide contained in the sealed source.
- Check the instrument's counting efficiency using a standard source of the same radionuclide as the source being tested or one with similar energy characteristics. The calibration source should be in the same configuration as the sample. Accuracy of standards should be within plus or minus 5 percent of the stated value and traceable to primary radiation standards such as those maintained by the National Institute of Standards and Technology.

Calculate the counting efficiency of the detector.

$$\text{Efficiency in cpm/Bq} = \frac{[(\text{cpm from std}) - (\text{cpm from bkg})]}{\text{activity of std in Bq}}$$

where cpm = counts per minute std =
standard bkg= background
Bq = becquerel

- Count each wipe sample and determine the net count rate.

• For each sample, calculate and record estimated activity in Bq (or microcuries). The activity of the sample in becquerels may be calculated using the following formula:

Activity of sample [Bq] = [(cpm from wipe sample) - (cpm from bkg)] e efficiency in cpm/Bq

• Sign and date the list of sources, data, and calculations. Retain records for 3 years [under Title 10 of the Code of Federal Regulations (10 CFR) 20.2103(a)].

. • If the wipe test activity is 185 Bq [0.005 microcurie] or greater, notify the radiation safety officer, so that the source can be withdrawn from use and disposed of properly. Also notify the U.S. Nuclear Regulatory Commission

BioRx is our proprietary software that performs the actions automatically as described above.

Specific testing procedure for Troy Curnutt Consulting

- record all results in BioRx
    - login to BioRx – Hot Lab
    - Sealed Source Leak Test or Sealed Source Leak Test Multiple
    - Choose facility where source/s you are leak testing
    - Enter date and time
    - Enter meter you are using for leak sample/s
    - Enter wipe sample that you are testing in the well chamber
    - Count source for 1 minute and enter number in Readings
    - Remove sample and if no contamination exists, discard in regular trash
    - With nothing in the well chamber, count background and record in the background section
    - Repeat 3 times
    - Upon completion, enter your name or drop down and select your name in the Name Line
    - Enter your title on the next line
    - Make sure the box Print Results on Save is selected
    - Select Save & Close(F3)
    - Give to the RSO for review and filing