GUIDE
FOR THE PREPARATION
OF APPLICATIONS FOR A
KENTUCKY RADIOACTIVE MATERIAL
LICENSE FOR LABORATORY USERS

RADIATION CONTROL BRANCH
CABINET FOR HEALTH SERVICES
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(Revised 1/98)
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I. INTRODUCTION

A. Purpose of Guide

This guide describes the information needed to evaluate an application for specific licenses for the possession and use of radioactive material for limited laboratory use. This guide also provides assistance in preparing applications for license amendments, license renewals and license termination. Before proceeding further, the applicant should determine if the facility's needs are in excess of the quantities specified in 902 KAR 100:080 (Appendix A). Quantities below those listed in Appendix A are exempt pursuant to 902 KAR 100:045, Section 3(6).

There is no single portion of the Kentucky Radioactive Material Regulations which specifically address laboratory use of radioactive material. Therefore, this guide is intended to provide you with information that will clarify more general regulatory requirements and licensing policies as they apply to laboratories. Licensing guides are issued to describe the methods acceptable to Radiation Control for implementing the Cabinet's regulations, to outline techniques used by the staff in evaluating specific problems, and to provide guidance to applicants. The information in this guide is not a substitute for training in radiation safety or for developing and implementing an effective radiation safety program. However, you should be aware that if your application references procedures in this guide, those procedures become a part of your licensing conditions and is, therefore a regulatory requirement.

After you are issued a license, you must conduct your program in accordance with (1) the statements, representations, and procedures contained in your application and other correspondence with Radiation Control, (2) the terms and conditions of the license, and (3) applicable regulations as discussed below. All information you provide in your application, therefore, must be clear, specific and accurate.

B. Applicable Regulations

In addition to the contents of this guide, applicants should refer to the requirements in the Cabinet's regulations listed below. The applicant should carefully read the regulations. This guide does not substitute for an understanding of the regulations. It is your responsibility as an applicant and licensee to have copies, read and abide by each regulation.

1. 902 KAR 100:010 "Definitions"
2. 902 KAR 100:012 "Fee Schedule"
3. 902 KAR 100:015 "General Requirements"
4. 902 KAR 100:019 "Standards for Protection Against Radiation"
5. 902 KAR 100:021 "Disposal of Radioactive Material"
6. 902 KAR 100:030 "Quantities of Radioactive Material Requiring Labeling"
7. 902 KAR 100:035 "Receiving Radioactive Material and Special Form Tests"
8. 902 KAR 100:040 "General Provisions for Specific Licensees"
9. 902 KAR 100:060 "Leak Testing"
10. 902 KAR 100:165 "Notices, Reports, and Instructions to Workers"

II. LICENSE FEES

A fee is required for a radioactive material license, renewals and amendments. The applicant should refer to 902 KAR 100:012, "Fee Schedule" to determine the amount of fee that must accompany the application. Review of the application will not begin until the proper fee is received. The fee, in the form of a check or money order made payable to the Kentucky State Treasurer, should be submitted with the application to Radiation Control.

III. FILING AN APPLICATION

An application for a license to possess and use radioactive material should be filed on Form RPS-7, "Application for Radioactive Material License." Since the space provided on the application form is limited, the applicant should attach additional sheets to provide complete information. Each separate sheet or document submitted with the application should be identified and keyed to the item number on the application to which it refers.

Two (2) copies of the application should be completed. The original should be mailed to the Radiation Control Branch, Cabinet for Health Services, 275 East Main Street, Frankfort, Kentucky 40621. Since the license will require, as a condition, that the licensee follow the statements and representations set forth in the application and any supplements to it, one copy of the application, with all attachments, should be retained by the applicant.

IV. INFORMATION TO BE SUBMITTED

The information submitted should pertain to the specific activities for which authorization is requested and should be as complete and detailed as possible. Submission of incomplete information will result in delays because of the correspondence necessary to obtain supplemental information. The submitted information must be sufficient to allow the Cabinet to determine that the proposed equipment, facilities, procedures, and controls are adequate to protect health and minimize danger to life and property.

Item 1 - Applicant's Name and Mailing Address

The applicant corporation or other legal entity should be specified by name and mailing address in Item 1. Individuals should be designated as the applicant only if they are acting in a private capacity and the use of radioactive material is not connected with their employment with a corporation or other legal entity.

Item 2 - Street Address(es) at Which Radioactive Material Will Be Used

If the actual locations where the radioactive materials will be possessed, stored, and/or used is different than listed in Item 1 or a post office box appears in Item 1, identify the street address, city, and zip code. If use is to be at more than one location, the specific address of each should be given. Describe the extent of use and the facilities and equipment at each location.

Item 3 - Telephone Number

Indicate the telephone number of the applicant.

Item 4 - Person to be Contacted

Indicate the person to be contacted regarding the application and to be listed as the person to whom correspondence should be addressed. This individual should know your proposed program and be able to answer questions regarding the application. A change in the contact person requires notification to the Cabinet but is not considered an application for amendment; therefore no fee is required.

Item 5 and 13 - Individual User(s) and Training

List the individual(s) and title(s) who will use and/or supervise the use of radioactive material. Complete Appendix B for the Radiation Safety Officer and each authorized user.

The qualifications, training, and experience of each person should be commensurate with the material and its use as proposed in the application. The amount and type of training and experience with radiation and radioactive materials required to support a determination of adequacy of training and experience by the Cabinet will vary with certain factors such as authorizations requested in the applications, activity of radioactive material to be used in a single operation, etc.

If other persons such as technical assistants and laboratory workers will use radioactive materials in the absence of persons specified above, the specification of the training of such personnel should include (a) instruction in radiation safety including topics covered and by whom taught, (b) on-the-job training in use of radioactive materials, and (c) determination of competency to work without the presence of supervisory personnel. The use of microcurie quantities of nonvolatile radioactive materials by a person with a minimum of training and experience under controlled conditions may be justified provided it is done under the surveillance of a radiation safety officer. Such minimum training and experience may consist of a few hours of training and experience in the use of one or more radioactive materials similar to the use proposed in the application under the supervision and tutorship of a licensed user.

Persons using millicurie quantities of a number of radionuclides for general laboratory tracer work under unspecified conditions should have more extensive training and experience and, depending on the exact nature of the proposed use of radionuclides, may need to have completed formal course work at the college or university level covering the areas listed in Appendix B.

The use of larger quantities of material (approaching a curie) under conditions where a potential exists for significant loss and ingestion, inhalation, or absorption of the radioactive material by those working with the material is normally done under carefully controlled conditions using specialized equipment. A person who is to use radioactive

materials independently under these conditions would not only have a background of formal training in all areas described in Appendix B but should also have extensive

experience working with radioactive material and a thorough working knowledge of the equipment required to handle the material safely.

Item 6 - Radiation Safety Officer

Identify the name and title of the person designated by and responsible to the facility and management as the Radiation Safety Officer (RSO). The RSO is normally an individual user, supervisor, or other individual who will maintain the license and have overall responsibility for the radiation protection program. The applicant should detail the named individual's duties and responsibilities in Item 12. He must be trained and experienced in radiation protection and in the use and handling of radioactive materials.

The RSO needs independent authority to stop operations that he or she considers unsafe. The RSO also needs sufficient time and commitment from management to fulfill certain duties and responsibilities to ensure that radioactive materials are used in a safe manner by authorized individuals.

Provide management's commitment that the RSO has independent authority to stop unsafe operations and will be given sufficient time to fulfill his/her radiation safety duties and responsibilities, including oversight of radiation safety at all use/storage locations. Provide a description of the methods and checks management will use to assure that the RSO has current copies of the regulations, reviews all new and revised regulations, and makes changes, as needed, in licensee procedures to comply with the regulations. Provide a copy of an organizational chart that shows the RSO position to demonstrate that the RSO has sufficient independence and direct communication with responsible management officials.

Item 7 - Licensed Material

List each radionuclide to be used and specify the particular nuclides to be licensed for use by each individual named in Item 5.

Describe the chemical and/or physical form and activity in millicuries or microcuries of each radionuclide to be possessed at any one time. A separate possession limit for each chemical and/or physical form should be specified. Possession limits requested should cover the total anticipated inventory including stored materials and waste and should be commensurate with the applicant's needs and facilities for safe handling.

If the use of sealed or plated sources is contemplated, the manufacturer, model number and activity of each sealed or plated source should also be specified.

Describe and key the intended use of each radionuclide and form listed in Subitems A through D. If the source is in the form of a sealed source and used in a gas chromatograph, gauge, or other device, the manufacturer and the model number of the device should be specified.

Item 8 - Radiation Detection Instruments

Specify for each radiation detection instrument, the manufacturer's name and model number, the number of each type of instrument available, the type of radiation detected (alpha, beta, gamma, or neutron), the sensitivity range (milliroentgens per hour or counts per minute), the window thickness in mg/cm2, and the type of use.

Item 9 - Calibration of Radiation Detection Instruments

Specify the calibration procedure for each radiation detection instrument listed in Item 8. State the frequency and describe the methods and procedures for instruments used in the radiation protection program.

Survey instruments should be calibrated at least annually and cannot be performed with built-in check sources. Therefore, indicate an organization that is specifically licensed by the Cabinet, the U.S. Nuclear Regulatory Commission or an Agreement State to calibrate survey instruments and the license number under which the calibrations will be performed.

Item 10 - Personal Monitoring Devices

Personnel monitoring is required to ensure compliance with Sections 3 and 13 of 902 KAR 100:019. The name of the organization furnishing film badge or thermoluminescence dosimeter (TLD) service and the frequency for changing badges, dosimeters, etc., should be specified. A monthly exchange is required for film badges. TLD's may be exchanged every three (3) months.

If personnel monitoring will not be used, the applicant should submit calculations or documentation from radiation surveys demonstrating that it is unlikely that any individual will receive a dose equal to or greater than indicated in 902 KAR 100:019, Section 13, to require monitoring.

Item 11 - Facilities and Equipment

The facilities and equipment for each site of use should be described in detail. The proposed facilities and equipment for each operation to be conducted should be adequate to protect health and minimize danger to life and property. In describing available facilities and equipment, the following should be included, as appropriate:

(a) A drawing or sketch of the physical plant, laboratory, or working area facilities. Identify fume hoods, glove boxes, waste receptacles, special sinks, ventilation and containment systems, effluent filter systems. All processing, work, and protective clothing change areas should be described. The location of all such equipment and the relationship of areas where radioactive materials will be handled to unrestricted areas where radioactive materials will not be handled should be included. In those programs where radioactive material may become airborne, or may be included in airborne effluents, the drawing or sketch should also include a schematic description of the ventilation system annotated to show airflow rates, differential pressures,

filtration, and other effluent treatment equipment, and air and effluent monitoring instruments. Drawings or sketches should be drawn to a specified scale, or dimensions should be included. Label each drawing or sketch to specify the location

of the facilities and equipment depicted with respect to the addresses given in Item 2 of Form RPS-7.

(b) Containers, devices, protective clothing, auxiliary shielding, general laboratory equipment, air sampling equipment, etc., actually employed in the daily use of material. Special provisions for shielding and containment to minimize personnel exposure should be described. Storage containers and facilities should provide both shielding and security for materials.

(c) The number, type, and length of remote handling devices.

(d) Follow the provisions of KAR 100:019, Sections 6 and 19 and submit appropriate information if respiratory protective equipment will be used to limit the inhalation of airborne radioactive material. This equipment must be certified by the National Institute for Occupational Safety and Health/Mine Safety and Health Administration (NIOSH/MSHA).

Item 12 - Radiation Protection Program

A Radiation Protection Program should be developed in the form of written procedures covering all aspects of the use of radioactive material. The procedures should include:

(a) Survey Program. Cabinet regulations require that surveys be made to determine if radiation hazards exist in a facility in which radioactive materials are used or stored (see 902 KAR 100:019, Section 12). Surveys include the evaluation of external exposure to personnel, concentrations of airborne radioactive material in the facility, and radioactive effluents from the facility. Although a theoretical calculation is often used to demonstrate compliance with regulations regarding airborne or external radiation, it cannot always be used in lieu of a physical survey.

Except for those cases where sources of radiation and radioactive material are well known and accurately and precisely controlled, it will usually be necessary that a physical survey be made with appropriate detection and measurement instruments to determine the nature and extent of radiation and radioactive material or, as a minimum, confirm the results of a theoretical determination.

Appendix C is included, as a convenience to the applicant in establishing an acceptable survey program. If the applicant does not wish to utilize the Appendix C standard survey program, the applicant must submit a survey program including the following surveys:

(1) In laboratory or plant areas (e.g., checking for contamination on bench tops, handling and storage equipment, clothing, and hands).

(2) While work is being done with radiation or radioactive materials (e.g., breathing zone air surveys; general air surveys; personnel exposure measurements, including eyes and extremities).

(3) In areas associated with disposal or release of radioactive materials (e.g., checking disposal containers and disposal sites; liquid, gas, and solid effluents, filters and filter-duct systems).

The frequency of surveys will depend on the nature of the radioactive materials and their use. However, surveys should be performed prior to the use of radioactive materials in

order to establish a baseline. The surveys should be repeated when radioactive materials are present and changes in the use, location, or control of radioactive materials occur.

For operations involving radioactive materials in gas, liquid, or finely divided forms, the survey program must be designed to monitor the adequacy of containment and control of the materials involved. The program must include air sampling, monitoring of effluents, and surveys to evaluate contamination of personnel, facilities, and equipment. Physical effluent measurements are essential to determine compliance with 902 KAR 100:019, Section 44.

The description of an air sampling program must include the area where samples will be taken, the frequency of sampling, and the location of the sampler with respect to workers' breathing zones. Assays performed to evaluate air samples and the methods used to relate results to actual personnel exposures must also be described.

The effluent monitoring program for releases to unrestricted areas should encompass all airborne and liquid radioactive material releases. Theoretical evaluations should be supplemented by stack monitoring, water sampling, and other environmental monitoring appropriate for the planned and potential releases.

For operations involving only sealed sources, such as fixed gauges, external radiation surveys must be made for both storage/off and use/on configurations at time of installation. Supplemental surveys should be performed following any changes in operation, shielding, or use.

The types, methods, and frequency of surveys should be described in the application. Guidance may be obtained from the National Council on Radiation Protection Report (NCRP) No. 57, "Instrumentation and Monitoring Methods for Radiation Protection", and the International Atomic Energy Agency's (IAEA) Technical Report Series No. 120, "Monitoring of Radioactive Contamination on Surfaces."

Copies of the NCRP report may be obtained from NCRP Publications, 7910 Woodmont Avenue, Suite 800, Bethesda, Maryland 20814.

Copies of the IAEA report may be obtained from UNIPUB, Inc., P.O. Box 433, New York, N.Y. 10016.

(b) Records Management Program. Complete and attach Appendix D, which defines required records for laboratory and industrial use of small quantities of radioactive material. Attach to the application a sample of each record form used in the radiation safety program.

(c) Leak Test Program. Sealed or foil sources containing more than 100 microcuries of a beta or gamma emitter or more than 10 microcuries of an alpha emitter must be leak tested at 6-month intervals. Leak testing of alpha-particle-emitting sources containing more than 10 microcuries of an alpha emitter is required to be leak tested at 3-month
intervals. If a commercial firm is to perform the leak tests, the name, address, and license number of the firm should be submitted. If the tests are to be performed using a commercial "kit", the name of the manufacturer or distributor and the processor of

the kit should be given. If the applicant intends to perform his own leak tests without the use of a commercial kit, the following information must be submitted:

(1) Qualifications of personnel who will perform the leak test,
(2) Procedures and materials to be used in taking test samples,
(3) The type, manufacturer's name, model number, and radiation detection and measurement characteristics of the instrument to be used for assay of test samples,
(4) Instrument calibration procedures, including calibration source characteristics, make, and model number, and
(5) The method, including a sample calculation, to be used to convert instrument readings to units of activity, e.g., microcuries.

(d) Ordering and Receiving Packages. Appendix E is an example of acceptable procedures for ordering and receiving packages. If the applicant does not wish to utilize Appendix E, the applicant must submit equivalent ordering and receiving procedures as an attachment to the license application. For guidance in composing such procedures, consult Appendix E and 902 KAR 100:035.

(e) Opening Packages. Appendix F is included for the convenience of the applicant in establishing acceptable procedures for opening packages. If the applicant does not wish to utilize Appendix F, the applicant must submit equivalent opening procedures as an attachment to the license application. For guidance in composing such procedures, consult Appendix F and 902 KAR 100:035.

(f) Emergency Procedures. Appendix G is included as a guide to the applicant in establishing acceptable emergency procedures. If the applicant does not wish to utilize Appendix G, then detailed emergency procedures equivalent to Appendix G must be submitted as an attachment to the license application. For guidance in composing acceptable emergency procedures see Appendix G and also Subpart (g) of Item 12.

(g) Instructions of Personnel. Appendices H and I are provided as a convenience to the applicant in establishing an acceptable training program for radiological and non-radiological workers. If the applicant does not wish to utilize these standard appendices, an equivalent description of the personnel training program must be submitted with the application as an attachment. The instructions must include, but not necessarily be limited to:

(1) The availability, selection, and use of laboratory apparel and safety-related equipment and devices, (e.g., laboratory coats, gloves, and remote pipetting devices).

(2) Limitations and conditions to be met in handling liquid or uncontained (unencapsulated, dispersible, or volatile) radioactive materials and special laboratory equipment required for working with these types of materials. For example, the instructions should explain when operations with materials must be confined to a radiochemical fume hood or glove box and must specify the use of appropriate shielding and remote handling equipment when energetic beta or gamma-emitting materials are to be used.

(3) The performance of radiation survey and monitoring procedures for each area in which radioactive materials are to be used.

(4) Safety precautions required for the movement of radioactive materials between buildings, rooms, and areas within rooms.

(5) Safety requirements for storage of radioactive materials, including labeling of containers of radioactive materials and posting and securing areas where radioactive materials are to be stored. This should include the storage of contaminated laboratory equipment such as glassware.

(6) Requirements for posting of areas in which radioactive materials are used.

(7) The availability and use of personnel monitoring devices, including the recording of radiation exposures and the procedures required for the processing of personnel monitoring devices such as thermoluminescent dosimeters and film badges in order to obtain personnel monitoring results.

(8) Waste disposal procedures required, including limitations on the disposal of liquid or other dispersible waste to the sanitary sewer and procedures for the collection, storage, and disposal of other wastes.

(9) The maintenance of appropriate records as required by 902 KAR 100:040 and 902 KAR 100:019.

(10) The requirements for and the method of performing or having appropriate sealed-source leak tests performed.

(11) Good radiation safety practices, including the control of contamination, specification of acceptable removable and fixed contamination levels for both restricted and unrestricted areas, prohibition of smoking and the consumption of food or beverages in areas where radioactive materials may be used, and prohibition of the frequent transfer of potentially contaminated equipment between potentially contaminated areas and unrestricted areas.

(12) The use of radioactive material in animals. If radioactive materials will be used in animals, instructions concerning such use should be prepared and submitted with the license application. Such instructions should include (a) specification of the facilities to be used to house the animals; (b) instructions to be provided to animal caretakers for handling animals, animal wastes, and

carcasses; (c) instructions to appropriate personnel for cleaning and decontaminating animal cages; and (d) methods to be used to ensure that animal rooms will be locked or otherwise secured unless attended by authorized users of radioactive materials. A description of animal handling and housing facilities should be included under Item 11.

(13) Emergency procedures. These instructions must be addressed to all personnel in all laboratory or facility areas where radioactive materials will be used and must cover actions to be taken in case of accidents involving radioactive materials such as spills, fires, release or loss of material, or accidental

contamination of personnel. Specifically, these instruments must (a) specify immediate actions to be taken in order to prevent or limit the contamination of personnel and areas, e.g., the shutting down of ventilation equipment, evacuation of contaminated and potentially contaminated areas, and containment of any spills of radioactive material; (b) give the telephone numbers of individuals to be notified in case of emergency; and (c) instruct personnel in proper entry, decontamination, and recovery operations for contaminated facilities. (Note: Only properly trained individuals should attempt decontamination and recovery operations.)

(14) Requirements and procedures for receiving and opening packages (see 902 KAR 100:035 and Appendix F).

(h) Duties and responsibilities of the Radiation Safety Officer. The RSO is expected to coordinate the safe use of the licensed material and to ensure compliance with the requirements of 902 KAR 100 regulations and the license conditions. Typical duties of the RSO may include the following:

(1) To ensure that radioactive material possessed or used by the applicant are limited to those materials specified in the license.

(2) To ensure that the radioactive materials are used only by those individuals authorized by the license.

(3) To ensure that all users wear personal monitoring equipment (if required) such as film badges, thermoluminescense dosimeters (TLD's), and/or pocket dosimeters.

(4) To ensure that licensed material is properly secured against unauthorized removal at all times.

(5) To develop operating and emergency procedures and to assist in personnel training and orientation in these procedures.

(6) To serve as a point of contact and give assistance in case of emergency and to ensure that proper authorities are notified promptly in case of accident or other incident that may involve the release of radioactive material.

(7) To ensure that the terms and conditions of the license such as periodic leak tests are met and that the required records such as personnel exposure, leak test, receipt, transfer, disposal, etc., are periodically reviewed for compliance with Cabinet regulations and the license conditions.

(i) Bioassay Program. Describe the criteria, procedures, and equipment used for performing bioassays. If a commercial bioassay service is to be used, provide the name and address of the firm. Bioassays may be required when individuals work with millicurie quantities of hydrogen-3 in organic compounds, iodine-125, or iodine-131 (depending on the chemical and physical form or procedures followed and the equipment used). Bioassays may also be required for other radionuclides if the chemical or physical form or procedures and equipment used make it likely that

radioactive material will be ingested, inhaled, or absorbed into the body. The applicant should show that the need for bioassays has been thoroughly considered and that the proposed bioassay program is appropriate for the applicant's intended use of radioactive material.

Bioassays may not be substituted for other elements of a safety program such as air monitoring and dispersion control (hoods, glove boxes, etc.) and for well-thought-out and well-executed handling procedures.

Item 13 - See Item 5

Item 14 - Waste Disposal

Appendix J is included for the convenience of the license applicant in establishing an adequate radioactive waste disposal program. If the applicant does not wish to utilize Appendix J, the applicant's procedures for disposing of radioactive waste must be described in an attachment to the application. Under department regulations, a licensee may dispose of waste in the following ways:

(a) Transfer to a person properly licensed to receive such waste in conformance with 902 KAR 100:040. The name of the firm (which should be contacted in advance to determine any limitations that the firm may have on acceptance of waste) should be given.

(b) Release into a sanitary sewer in conformance with 902 KAR 100:021. Depending on water usage, releases of up to 1 curie per year are permitted. Only material that is readily soluble or readily dispersible biological material, in water is permitted to be discharged into a sanitary sewer.

(c) Release into air or water in concentrations in conformance with 902 KAR 100:019, Section 44. Possible exposure to persons off-site limits the amount that may be released.

(d) Other methods specifically approved by the Cabinet pursuant to 902 KAR 100:021.

(e) If animal use is anticipated or planned, submit detailed radiation safety procedures (including waste disposal) as an attachment to the license application.

Item 15 - Certification

The application should be signed and dated by an official representative of the applicant, e.g., President, department or division head, or other person authorized to sign official documents to certify that the application contains information that is true and correct to the best of the applicant's knowledge and belief. Applications that are unsigned will be returned for proper signature.

V. AMENDMENTS TO LICENSES

Licensees are required to conduct their programs in accordance with statements, representations, and procedures contained in the license application and supportive documents. The license must, therefore, be amended if the licensee plans to make any

changes or modifications in facilities, equipment, procedures, personnel, or radioactive material to be used.

Applications for license amendments may be filed either on the application form or in letter form. The application should identify the license by number and should clearly describe the exact nature of the changes, modifications, additions, or deletions. References to previously submitted information and documents should be clear and specific and should identify the pertinent information by date, page, and paragraph.

VI. RENEWAL OF A LICENSE

An application for renewal of a license should be filed at least thirty (30) days prior to the expiration date. This filing will ensure that the license does not expire until final action on the application has been taken as provided in 902 KAR 100:040, Section 8. The applicant should refer to Section II of this guide to determine the submission of fees.

VII. TERMINATION OF A LICENSE

If you do not wish to renew your license, you must dispose of all licensed radioactive material you possess in a manner authorized by 902 KAR 100:021. Submit form RPS-10 "Disposition of Radioactive Material," or a letter, indicating the manner in which you disposed of the radioactive material and send to the Kentucky Radiation Control office before the expiration date of your license with a request that your license be terminated. Include your Kentucky Radioactive Material License Number in the request. There is no fee assessed for terminating a license.

If you cannot dispose of all the licensed radioactive material in your possession before the expiration date, you must submit a request for license renewal, along with the renewal fee, for storage only of the radioactive material. The renewal is necessary to avoid violating Kentucky Administrative Radiation Regulations that do not allow you to possess licensable radioactive material without a valid license.

Appendix A

TRAINING AND EXPERIENCE
AUTHORIZED USER OR RADIATION SAFETY OFFICER
(Use supplemental sheets if necessary.)

1. NAME OF APPLICANT

2. TRAINING RECEIVED IN BASIC RADIOISOTOPE HANDLING TECHNIQUES

TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	FORMAL COURSE	ON THE JOB
a. Principles and practices of radiation protection			YES NO	YES NO
b. Radioactivity measurement standardization and monitoring techniques and instruments			YES NO	YES NO
c. Mathematics and calculations basic to the use and measurement of radioactivity			YES NO	YES NO
d. Biological effects of radiation			YES NO	YES NO

3. EXPERIENCE WITH RADIATION (Actual use of radioisotopes)

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE

RESUME OF RADIATION WORK EXPERIENCE

DATES OF EMPLOYMENT	EMPLOYER ADDRESS	JOB TITLE DUTIES

APPENDIX C

STANDARD SURVEY PROGRAM (NON-CONTAINED SOURCES)

1. Clothing, hands, and all primary work areas (except as in Item 2 below) shall be surveyed daily with an appropriate low-range survey meter and decontaminated if necessary. For low energy beta emitters, appropriate wipe samples shall be taken in lieu of direct measurement.

2. Laboratory areas where only small quantities of radioactive materials are used (less than 10 microcuries of I-125 or I-131 or 100 microcuries of other non-special nuclear material or source material isotopes) will be surveyed monthly.

3. Waste storage areas and all other laboratory areas will be surveyed weekly.

4. The weekly and monthly surveys will consist of:

    a. A measurement of radiation levels with a survey meter sufficiently sensitive to detect 0.05 mR/hr.

    b. A series of wipe tests to measure contamination levels. The method for performing wipe tests will be sufficiently sensitive to detect 200 dpm per 100 cm^2 for the contaminant involved. Wipes of elution and preparation areas or other "high background" areas will be removed to a low background area for measurement.

5. A permanent record will be kept of all survey results, including negative results. The record will include:

    a. Location, date, and identification of equipment used, including the serial number and pertinent counting efficiencies.

    b. Name of person conducting the survey.

    c. Drawing of area surveyed, identifying relevant features such as active storage areas, active waste areas, etc.

    d. Measured exposure rates, keyed to location on the drawing (point out rates that require corrective action).

    e. Detected contamination levels, keyed to locations on drawing.

    f. Corrective action taken in the case of contamination or excessive exposure rates, reduced contamination levels or exposure rate after corrective action, and any appropriate comments.

6. Area will be cleaned if the contamination level exceeds 200 dpm/100 cm^2.

APPENDIX D

RECORDS REQUIRED FOR LABORATORY-INDUSTRIAL LICENSE

Laboratory and industrial radioactive material licensees are required to maintain a number of records. This form is designed to simplify your task of complying with the regulations in regards to recordkeeping. The different record requirements are listed below. It is your responsibility to develop your own records and make sure that all required records are maintained.

Because the RPS-7 application form is used for a wide variety of laboratory and industrial applications, ranging from small laboratories to large scale industrial uses of radioactive materials, this appendix may list a number of records which may not apply to all users. If a record described in this appendix is for some material, or equipment that you will not have, write N/A in the space to the right of the record description. If the need for a particular record would arise only rarely, you need not compose a special form for that record, but may document the required information by letter or memo.

REGULATION	TYPE OF RECORDS	REQUIRED YES	NO	N/A
902 KAR 100:040	General provisions require records of receipt use, storage, transfer and/or disposal of radiation sources			
902 KAR 100:021	Waste shipment certification to accompany each shipment of radioactive waste to the low-level radioactive waste burial site			
902 KAR 100:050	For licensee's with generally licensed gauges, maintain records of tests of leakage of radio-active material and proper operation of the on-off mechanism or indicator			
902 KAR 100:019	Records of employee's prior exposure history (NRC Form 4)			
902 KAR 100:019	A written evaluation of expected exposure in excess of that permitted under 902 KAR 100:019			
902 KAR 100:060	Record of leak tests			
902 KAR 100:019	Records of surveys preserved as specified in 902 KAR 100:019 (this includes receipt surveys, contamination surveys, etc.)			
902 KAR 100:021	Records of disposal by release into sanitary sewerage systems proving compliance with limits in 902 KAR 100:021			
902 KAR 100:019	Records of radiation exposure on NRC Form 5 or all other forms containing all the information required by NRC Form 5. (This information is usually contained in vendor's film badge exposure reports)			
902 KAR 100:165	Records of instructions to workers			

NOTE: Where records of surveys and monitoring are required, the records must show the units in this part, i.e., millirem per hour for external radiation, microcuries for removable contamination, etc. It is not sufficient to just indicate that a survey was performed. The actual reading has to be recorded with location of the reading. The survey report should also give a numerical interpretation of background, and not state merely that the reading was less than background.

PROCEDURES FOR ORDERING AND ACCEPTING DELIVERY OF RADIOACTIVE MATERIAL

1. The Radiation Safety Officer or his/her designee will place all orders for radioactive materials and will ensure that the requested materials and quantities are authorized by the license and that possession limits are not exceeded.

2. A system for ordering and receiving radioactive materials will be established and maintained. The system will consist minimally of the following:

   a. Ordering of routinely used materials.

      (1) Written records that identify the isotope, compound, activity levels, and supplier, etc., will be used.

      (2) The written records will be referenced when opening or storing radioactive shipments.

   b. Ordering of specially used materials.

      (1) A written request will be obtained from the authorized user who will perform the procedure.

      (2) Persons ordering the materials will reference the authorized user's written request when placing the order. The authorized user's request will indicate isotope, compound, activity level, etc.

      (3) The authorized user's written request will be referenced when receiving, opening, or storing the radioactive material.

   c. Maintain written records for all ordering and receipt procedures.

3. During normal working hours, carriers will be instructed to deliver radioactive packages directly to the nuclear laboratory or to some other official receiving area for radioactive materials.

4. During off-duty hours, security personnel or other designated individuals will accept delivery of radioactive packages in accordance with the procedures outlined in the sample memorandum on the following page.

SAMPLE* MEMORANDUM

TO: Security personnel _____

FROM: Administrator_____

SUBJECT: RECEIPT OF PACKAGES CONTAINING RADIOACTIVE MATERIAL

Any package containing radioactive material that arrives between 4:30 p.m. and 7 a.m. or on Sundays shall be signed for by the security guard on duty and be taken immediately to the laboratory. Unlock the door, place the package on top of the counter immediately to the right of the door, and relock the door.

If the package is wet or appears to be damaged, immediately contact the company Radiation Safety Officer. Ask the carrier to remain until it can be determined that neither the driver nor the delivery vehicle is contaminated.

RADIATION SAFETY
OFFICER:_____

OFFICE PHONE:_____

HOME PHONE:_____

*Submit a copy of your own company's memorandum.

PROCEDURES FOR SAFELY OPENING PACKAGES CONTAINING RADIOACTIVE MATERIAL

1. Special requirements will be followed for packages containing quantities of radioactive material in excess of the "Type A" quantity limits. They will be monitored for surface contamination and external radiation levels within three (3) hours after receipt if received during working hours or within eighteen (18) hours if received after working hours, in accordance with the requirements of 902 KAR 100. All shipments of liquids greater than exempt quantities will be tested for leakage. The department will be notified in accordance with the regulations if removable contamination exceeds 2200dpm/100 cm^2 or if external radiation levels exceed 200 mR/hr at the package surface or 10 mR/hr at 3 feet (or 1 meter).

2. For all packages, the following additional procedures for opening packages will be carried out:

    a. Put on gloves to prevent hand contamination.

    b. Visually inspect package for any sign of damage (e.g., wetness, crushed). If damage is noted, stop procedure and notify Radiation Safety Officer.

    c. Measure exposure rate at 3 feet (or 1 meter) from package surface and record. If reading is greater than 10 mR/hr, stop procedure and notify Radiation Safety Officer.

    d. Measure surface exposure rate and record. If reading is greater than 200 mR/hr, stop procedure and notify Radiation Safety Officer.

    e. Open the package with the following precautionary steps:

        (1) Open the outer package (following manufacturer's directions if supplied) and remove packing slip.

        (2) Open inner package and verify that contents agree with those on packing slip. Compare requisition, *packing slip, and label on bottle.

        (3) Check integrity of final source container (i.e., inspect for breakage of seals or vials, loss of liquid, and discoloration of packaging material).

        (4) Check also that shipment does not exceed possession limits.

*In the case of special orders, also compare with authorized user's written request.

f. Wipe external surface of final source container and remove wipe to low background area. Assay the wipe and record amount of removable radioactivity (e.g., dpm/100 cm^2, etc.). Check wipes with a thin-end-window G-M survey meter, and take precautions against the spread of contamination as necessary.

g. Monitor the packing material and packages for contamination before discarding.

(1) If contaminated, treat as radioactive waste.

(2) If not contaminated, obliterate radiation labels before discarding in regular trash.

3. Maintain records of the results of checking each package, using "Radioactive Shipment Receipt Record", (see next page) or a form containing the same information.

TYPE A PACKAGE QUANTITY LIMITS FOR SELECTED RADIONUCLIDES
(ADDITIONAL RADIONUCLIDES ARE LISTED IN 49 CFR 173.435)

SYMBOL OF RADIONUCLIDE	ELEMENT AND ATOMIC NUMBER	A_1(Ci) (Special Form)	A_2(Ci) (Normal Form)
C-14	Carbon (6)	1080	54.1
Cs-137	Cesium (55)	54.1	13.5
Pb-201	Lead (82)	16.2	0.243
Mo-99	Molybdenum (42)	16.2	13.5
Ra-226	Radium (88)	8.11	0.541
S-35	Sulfur (16)	1080	54.1

EXAMPLE

RADIOACTIVE SHIPMENT RECEIPT REPORT

1. P.O. No.:_____ Survey Date_____ Time_____

   Surveyor_____

2. CONDITION OF PACKAGE:

   O.K. Punctured Wet Crushed

   (Other)_____

3. RADIATION UNITS OF LABEL:_____mR/hr

4. MEASURED RADIATION LEVELS:

   a. 3 feet or 1 meter from surface_____mR/hr

   b. Package surface_____mR/hr

5. DO PACKING SLIP AND VIAL CONTENTS AGREE:

   a. Radionuclide yes no difference_____

   b. Amount yes no difference_____

   c. Chemical Form yes no difference_____

6. WIPE RESULTS FROM:

   d. Outer_____CPM=_____DPM

      CPM ÷ (efficiency)=DPM

7. SURVEY RESULTS OF PACKING MATERIAL AND CARTONS_____mR/hr, CPM

8. DISPOSITION OF PACKAGE AFTER INSPECTION_____

9. IF DEPARTMENT/CARRIER NOTIFICATION REQUIRED, GIVE TIME, DATE, AND PERSONS NOTIFIED.

_____ _____

Signature Date

APPENDIX G

EMERGENCY PROCEDURES

MINOR SPILLS

1. NOTIFY: Notify persons in the area that a spill has occurred.

2. PREVENT THE SPREAD: Cover the spill with absorbent paper.

3. CLEAN UP: Use disposable gloves and remote handling tongs. Carefully fold the absorbent paper and pad. Insert into a plastic bag and dispose in the radioactive waste container. Also insert into the plastic bag all other contaminated materials such as disposable gloves.

4. SURVEY: With a low-range, thin-window G-M survey meter. Check the area around the spill, hands, and clothing for contamination.

5. REPORT: Report incident to the Radiation Safety Officer.

MAJOR SPILLS

1. CLEAR THE AREA: Notify all persons not involved in the spill to vacate the room.

2. PREVENT THE SPREAD: Cover the spill with absorbent pads, but do not attempt to clean it up. Confine the movement of all potentially contaminated personnel to prevent the spread.

3. SHIELD THE SOURCE: If possible, the spill should be shielded, but only if it can be done without further contamination or without significantly increasing your radiation exposure.

4. CLOSE THE ROOM: Leave the room and lock the door(s) to prevent entry.

5. CALL FOR HELP: Notify the Radiation Safety Officer immediately.

6. PERSONNEL DECONTAMINATION: Contaminated clothing should be removed and stored for further evaluation by the Radiation Safety Officer. If the spill is on the skin, flush thoroughly and then wash with mild soap and lukewarm water.

RADIATION SAFETY OFFICER:

OFFICE PHONE:

HOME PHONE:

LOSS, THEFT, FIRE, EXPLOSION, OR VEHICLE ACIDENT

1. SECURE THE AREA AROUND THE ACCIDENT. KEEP UNAUTHORIZED PERSONS AWAY, ALERT PEOPLE IN THE VICINITY OF THE PRESENCE OF RADIOACTIVITY AND A POSSIBLE HAZARD.

2. DO NOT LEAVE THE SITE. Send a helper or onlooker to notify the following:

    a. Radiation Safety Officer_____

    Work phone:_____ Home phone:_____

    b. Local Police_____

    c. Local Fire Department were applicable_____

3. The Radiation Safety Officer in turn must immediately notify Radiation Control, Kentucky Cabinet for Health Services: 502/564-3700 (normal hours), or 502/564-7815 (after hours), and other local authorities as indicated.

4. The radiation worker should inform emergency workers of the radiation hazard possibly existing, should help them keep the area secure, and should explain to the emergency personnel the location of the radioactive device or chemical and the extent of the possible hazard. In no case should the radiation worker leave the site until qualified experts arrive, unless, of course, the operator is seriously injured or incapacitated, and must be removed from the site by emergency personnel.

ALTERNATE NAMES AND TELEPHONE NUMBERS DESIGNATED BY RADIATION SAFETY OFFICER:

APPENDIX H

PRESONNEL TRAINING PROGRAM

1. The Radiation Safety Officer or (title)_____ shall provide instruction to radiation workers. Instruction shall include, but is not limited to:

   a. General radioactive materials safety rules;

   b. Personnel monitoring program (e.g., use, exchange, storage, records, and reports);

   c. Radiation and contamination survey program;

   d. Accident, incident, and emergency procedures;

   e. Radioactive materials work procedures:

      1. ordering, receipt, and opening procedures,
      2. storage,
      3. use of radioactive materials,
      4. waste packaging and storage, and
      5. transportation procedures.

   f. Applicable state and federal rules and regulations and license conditions.

2. The Radiation Safety Officer or (title)_____ shall provide instruction to ancillary personnel, such as clerical, janitorial, and security personnel, whose duties may require them to work in the vicinity of radioactive material. The instruction shall include, but not be limited to:

   a. All terms of the license pertinent to radiation safety.

   b. Identification of areas where radioactive material is used or stored.

   c. Potential hazards associated with radioactive material.

   d. Radiological safety procedures appropriate to their respective duties.

   e. Pertinent state and federal regulations.

   f. Rules and procedures of the license.

   g. Obligation to report unsafe conditions to the Radiation Safety Officer.

   h. Appropriate response to emergencies or unsafe conditions.

   i. Right to be informed of their radiation exposure and bioassay results.

   j. 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 902 KAR 100:165.

The Radiation Safety Officer shall verify that personnel will be properly instructed before assuming duties, with, or in the vicinity of, radioactive materials, during annual refresher training, and whenever there is a significant change in duties, regulations or the terms of the license.

APPENDIX I

GENERAL RULES FOR SAFE USE OF RADIOACTIVE MATERIAL

1. Wear laboratory coats or other protective clothing at all times in areas where dispersible radioactive materials are used.

2. Wear disposable gloves at all times while handling dispersible radioactive materials.

3. Monitor hands and clothing for contamination after each procedure or before leaving the area.

4. Use shielding devices and/or remote tools when working with millicurie or greater quantities of radioactive materials.

5. a. Do not eat, drink, smoke, or apply cosmetics in any area where radioactive material is stored or used.

   b. Do not store food, drink, or personal effects with radioactive material (e.g., in refrigerator).

6. Wear personnel monitoring devices (film badge or TLD) at all times while in areas where radioactive materials are used or stored. These devices should be worn at chest or waist level. Personnel monitoring devices, when not being worn to monitor occupational exposures, should be stored in a designated low background area.

7. Wear TLD finger badges when manipulating millicurie or greater quantities of radioactive materials.

8. Dispose of radioactive waste only in specially designated drains or properly shielded receptacles.

9. Never pipette by mouth.

10. Survey laboratory work area for contamination after each procedure or at the end of the day. Decontaminate if necessary.

11. Confine radioactive solutions in covered containers plainly identified and labeled with name of compound, radionuclide, date, activity, and radiation level, if applicable.

12. Always transport radioactive material in shielded containers.

13. Use remote tools when handling sealed sources.

14. Leak test nuclear gauges with gauges in the locked, stored, or safe position (but only if the license authorizes you to take the leak tests).

APPENDIX J

WASTE DISPOSAL

NOTE: In view of the recent problems with shallow-land burial sites used by commercial waste disposal firms, licensees are encouraged to reduce the volume of waste sent to these facilities. Important steps in volume reduction are to: segregate radioactive from

nonradioactive waste; hold short-lived radioactive waste for decay in storage; and release certain materials into the sanitary sewer only in accordance with 902 KAR 100:021.

1. Liquid waste will be disposed of (check as appropriate)

    ____ In the sanitary sewer system in accordance with 902 KAR 100:021 (see also Item 4 below).

    ____ By commercial waste disposal service (see also Item 3 below).

    ____ Other (specify):

2. Other solid waste will be (check as appropriate)

    ____ Returned to the manufacturer for disposal.

    ____ Held for decay* until radiation levels, as measured in a low background area with a low-level survey meter and with all shielding removed, have reached background levels. All radiation labels will be removed or obliterated, and the waste will be disposed of in normal trash.

    ____ Disposed by commercial waste disposal service (see also Item 3 below).

    ____ Other (specify):

3. The commercial waste disposal service used will be

_____

(NAME) (CITY, STATE)

RADIOACTIVE MATERIALS LICENSE NO._____

*BE SURE WASTE STORAGE AREAS ARE DESCRIBED IN ITEM 11 AND ARE SURVEYED PERIODICALLY (ITEM 12).

SANITARY SEWER RADIOACTIVE MATERIAL DISPOSAL CONCENTRATION CALCULATION
(NOTE: MATERIAL MUST BE READILY SOLUBLE, OR READILY DISPERSIBLE BIOLOGICAL MATERIAL, IN WATER)

(1) DETERMINE TOTAL VOLUME OF SEWAGE PER MONTH_____ml

(Note, the total volume of sewage may be estimated by averaging the volume as stated on a sewage bill or the volume of water used by a facility as stated on a water bill.)

USEFUL COVERSIONS: 1 cubic foot = 2.832×10^4 ml
1 gallon = 3.78×10^3 ml

(2) DETERMINE AVERAGE ACTIVITY FOR EACH ISOTOPE DISPOSED OF VIA THE SANITARY SEWER PER MONTH:

ISOTOPE	ACTIVITY (MICROCURIES PER MONTH)
a.	
b.	
c.	
d.	
e.	

(3) FOR EACH ISOTOPE*, DIVIDE THE ACTIVITY (MICROCURIES) BY THE MONTHLY VOLUME (ml):

ISOTOPE	ACTIVITY/MONTHLY VOLUME	=	AVERAGE MONTHLY CONCENTRATION
a.	_____uCi/_____ml	=	_____uCi/ml
b.	_____uCi/_____ml	=	_____uCi/ml
c.	_____uCi/_____ml	=	_____uCi/ml
d.	_____uCi/_____ml	=	_____uCi/ml
e.	_____uCi/_____ml	=	_____uCi/ml

*If more than one (1) radionuclide is released, the sum of fractions must not exceed unity (see 902 KAR 100:021, Section 3).

(4) TO DETERMINE COMPLIANCE WITH REGULATIONS REFER TO 902 KAR 100:019, SECTION 44 AND 902 KAR 100:021.