

NEW YORK STATE DEPARTMENT OF HEALTH
BUREAU OF ENVIRONMENTAL RADIATION PROTECTION
RADIATION GUIDE 10.9 REVISION 1
GUIDE FOR THE PREPARATION OF APPLICATIONS
FOR LICENSES TO USE RADIOACTIVE MATERIALS
IN CALIBRATING RADIATION SURVEY AND MONITORING INSTRUMENTS

A. Purpose of Guide

This guide describes the information needed by the New York State Department of Health staff to evaluate an application for a specific license to possess and use radioactive material for calibration of radiation survey and monitoring instruments.

The applicant should carefully study the regulations and this guide, and should submit all information requested. The Department will request additional information when necessary to provide reasonable assurance that the applicant has established an adequate radiation safety program. Such requests will delay final action on the application.

1. Purpose of Appendices to Guide

The regulations require that the licensee develop and implement procedures that will ensure compliance with the regulations. Appendices A through E to this guide describe model radiation safety procedures. Each applicant should carefully read the applicable regulations and model procedures and adopt them as written whenever possible. If you are unable to adopt a particular procedure as written submit a copy of the procedure in the guide with your changes indicated in red ink. You must keep copies of these procedures with the license document when it is issued since they will be made a part of the license.

B. Applicable Regulations

All regulations pertaining to this type of license are found in Title 10, Chapter 1, Part 16 of the New York Code of Rules and Regulations (10 NYCRR 16). Chapter 1 is entitled "State Sanitary Code" and Part 16 is entitled "Ionizing Radiation." The statutory authority for the rules and regulations is found in the New York State Public Health Law, Section 225.

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- (b) Return any sealed sources or devices to the manufacturer in accordance with the manufacturer's specific packaging and shipping instructions.
 - (c) Describe any other methods you will use and demonstrate their compliance with the regulations.
18. Not applicable.
 19. Not applicable.
 20. Not applicable.
 21. Not applicable.
 22. Other Procedures and Precautions - Describe your procedures for calibration of survey and monitoring equipment, including calibration of pocket dosimeters. Appendix C contains a model procedure. State that you will follow the model procedure or submit a copy of the Appendix with your changes indicated in red ink.

Indicate what the maximum exposure levels will be in unrestricted areas adjacent to facilities used for calibration. Also indicate what exposures to calibration personnel are expected and means of shielding personnel during calibration procedures.

- Leak-Testing of Sealed Sources - Describe your procedure for leak-testing sealed sources are required by Section 16.10 (a) (4), New York State Sanitary Code, (10 NYCRR 16). Appendix B to this Guide contains a model procedure. Submit a statement that you will adopt this particular Appendix, or submit a copy of the model procedure with your changes indicated in red ink. If an outside service analyzes leak-test samples submit a statement that the service will be performed by persons licensed to do so by the U.S. Nuclear Regulatory Commission or an Agreement State and that a copy of this license will be kept on file with the leak-test reports.
23. Personnel Monitoring Program - Appendix E to this Guide contains a model procedure. State that you will follow the model procedure or submit a copy of the Appendix with your changes indicated in red ink.
 24. Not applicable.
 25. Not applicable.
 26. Certificate - The application should be signed by the President, or Chief Executive Officer. Identify the title of the office held by the individual who signs the application.

APPENDIX A

MODEL PERSONNEL TRAINING PROGRAM

It may not be assumed that safety instruction has been adequately covered by prior training at other institutions, even experienced professionals will need instruction in your institution's procedures and the conditions of your license. Ancillary personnel (e.g., clerical, housekeeping, security) whose duties may require them to work in the vicinity of radioactive material (whether escorted or not) need to be informed about radiation hazards and appropriate precautions. A training program that provides necessary instruction should be written and implemented.

MODEL PROGRAM

Personnel will be instructed:

1. Before assuming duties with, or in the vicinity of, radioactive materials.
2. During annual refresher training.
3. Whenever there is a significant change in duties, regulations, or the terms of the license.

Instruction for individuals in attendance will include the following subjects:

1. Applicable regulations and license conditions.
2. Areas where radioactive material is used or stored.
3. Potential hazards associated with radioactive material in each area where the employees will work.
4. Appropriate radiation safety procedures.
5. Licensee's in-house work rules.
6. Each individual's obligation to report unsafe conditions to the Radiation Safety Officer.
7. Appropriate response to emergencies or unsafe conditions.
8. Worker's right to be informed of occupational radiation exposure and bioassay results.
9. Locations where the licensee has posted or made available notices, copies of pertinent regulations, and copies of pertinent licenses and license conditions (including applications and applicable correspondence), as required by Section 16.13, New York State Sanitary Code (10 NYCRR 16).

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Records that Document Training:

Records of initial and refresher training will be maintained for five years and will include:

1. the name of the individual who conducted the training;
2. the names of the individuals who received the training;
3. the dates and duration of the training session; and
4. a list of the topics covered.

APPENDIX B

INSTRUMENTATION

1 Survey meters

a. Manufacturer's name _____

Manufacturer's model number _____

Number of instruments available _____

Minimum range _____ mR/hr to _____ mR/hr

Minimum range _____ mR/hr to _____ mR/hr

b. Manufacturer's name _____

Manufacturer's model number _____

Number of instruments available _____

Minimum range _____ mR/hr to _____ mR/hr

Maximum range _____ mR/hr to _____ mR/hr

c. Manufacturer's name _____

Manufacturer's model number _____

Number of instruments available _____

Minimum range _____ mR/hr to _____ mR/hr

2. Other instruments used for quantitative measurement procedures (e.g., liquid scintillation counter, well counter, velocimeter)

<u>Type of Instrument</u>	<u>Manufacturer's Name</u>	<u>Model No.</u>
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APPENDIX C

MODEL PROCEDURE FOR CALIBRATING SURVEY INSTRUMENTS

Radiation survey meters should be calibrated with a radioactive source. Electronic calibrations are not acceptable. Survey meters must be calibrated at least annually and after servicing. (Battery changes are not considered "servicing.")

Model Procedure

1. The source must be approximately a point source.
2. Either the apparent source activity or the exposure rate at a given distance must be traceable by documented measurements to a standard certified within 5 per cent accuracy the the National Bureau of Standards.
3. A source that has the same photon energy as the environment in which the calibrated device will be employed should be used for the calibration.
4. The source should be of sufficient strength to give an exposure rate of about 30 mR/hr at 100 cm. Minimum activities of typical sources are 85 millicuries of cesium-137, 21 millicuries of cobalt-60, and 34 millicuries of radium-226.
5. The inverse square law and the radioactive decay law must be used to correct for change in exposure rate due to changes in distance or source decay.
6. A record must be made of each survey meter calibration.
7. A single point on a survey meter scale may be considered satisfactorily calibrated if the indicated exposure rate differs from the calculated exposure rate by less than 10 per cent.
8. The following three kinds of scales are frequently used on survey meters:
 - a. Meter on which the user selects a linear scale must be calibrated at no less than two points on each scale. The points should be at approximately 1/3 and 2/3 of full scale.
 - b. Meters that have a multi-decade logarithmic scale must be calibrated at no less than one point on each decade and no less than two points on one of the decades. Those points should be at approximately 1/3 and 2/3 scale.
 - c. Meters that have an automatically ranging digital display device for indicating rates must be calibrated at no less than one point on each decade and at no less than two points on one of the decades. Those points should be approximately 1/3/ and 2/3 of the decade.

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9. Readings above 1,000 mR/hr need not be calibrated. However, such scales should be checked for operation and approximately correct response.
10. At the time of calibration, the apparent exposure rate from a built-in or owner-supplied check source must be determined and recorded.
11. The report of a survey meter calibration should indicate the procedure used and the data obtained. The description of the calibration will include:
 - a. The owner or user of the equipment.
 - b. A description of the instrument that includes manufacturer, model number, serial number, and type of detector.
 - c. A description of the calibration source, including exposure rate at a specified distance on a specified date.
 - d. For each calibration point, the calculated exposure rate, the indicated exposure rate, the deduced correction factor (the calculated exposure rate divided by the indicated exposure rate), and the scale selected on the instrument.
 - e. The reading indicated with the instrument in the "battery check" mode (if available on the instrument).
 - f. The angle between the radiation flux field and detector (for external cylindrical GM or ionization-type detectors, this will usually be "parallel" or "perpendicular" indicating photons traveling either parallel with or perpendicular to the central axis of the detector. For instruments with internal detectors, this should be the angle between the flux field and a specified surface of the instrument.
 - g. For detectors with removable shielding, an indication of whether the shielding was in place or removed during the calibration procedure.
 - h. The apparent exposure rate from the check source.
 - i. The name of the person who performed the calibration and date on which the calibration was performed.

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12. The following information will be attached to the instrument as a calibration sticker or tag:
 - a. The source that was used to calibrate the instrument.
 - b. The proper deflection in the battery check mode (unless this is clearly indicated on the instrument).
 - c. For each scale or decade, one of the following as appropriate:
 - 1) the average correction factor;
 - 2) a graph or graphs from which the correction factor for each scale or decade may be deduced; or
 - 3) an indication that the scale was checked for function but not calibrated, or an indication that the scale was inoperative.
 - d. The angle between the radiation flux and the detector during the calibration.
 - e. The apparent exposure rate from the check source.

NOTE: One-word reminders or symbols that are explained on the Survey Meter Calibration report may be used on the calibration sticker.

On the following page is a form you may want to use.

APPENDIX D

MODEL PROCEDURE FOR LEAK-TESTING SEALED SOURCE

Model Procedure

1. Make a list of all sources to be tested. This should include at least the isotope, the activity on a specified date, and the physical form.
2. If you will be testing high-activity sources, set out a survey meter, preferable with a speaker, so you can monitor your exposure rate.
3. Prepare a separate wipe sample for each source. A cotton swab, injection prep pad, filter paper, or tissue paper is suitable. Number each wipe so you will know for which source it is to be used. Samples should be taken as follows:
 - a. For small sealed sources, it is easiest to wipe the entire accessible surface area. Pay particular attention to seams and joints. However, do not wipe the port of beta applicators.
 - b. For larger sealed sources and devices (survey meter calibrator, irradiators), take the wipe near the radiation port and on the activating mechanisms.
 - c. If you are testing radium sources, they should also be checked for radon leakage. This can be done by submerging the source in a vial of fine-grained charcoal or cotton for a day. Then remove the source and analyze the absorbent sample as described below. A survey should be done to be sure the sources are adequately shielded during the leak-test period.
4. The samples will be analyzed as follows:
 - a. Select a suitable detector that is sufficiently sensitive to detect 0.005 microcuries. For beta sources, a proportional flow counter, liquid scintillation counter, or thin-end-window GM survey meter may be appropriate. For gamma sources, a crystal with a ratemeter or scales or a GM survey meter may be appropriate.
 - b. Assay a check source that has the same isotope as the sealed source and whose activity is certified by the supplier. If one is not available, it will be necessary to use a certified check source with a different isotope that has a similar spectrum in order to estimate the detection efficiency of the analyzer used to assay the wipe samples.
 - c. Assay the wipe sample. It must be in the same geometry relative to the detector as was the certified check source.

- d. Calculate the estimated activity in microcuries on the wipe sample.
- e. Continue same analysis procedure for all wipe samples.
- f. If the wipe sample activity is 0.005 microcuries or greater, notify the RSO. The source must be withdrawn from use to be repaired or disposed of and the Health Department must be notified.
- g. Record the wipe sample results on the list of sources, and sign and date the list.

APPENDIX E

MODEL PERSONNEL EXTERNAL EXPOSURE MONITORING PROGRAM

Personnel monitoring devices should be provided for individuals who are exposed to sources of whole-body radiation, or who handle millicurie quantities of energetic beta or gamma-emitting radionuclides.

Model Program

1. The Radiation Safety Officer will promptly review all exposure reports to look for workers or groups of workers whose exposure is unexpectedly high or low. This procedure does not apply to backup monitor records (e.g., pocket ionization chamber, when the monitor of record is a film or TLD).
2. All individuals who are occupationally exposed to radiation on a regular basis will be issued a film or TLD whole body monitor that will be processed by a contract service on a monthly basis. This service must be accredited under NVLAP (a voluntary program for determining that a dosimetry service meets ANSI standards).
3. All individuals who handle radioactive material on a regular basis will be issued a film or TLD finger monitor that will be processed by a contract service on a monthly basis.
4. All individuals who are occupationally exposed to radiation on an occasional basis will consult with the Radiation Safety Officer concerning personnel monitoring before using radioactive materials.
5. Other individuals who are exposed to radiation on an occasional basis, such as security personnel who deliver packages, will not normally be issued exposure monitors.