GUIDE FOR THE PREPARATION OF

RADIOACTIVE MATERIAL APPLICATIONS FOR

WELL LOGGING OPERATIONS IN KENTUCKY

Radiation Control
Cabinet for Human Resources
275 East Main Street
Frankfort, Kentucky 40621

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I. INTRODUCTION

This guide describes the type of information that is needed to evaluate an application for the use of radioactive materials in oil, gas and mineral well-logging operations. The well-logging operations covered by this guide are (1) the use of the electronic well-logging tools containing sealed sources and (2) the use of radioactive materials to conduct tracer studies. This guide is not intended for use in the preparation of applications for use of multicurie tracers in secondary recovery operations or for use of special nuclear material in well-logging operations.

Applicable Regulations:

1. 902 KAR 100:010, "Definitions"
2. 902 KAR 100:012, "Fee Schedule"
3. 902 KAR 100:015, "General Requirements"
4. 902 KAR 100:020, "Standards for Protection Against Radiation"
5. 902 KAR 100:021, "Disposal of Radioactive Material"
6. 902 KAR 100:035, "Receiving Radioactive Material and Special Form Tests"
7. 902 KAR 100:040, "General Provisions for Specific Licenses"
8. 902 KAR 100:060, "Leak Testing"
9. 902 KAR 100:070, "Transportation of Radioactive Material"
10. 902 KAR 100:142, "Wireline Service Operations"
11. 920 KAR 100:165, "Notices, Reports, and Instructions to Workers"

II. LICENSE FEES

A fee is required for a radioactive material license and renewals. 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 submitted. Checks or money orders should be made payable to the Kentucky State Treasurer.

III. FILING AN APPLICATION

An application for a license to possess and use radioactive material in well-logging operations 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 append 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 copies of the application should be completed. The original should be mailed to the Radiation Health & Toxic Agents Branch, Cabinet for Health & Family Services, 275 East Main Street, Mailstop HS1CA, 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.

The information submitted should pertain to the specific activities for which authorization is requested and should be as complete and detailed as possible. Submissions 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.

IV. CONTENT OF AN APPLICATION

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) Where Radioactive Material Will be Used.

The actual location(s) where the radioactive materials will be possessed, stored, and/or used should be specified in Item 2. Permanent facilities such as laboratory or storage areas should be identified by street address, city and zip code. A post office box should not appear in Item 2. Field locations of wells should be specified as temporary job sites of the applicant.

Item 3. Telephone Number.

Indicate the telephone number of the applicant.

Item 4. Person to be Contacted and Listed as Contact Person.

List the person to be contacted regarding this application and to whom all correspondence should be addressed.

Item 5. Individual(s) and Title(s) Who will Use Radioactive Material.

The name of each individual who will use and/or supervise the use of licensed materials must be listed in Item 5. An adequate number of trained users should be listed to provide for continuity of operations.

Item 6. Radiation Protection Officer.

The individual designated as Radiation Protection Officer (RPO) should be identified in Item 6. The RPO 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. The RPO is expected to coordinate the safe use of licensed material and to ensure compliance with the requirements of the 902 KAR 100 regulations and the license conditions. Typical duties of the RPO should include the following:

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

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

(c) To ensure that all users wear personnel monitoring equipment, such as film badges or thermoluminescence dosimeters (TLD's).

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

(e) To supervise leak testing of sealed sources and instrument calibrations.

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

(g) To serve as a point of contact and give assistance in case of emergency (well-logging tool damage, theft of licensed materials, fire, etc.) and to ensure that proper authorities are notified promptly in case of an accident or other incident that may involve the release of licensed material.

(h) 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 records, leak test records, etc., are periodically reviewed for compliance with the Cabinet's regulations, and the license conditions.

(i) To conduct radiation safety inspections of licensed activities periodically to ensure compliance with the regulations and license conditions.

Item 7. Licensed Material.

The applicant should specify in item 7, the radioactive material that will be used. The applicant should identify the physical form, usually sealed sources, for materials used in electronic tools, and the chemical form for materials used for tracer studies. The applicant should specify the name of the manufacturer, model number and activity of the sealed source. For each sealed source listed to be used in downhole operations,

documentation must be maintained, certifying that the sources meet the sealed source performance requirements or oil well-logging as contained in the American National Standard N542, "Sealed Radioactive Sources, Classification."

Describe Purpose for Which Radioactive Material will be Used.

The applicant should identify the purpose for which the material will be used. In particular, the applicant should indicate the type of wells in which the material will be used (e.g., gas, oil, mineral). The applicant must also specify the container or device in which each sealed source will be transported, stored or used and the manufacturer's name and model number for the container. The containers or devices should be keyed alphabetically to the sources listed in Item 7 with which they will be used.

Items 8 and 9. Radiation Detection Instruments and Calibration.

The applicant should specify for each type of radiation detection instrument available, the manufacturer's name and model numbers, the number of instruments available, the type of radiation detected (alpha, beta, gamma and/or neutron), and the sensitivity range in milliroentgens per hour or counts per minute. At least one low range beta-gamma type of survey instrument with ranges of 0.1-50 mr/hr is required at each temporary job site.

The applicant should specify the name and address of the service organization that will calibrate the instruments and the frequency of calibration. Intervals should not exceed six (6) months and after each instrument servicing.

Item 10. Personnel Monitoring Devices.

The applicant should (1) specify the type of personnel dose monitoring devices to be used (film badges, thermoluminescence dosimeters (TLD), pocket chambers), (2) provide the name and the supplier of the film badge or TLD dosimetry services, and (3) specify the frequency at which film badges or TLD's will be evaluated.

Film badges or TLD personnel monitoring devices are required for well-logging operations. Use of these devices with monthly evaluations is an acceptable practice.

During tracer studies bioassays (thyroid checks, urinalyses, etc.) may be required when individuals work with multi-millicurie quantities of iodine-131 depending on the type of work, equipment used, and procedures followed. For example, if an individual handles 50 millicuries of iodine-131 per week in noncontained form, thyroid checks should be made. The criteria to be used in determining the need for bioassays and the type of bioassays that will be performed should be described. If a commercial bioassay service is to be used, the name and address of the firm should be provided.

Item 11. Facilities and Equipment.

The applicant should describe the facilities and equipment to be used to ensure security and safe use and storage of materials. Subitem A below describes information to be submitted for sealed source program. Subitem B describes information to be submitted for tracer programs.

A. Sealed Source Program

1. Storage and other facilities. The description of field office, site or vehicular storage containers and facilities should include drawings or sketches. The design dimensions, thickness of shielding, type of shielding materials (concrete, steel, lead, etc.), and means for securing sources from unauthorized removal should be described. The expected radiation levels at the surface of containers and accessible areas of storage facilities should be given. Storage facilities should be designed for sources positioned so that radiation levels do not normally exceed 2 mr per hour at 18 inches from the exterior surface of the storage facility.

2. The number, type, and length of handling tools. Drawings or sketches showing general design and provisions for attaching to or gripping sources should be submitted. WELL-LOGGING SOURCES MUST NEVER BE HANDLED DIRECTLY.

B. Tracer Operations

1. Storage provisions. The description of storage facilities should include drawings or sketches of the rooms, buildings, pits, etc., showing shielding materials (concrete, steel, leak, earth, etc.), and means for securing materials from unauthorized removal. Storage facilities should be designed and materials positioned so that radiation levels do not normally exceed 2 mr per hour at 18 inches from the exterior surface of the storage facility.

2. General safety equipment. A description of protective clothing (such as rubber gloves, coveralls, respirators, and face shields), auxiliary shielding, absorbent materials, injection equipment, secondary containers, plastic bags for storing contaminated clothing, tissue, handling tools, etc., that will be available at well sites should be submitted.

Item 12. Radiation Protection Program.

The applicant should describe the radiation protection program that will be implemented to ensure safe use of licensed materials and the duties and responsibilities of the Radiation Protection Officer (See Item 6.). The applicant may submit a copy of the operating and emergency procedures that individuals will follow during use of licensed material. Appendix B, describes the elements of an acceptable radiation protection program for the use of sealed sources. Similarly, Appendix C describes the elements of an acceptable radiation protection program for tracer use of licensed materials.

Sealed 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. If the tests will be performed using a commercial "kit", the name of the kit manufacturer or distributor and the kit model designation must be given.

Item 13. Training and Experience of Users.

A resume of the training and experience of each person who will supervise the use of licensed material, who will use licensed material without supervision, or who will have responsibilities for radiation safety should be submitted. Minimum training requirements for logging supervisors and logging assistants is listed in Appendix A.

Item 14. Waste Disposal and Packaging Procedures.

The applicant should describe the procedures for disposing and packaging of licensed materials.

A. Sealed Sources

Sealed sources containing licensed material should be returned to the manufacturer or transferred to another licensee authorized to possess the specific quantity and form being transferred.

B. Tracer Operations

Wastes from tracer operations such as unused materials, contaminated tissues, gloves, tools, clothing, containers, etc. should be disposed of in accordance with 902 KAR 100:021.

Short half-life materials may be stored to allow decay to background radiation levels. Containment and security during storage should be provided.

C. Packaging Procedures

Procedures for packaging disposal should be attached. The procedures shall meet the provisions in 902 KAR 100:021 and 902 KAR 100:070.

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 licensed 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. Refer to 902 KAR 100:012, Fee Schedule, to determine the amount of fee to be submitted.

VI. RENEWAL OF A LICENSE

An application for renewal of a license should be filed at least 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 9. 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 Materials” or a letter indicating the manner in which you disposed of the radioactive material and send to the Kentucky Radiation Health & Toxic Agents Branch 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 Regulations that do not allow you to possess licensable material without a valid license.

APPENDIX A
Minimum Training Requirements

The following is the minimum training requirements for logging supervisors and users of licensed material.

LOGGING SUPERVISORS

A. Has successfully completed a course recognized by the Cabinet, another agreement state, or the U.S. Nuclear Regulatory Commission covering the following subjects.

(1) Fundamentals of radiation safety
  (a) Characteristics of gamma, neutron and x-radiation
  (b) Units of radiation dose (mRem) and quantity of radioactivity (curie)
  (c) Significance of radiation dose
    1. Radiation protection standards
    2. Biological effects of radiation dose
  (d) Levels of radiation from sources of radiation
  (e) Methods of controlling radiation dose
    1. Working time
    2. Working distance, and
    3. Shielding
(2) Radiation detection instrumentation to be used:
  (a) Use of radiation survey instruments
    1. Operation
    2. Calibration, and
    3. Limitations
  (b) Survey techniques
  (c) Use of personnel monitoring equipment
(3) Equipment to be used
  (a) Remote handling equipment
  (b) Sources of radiation
  (c) Storage and transport containers
  (d) Operation and control of equipment

B. Has received copies of and demonstrated an understanding of the following:

1. The requirements contained in 902 KAR 100:142 “Wireline Service Operations”.
2. Other applicable provisions of the Cabinet’s radiation regulations
3. The conditions of the license or registration certificate issued by the Cabinet; and
4. The licensee’s or registrant’s approved operating and emergency procedures.

C. Has demonstrated competence to use sources of radiation, related handling tools and radiation survey instruments which will be employed in his assignment.

Logging Assistant

A. Has read and received instruction in the licensee's or registrant's operating and emergency procedures, the requirements contained in 902 KAR 100:142 "Wireline Service Operations" and other applicable provisions of the Cabinet's radiation regulations, and shall have demonstrated understanding.

B. Has demonstrated competence to use, under the personal supervisor of the logging engineer, the sources of radiation, related handling tools and radiation survey instruments which will be employed in his assignment.

Each licensee or registrant shall maintain employee training records, for inspection by the Cabinet, for two (2) years following termination of employment.

APPENDIX B
RADIATION PROTECTION PROGRAM – SEALED SOURCES

Procedures should be established to ensure compliance with the provisions of 902 KAR 100:165, "Notices, Reports, and Instructions to Workers" and should be specific and adequate to provide protection against potential radiation hazards associated with the use of sealed sources in well-logging activities. As a minimum, each of the following elements should be described in the application.

1. Survey Program

Cabinet regulations require that surveys be made to determine if radiation hazards exist during the use of licensed material. A survey means an evaluation of the radiation hazards incident to the use, release, disposal, or presence of radioactive materials. When appropriate, this evaluation includes a physical survey of the location of radiation or concentrations of radioactive materials present.

For operations involving sealed sources, a survey program should include evaluation and/or measurements of gamma and/or neutron radiation levels for both storage and use of sealed sources. Surveys for evaluating the adequacy of shielding, dose rates during leak testing of sources, the need for personnel dosimeters, or changes in operating procedures may be appropriate. Preparation of shipping labels, posting and establishing restricted areas, limiting work times, locating lost or dropped sources, and monitoring during any down-hole recovery operations are activities that may require surveys. Leak test wipes should be checked with a low-range survey meter for gross contamination to determine safe handling before mailing or otherwise forwarding for assay. After removal of the sealed source from the logging tool and before departing the job site, the logging tool detector must be energized, or a survey meter used, to assure that the logging tool is free of contamination.

It is expected that normally licensees will clean-up contamination to non-detectable levels as measured using appropriate instrumentation. Recommended survey contamination limits may be found in "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use of Termination of Licenses for Byproduct, Source, or Special Unrestricted Material", August 1987. Copies may be obtained from the Kentucky Radiation Health & Toxic Agents Branch office. NRC has not established criteria for acceptable levels of contamination in soil. In cases where it is not practical to remove all detectable contamination, the Cabinet will consider specific requests for approval of release of soil with residual contamination.

The following should be considered in your procedures:

a. Your instructions should describe how personnel would determine the presence of contamination through surveys and when to implement decontamination procedures.

b. Identify the radiation or contamination levels at which logging personnel should not attempt to perform decontamination by themselves.

c. Describe the procedures personnel will be expected to follow to perform simple decontamination tasks.

d. Identify the equipment to be used to perform the decontamination.

e. The procedures for preventing personal contamination during the decontamination tasks should be described.

f. Include the procedures for properly handling contaminated waste materials.

g. Include instructions to resurvey to confirm the effectiveness of decontamination efforts.

h. Provide that records of the surveys, both before and after decontamination, be completed and maintained.

i. Identify who should be contacted in case of problems.

Logging supervisors and assistants should be instructed that they are only allowed to perform simple decontamination tasks. If they find excessive contamination or radiation levels, they should be instructed to immediately initiate emergency procedures.

NOTE: If extensive contamination is found, the licensee should not attempt to decontaminate, but should secure the area and contact the Kentucky Radiation Health & Toxic Agents Branch office as soon as possible.

2. Records Management Program

Provisions for maintenance and management review of utilization logs and records of surveys, inventories, personnel exposures, leak tests and employee training should be established. Job log sheets or other standard forms would facilitate keeping records on field operations. Procedures for ordering or shipping materials, for receipt of materials, and for notification for responsible persons upon receipt should also be established.

3. Methods for Establishing, Posting, and Controlling Access to Restricted Areas

Procedures for posting and controlling access to work areas that comply with 902 KAR 100:020 and 902 KAR 100:165 should be established. When radiation levels that exceed 2 mR/hr are created, methods for controlling access to operational areas should be established. All unnecessary personnel should be restricted from the areas. When the area will not be under constant attendance for radiation protection purposes, “Caution-

Radiation Area" signs should be posted when radiation levels exceed 5 mR per hour, and "Caution-High Radiation Area" signs should be posted when radiation levels exceed 100 mR/hr.

Physical surveys or established distances from sources may be used to establish radiation areas and the need for personnel monitoring in a particular area.

4. Transportation of Licensed Material

The transport of licensed materials over public roads by licensees is subject to the regulations of the Department of Transportation. 902 KAR 100:073 of the Cabinet's regulations, "Transportation of Radioactive Materials", requires that DOT regulations be followed for transport of radioactive materials when transport of radioactive materials is intrastate. The DOT regulations cover, among other things, radiation levels at package surfaces (not to exceed 10 mR/hr at 3 feet from any surface and 200 mR/hr at the surface of containers); contents, construction, and labeling of packages; permissible radiation levels around a vehicle, placarding of vehicles; and accident reporting.

Procedures established to assure safe transport and should include at least the following: (a) methods for securing radioactive materials in vehicles to prevent shifting or unauthorized removal during transport; (b) a survey program including determination that radiation levels in the passenger compartment do not exceed 2 mR/hr per hour; and (c) placarding vehicles on all four sides with "Radioactive" when "Radioactive Yellow-III" labeled packages are being transported.

When vehicles are used for storage, the requirements of 902 KAR 100:020 and 902 KAR 100:142 are applicable. Security from unauthorized removal, posting with "Caution-Radioactive Material", and radiation levels (verified by surveys) not exceeding 2 mR per hour at 18 inches from the vehicle are acceptable practices.

5. Operating and Emergency Procedures

Written standard operating and emergency procedures for operating personnel should be developed for the specific operations that will be performed. The procedures may be incorporated into check-off type sheets or other forms used onsite to keep records. Copies should be supplied to all employees who are responsible for job site use of materials. Management should institute review procedures to assure that the established radiation safety program is followed.

Procedures for operations with sealed sources should include at least the following:

a. Precautionary procedures for loading and logging tool, placing the tool in the well, removing the tool from the well and unloading the source. The use of handling tools, logging tool orientation, establishing, posting, and controlling access to restricted areas; minimum times and distances to be observed during handling of sources; and instructions for dealing with equipment malfunction including lost or dropped sources

should be covered. Also, the applicant must indicate whether he intends to conduct removal of sealed sources from the source holder or logging tool and maintenance of the sealed sources or holders which contain sealed sources. Such activities are prohibited unless a written procedure is approved by an Agreement State or NRC.

b. Survey program. The occasions for surveys, frequency and methods, instrument to be used, and records to be kept should be covered.

c. Procedures and occasions for locking and securing sources of radiation at the job site and on returning to the permanent storage area.

d. Personnel monitoring provisions. Instructions covering the occasions for using personnel monitoring devices, the location on the body where the devices are to be worn, frequency at which they should be changed, records to be kept and care of devices should be covered. Indicate who will have responsibility for reviewing personnel monitoring records upon receipt from the supplier.

e. Procedures for transporting sources to job and well sites and for storing and securing in the vehicle the sources in transit and onsite. Surveys of radiation levels around vehicles and storage sites, securing and positioning sources and containers, placarding of vehicles, inspection of equipment, posting, and records to be kept should be covered.

f. Emergency procedures. These instructions should cover procedures to follow in case of vehicle accidents, fire or explosion, ruptured sources, or similar emergency situations such as sources lodged in tools. The instructions should describe personnel, equipment, and facilities and evacuation of the area. The instructions should specifically state the names and telephone number of the responsible persons to be notified in case of an emergency (owners, management, and the Cabinet (502) 564-3700 normal working hours and (502) 564-7815 other hours). 902 KAR 100:020 and 902 KAR 100:142 contains a number of specific requirements for the occasions and methods for reporting the incidents. Instructions must also include a statement prohibiting chiseling or drilling in an attempt to remove a source lodged in a tool.

g. Maintenance of records. Instructions should describe what information is to be recorded and maintained as permanent records for inspection by the Cabinet. Such records must include but may not be limited to: survey, receipt and transfer, inspection and maintenance, signed agreements (refer to 902 KAR 100:142, Section 2), survey instrument calibrations, leak tests, inventory, utilization, personnel monitoring, training and certification documents for sealed sources.

h. Procedures for six (6) month inspections of sealed sources and inspection and maintenance of source holders, logging tools, source handling tools, storage containers, and transport containers.

i. Precautionary procedures to be followed to assure the recovery of sealed sources in shallow, uncased holes. The procedures should include the means for preventing possible contamination of potable aquifers during mineral logging operations.

j. Procedures to be followed in the event a source is lost down hole. Instructions should cover notification of owners, management, and the Cabinet. Prevention of damage to the source during retrieval efforts, provisions for controlling exposures, personnel monitoring, and provisions for permanently sealing the source in place and permanently marking the well when the source cannot be recovered should be included. The instructions should also include procedures for monitoring the circulating fluids during efforts for recovery of the source and instructions concerning "prohibited" fishing techniques (which risk destroying the source), cementing techniques, and placement of a deflection device.

k. Procedures to be used for picking up, receiving and opening packages containing radioactive material.

6. Sealed Source Leak Testing

Well-logging sealed sources (and any sealed calibration sources) should be tested for leakage and contamination at intervals not to exceed six (6) months. Then the supplier does not certify that such tests have been performed within six (6) months, the sources should not be used until tested. The test should be capable of detecting the presence of 0.005 microcuries of contamination. The test sample should be taken from the source or from accessible surfaces of the device in which the sealed source is mounted or stored where contamination is likely if the source is leaking. Records of leak test results should be maintained for inspection by the Cabinet. Leaking sources must be withdrawn from use.

7. Sealed Sources Stuck in a Source Holder

In general, drilling, cutting or chiseling to remove a sealed source stuck in a source holder is prohibited.

8. Agreement With Well Owner or Operator

902 KAR 100:142, Section 2 requires, in part, that well logging conducted with a sealed source only be performed if a written agreement with the employing well owner or operator has been executed. The section also requires that the following steps be taken should a source become lodged downhole:

1. A reasonable effort be made to recover source.

2. The requirements of 902 KAR 100:142, Section 23 be performed should the source be abandoned.

Describe the contents of the agreement to be used or submit a copy of a blanket agreement.

APPENDIX C
RADIATION PROTECTION PROGRAM-TRACER STUDIES

Procedures should be established to ensure compliance with the provisions of 902 KAR 100:165, "Notices, Reports and Instructions to Workers", and 902 KAR 100:020, "Standards for Protection Against Radiation". The procedures should be specific and adequate to provide protection against potential radiation hazards associates with the use of radioactive materials during tracer studies in well-logging activities. As a minimum, each of the following elements should be described in the application.

For licensees who use both sealed sources and tracer materials it is not necessary to submit separate radiation protection programs for each, however, all items addressed below, not previously addressed in the sealed source program, must be submitted as part of the radiation protection program.

1. Survey Program

Cabinet regulations require that surveys be made to determine if radiation hazards exist during the use of licensed material. A survey means an evaluation of the radiation hazards incident to the use, release, disposal, or presence of radioactive materials. When appropriate, this evaluation includes a physical survey of the location of radiation or concentration of radioactive materials present.

For operations involving tracer use of licensed material a survey program must include surveys ate the job site or well head prior to and after each operation with an appropriate survey meter. Surveys must also include monitoring of personnel (hands, feet, clothing) and all tools, equipment, and facilities at job sites for contamination and effectiveness of cleanup. Reasonable efforts should be made to remove all residual contamination.

Acceptable levels of residual contamination should be established. For example, when gamma survey meter readings are less than 0.2 mR/hr or three times background at an inch from the surfaces, equipment and facilities may be released for unrestricted use at job sites. It is expected that normally licensees will cleanup contamination to non-detectable levels as measured using appropriate instrumentation. Recommended surface contamination limits may be found in "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material", August 1987. Copies may be obtained from the Kentucky Radiation Health & Toxic Agents Branch office. NRC has not established criteria for acceptable levels of contamination in soil. In cases where it is not practical to remove all detectable contamination, the Cabinet will consider specific requests for approval of release of soil with residual contamination.

The following should be considered in your procedures:

a. Your instruction should describe how personnel would determine the presence of contamination through surveys and when to implement decontamination procedures.

b. Identify the radiation or contamination levels at which logging personnel should not attempt to perform decontamination by themselves.

c. Describe the procedures personnel will be expected to follow to perform simple decontamination tasks.

d. Identify the equipment to be used to perform the decontamination.

e. The procedures for preventing personal contamination during the decontamination tasks should be described.

f. Include the procedures for properly handling contaminated waste materials.

g. Include instructions to resurvey to confirm the effectiveness of decontamination efforts.

h. Provide that records of the surveys, both before and after decontamination, be completed and maintained.

i. Identify who should be contacted in case of problems.

Logging supervisors and assistants should be instructed that they are only allowed to perform simple decontamination tasks. If they find excessive contamination or radiation levels, they should be instructed to immediately initiate emergency procedures.

NOTE: If extensive contamination is found, the licensee should not attempt to decontaminate, but should secure the area and contact the Radiation Health & Toxic Agents Branch office as soon as possible.

Short half-life wastes that are stored to allow physical decay to background levels should be surveyed with an appropriate instrument before discarding with normal trash. Any radioactive labeling should be defaced or destroyed before disposal.

Operations with tracers may require surveys to evaluate the adequacy of storage facility shielding to determine if restricted areas must be established and posted.

2. Records Management Program

Provisions for maintenance and management review of utilization logs and records of surveys, inventories, personnel exposures, leak tests and employee training should be established. Job log sheets or other standard forms would facilitate keeping records on field operations. Procedures for ordering or shipping materials, for receipt of

materials, and for notification of responsible persons upon receipt should also be established.

Management control of operations with tracers should include procedures to avoid injection into fresh water zones and to evaluate expected concentrations of radioactivity in water, oil, gas, or air released for unrestricted use.

3. Methods for Establishing, Posting, and Controlling Access to Restricted Areas

The applicant should establish and describe procedures for posting and controlling access to all work areas including injection sample preparation area and field sites to comply with 902 KAR 100:020, Sections 12 or 13. When radiation levels are created that exceed 2 mR/hr the applicant should establish and describe methods for controlling access to all operational areas. All unnecessary personnel should be restricted from the areas. When the area will not be under constant attendance for radiation protection purchases, "Caution-Radiation Area" signs should be posted when radiation levels will exceed 5 mR/hr, and "Caution-High Radiation Area" signs should be posted when radiation levels will exceed 100 mR/hr.

4. Transportation of Licensed Material

The transport of licensed materials over public roads by licenses is subject to the regulations of the Department of Transportation. 902 KAR 100:070 of the Cabinet's regulations requires that DOT regulations be followed for transport of radioactive materials when transport is intrastate. The DOT regulations cover, among other things, radiation levels at package surfaces (not to exceed 10 mR/hr at 3 feet from any surface and 200 mR/hr at the surface of containers); contents, construction, and labeling of packages, placarding of vehicles; and accident reporting.

Procedures established to assure safe transport and should include at least the following: (a) methods for securing radioactive materials in vehicles to prevent shifting or unauthorized removal during transport, (b) a survey program including determination that radiation levels in the passenger compartment do not exceed 2 mR per hour, and (c) placarding vehicles on all four (4) sides with "Radioactive" when "Radioactive-Yellow-III" labeled packages are being transported.

When vehicles are used for storage, the requirements in 902 KAR 100:020 and 902 KAR 100:142 are applicable. Security from unauthorized removal, posting with "Caution-Radioactive Material", and radiation levels (verified by surveys) not exceeding 2 mR per hour at 18 inches from the vehicle are acceptable practices.

5. Operating and Emergency Procedures

Written standard operating and emergency procedures for operating personnel should be developed for the specific operations that will be performed. The procedures may be incorporated into check off type sheets or other forms used onsite to keep records.

Copies should be supplied to all employees who are responsible for job site use of materials and should be submitted as part of the application. Management should institute review procedures to assure that the established radiation safety program is followed.

Instructions covering tracer operations should include at least the following:

a. Procedures for handling samples, including sample preparation, and injection methods. The instructions should also include methods for establishing, posting, and controlling access to the area; prevention of contamination of site, equipment, and personnel; and tools and protective clothes and equipment to be used in performing the trace study.

b. Survey programs. The required frequency and methods of surveys, instruments to be used, records to be kept and contamination limits to be observed should be covered.

c. Procedures and occasions for looking and securing sources of radiation at the job site and on returning to the permanent storage area.

d. Personnel monitoring provisions. Instructions covering the occasions for using of personnel monitoring devices, the location on the body where the devices are to be worn, frequency at which they should be changed, records to be kept and care of devices should be covered.

e. Procedures for transporting sources to job and well sites and for storing and securing in the vehicle the sources in transit and onsite. Surveys of radiation levels around vehicles and storage sites, securing and positioning sources and containers, placarding of vehicles, inspection of equipment, posting, and records to be kept should be covered.

f. Emergency procedures. Procedures to be followed in case of vehicle accidents, fire or explosion, personnel contamination or overexposures, or similar emergency situations should be explained. These instructions should describe immediate action to be taken to prevent contamination of work areas and personnel, the need for restricting and/or evacuating the area, and indicate procedures for containment of the spills. The instructions should specifically state the names and telephone numbers of responsible persons (owners, management, and Cabinet (502) 564-3700 normal working hours and (502) 564-7815 other hours) to be notified in case of an emergency. 902 KAR 100:020 and 902 KAR 100:142 contains a number of specific requirements for the occasions and methods for reporting incidents.

g. Maintenance of records. Instructions should describe what information is to be recoded and maintained as permanent records for inspection by the Cabinet. Such records must include but may not be limited to: survey, receipt, transfer and disposal, inspection and maintenance, survey instrument calibrations, utilization, inventory, personnel monitoring, bioassay and training.

h. Procedures for six (6) month inspection and maintenance of injection tools, handling tools, storage and transport containers.

i. Decontamination procedures. These procedures should cover cleaning up spills, using protective clothing and equipment, and decontaminating personnel and equipment including acceptable contamination limits.

j. Waste disposal procedures. The disposal methods to be used, surveys to be made and records to be kept should be included in the procedures.

k. Procedures to be used for picking up, receiving and opening packages containing radioactive material.