Radioactive Material License Guide

Well Logging Operations

Louisiana Department of Environmental Quality
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(Rev 1/11)

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ATTACHMENTS

INTRODUCTION

If for any reason you feel confident that an application can be submitted without following this guide, please remember that any necessary information that is not submitted will delay completion of the review of your application.

The purpose of this document is to describe the type and extent of information that the Department needs to evaluate an application for the use of radioactive materials in oil, gas, and mineral well-logging operations. The issuance of this type of license is provided for under LAC 33:XV.324 and 325. The applicant should carefully study the regulations and this guide and submit all information requested. The well-logging operations covered by this guide are the use of the electronic well-logging containing sealed sources and the use of radioactive materials to conduct tracer studies. This guide is not intended for use in the preparation of applications for use of multi-curie tracers in secondary recovery operations or for use of special nuclear material in well-logging operation.

The following chapters of LAC 33:XV apply to well-logging operations and should be used in conjunction with this guide. The applicant should carefully study the regulations. This guide does not substitute for understanding the requirements of the regulations.

Chapter 1, "General Provisions"

Chapter 3, "Radioactive Material Other than Source Material"

Chapter 4, "Standards for Protection Against Radiation"

Chapter 10, "Notices, Instructions and reports to Workers, Inspections"

Chapter 20, "Radiation Safety Requirements for Wireline Service Operations and Subsurface Tracer Studies

Please note that this guide is intended only for general guidance in preparation of the license application and should not be considered as a substitute for the applicant's safety evaluation of the proposed use of radioactive material. The applicant must ensure that the application correctly and adequately describes the radiation safety measures and procedures to be followed in order to provide adequate protection.

AS LOW AS REASONABLY ACHIEVABLE

The applicant should, in addition to complying with the requirements set forth in the Louisiana Radiation Regulations, make every reasonable effort to maintain radiation exposures, and radioactive material effluents to unrestricted areas As Low As Reasonably Achievable (ALARA). Applicants should give consideration to the ALARA philosophy in the development of operating procedures and in the training of personnel using radioactive material.

Some of the items that should be considered to help maintain radiation exposures as low as reasonably achievable are discussed below. The discussion is not intended to be all inclusive, but should be used as a guide in establishing an operating philosophy for maintaining occupational radiation exposures as low as reasonably achievable.

The most important single item is the routine use of survey meters to ensure that radioactive sources have been returned to the storage container after each log operation. The necessity of performing adequate surveys should be emphasized during initial classroom training, on-the-job training and refresher training of personnel.

The habit of taking advantage of available shielding at temporary jobsites also contributes to maintaining low occupational exposures. Again, this practice can and should be addressed during initial training, on-the-job training, and refresher training.

In addition to the practices mentioned above, taking advantage of the full length of the handling devices, using as long a handling tool as possible, and properly storing radioactive material as soon as possible after use can all contribute to maintaining occupational exposures as low as reasonably achievable.

In addition to providing for items such as those listed above, the necessity of using the safety equipment that is provided should be emphasized during initial training of radiation workers.

Management can also contribute to maintaining low occupational exposures by spreading the workload among personnel so that the same person does not always receive the assignment that involves the highest exposure. Management should review personnel monitoring records to identify those individuals who have exposures higher than the average and to try to establish and correct the cause.

LICENSE FEES

A fee is required for all initial applications and for licenses that are required to be reissued. The applicant should refer to the fee schedule in LAC 33:XV. Chapter 25 to determine the amount of the fee that must accompany the application. Review of the application will not begin until the proper fee is received by the Department. If you have any questions concerning the fee or the amount to submit, please do not hesitate to contact the Registrations and Certifications Section. Checks should be made payable to the Louisiana Department of Environmental Quality.

FILING AN APPLICATION

A license application for radioactive material should be submitted on Form DRC-11, "Application for Radioactive Material License" and Form DRC-13, "Schedule of Radioactive Material". Since the space on Forms DRC-11 and 13 is usually not sufficient to contain all of the required information, additional sheets should be appended. Each separate sheet or document submitted with the application should be clearly identified by a heading indicating the appropriate item number.

The application should be completed in duplicate. The original should be mailed to the Registrations and Certifications Section, P. O. Box 4313, Baton Rouge, LA 70821-4313. 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. In addition, LAC 33:XV.491 requires that this information be posted or otherwise made available to employees of the licensee.

Upon completion, the application Form DRC-11 must 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.

CONTENTS OF APPLICATION

The following discussion deals with specific items on the application forms. Any section of the application which is not applicable should be so designated. Materials submitted on a separate attachment should be clearly identified.

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 Department to determine that the proposed equipment, facilities, procedures, and controls are adequate to protect health and minimize danger to life and property.

If applying for amendment to existing license, information previously submitted may be referenced.

FORM DRC-11

APPLICATION FOR RADIOACTIVE MATERIAL LICENSE

Item 1 - Enter the name of the firm applying for the license, the mailing address, telephone number, fax number, and email address.

Item 2 - Check "New License" (or "Amendment," if already licensed).

Item 3 - If the mailing address in Item 1 is a P. O. Box or if different from the location where radioactive material will be primarily stored, then list the street address where the radioactive material will be primarily stored and/or used. State if offshore work or out-of-state work will be performed in addition to work at temporary job sites in Louisiana. In an attachment, please give precise directions to the location of your storage facility in Louisiana.

Item 4 - Radiation Program Personnel

A qualified individual should be designated the responsibility for radiation protection. The individual designated as Radiation Safety Officer (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. The RSO is expected to coordinate the safe use of radioactive material and to ensure compliance with the requirements of LAC 33:XV.

Typical duties of the RSO should include the following:

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

(b) To ensure that the radioactive 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 thermoluminescense dosimeters (TLD).

(d) To ensure the radioactive 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 conduct a quarterly physical inventory to account for all sources of radiation.

(h) To conduct a program of inspection and maintenance of equipment and containers to assures proper labeling and physical condition.

(i) To serve as a point of contact and give assistance in case of emergency (well-logging tool damage, theft of radioactive materials, fire, etc.) and to ensure that proper authorities, for example, local police and Department personnel, are notified promptly in case of accident or other incident that may involve the release of radioactive material.

(j) 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 LAC 33:XV, applicant license conditions and applicant submittals to the Registrations and Certifications Section.

(k) To conduct radiation safety inspection of licensed activities periodically to ensure compliance with the regulations, license conditions and company operating procedures.

The individuals who will use or supervise the use of radioactive materials should be listed, and the qualifications and training of these individuals along with a brief resume of their experience with radioactive materials and formal training should be entered on the back of Form DRC-13. If more convenient, the information required under the "Radiological Qualifications and Training" section, may be presented on a separate attachment.

Item 5 - Personnel Monitoring

The types of personnel monitoring employed should be adequately described. Please specify the type of radiation detected by the film badges and in addition, indicate what company supplies the film badge service. State at what intervals the film badges will be exchanged and where personnel generally clip the badges.

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

If the use of pocket dosimeters is proposed, the applicant should provide the name of the manufacturer, type, model number and range (mR), and frequency of reading and recording.

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. Such 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 6a - Contamination Surveys

Please describe in detail the procedure used for determining if contamination is present on the logging tool after the completion of each log. The logging tool and well site must be surveyed for contamination when logging tools are removed from the hole and after the source has been removed from the logging tool. The survey may be performed with a survey meter or by energizing the logging tool after the source has been removed. Methods and instruments used in surface contamination surveys should be sufficiently sensitive to detect the nuclides being monitored. Records of contamination surveys must be maintained for inspection by the Department.

LAC 33:XV does not specify limits for surface contamination. Each applicant may propose and justify the levels of removable surface contamination that will be allowable before decontamination must be performed. These limits should be based on the need to avoid transfer to significant amounts of contamination to unrestricted areas and to maintain exposures as low as is reasonably achievable. Emergency instructions should be established in case contamination is detected. Decontamination procedures should be provided by the applicant.

Item 6b - Radiation Area Surveys

Please indicate in detail the methods and occasions for conducting radiation surveys. Detail the procedures employed to assure that personnel exposure is kept to a minimum during source handling. (Refer to Appendices A and/or B of this guide.)

Indicate in detail the procedure employed to assure that the source has been returned to its storage container after use for a log. In addition, indicate what records are maintained for this survey. Please submit the format used for these records.

Describe the procedure, the frequency of the procedure, and the instrument used for performing surveys for the purpose of determining radiation levels at the storage location and what quantities of radioactive material are used. Specify what records will be maintained.

Item 6c - Environmental Surveys

Environmental surveys are not applicable with the use of sealed radioactive sources.

Environmental surveys are required if radioactive tracer materials are used. In the event of a spill or a well-head ejection of radioactive material, detailed procedures should be on hand for clean-up, decontamination, and environmental and follow-up surveys. The applicant should submit these procedures with or as a part of their Health Physics Program.

Item 7 - A leak test of sealed radioactive sources used for well logging is required at six (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. If the applicant intends to perform in-house leak tests without the use of an approved commercial leak-test kit, the following information must be submitted:

(a) The name and qualification of each individual who will perform the leak test.

(b) Procedures and materials to be used in collecting test samples.

(c) The type, manufacturer's name, model number, and radiation detection and measurement characteristics of the instrument to be used for assaying the test samples. Determination and periodic verification of the counting efficiency of the instrument should be included in the measurement characteristics of the instrument.

(d) Instrument calibration procedures, including the name of the manufacturer and model number of each standard source to be used, the step-by-step calibration procedures to be followed, and the name, experience, and training of each individual who will perform the calibrations. In providing information about the standard sources used in the calibrations, applicants should provide information concerning the accuracy of each source used. Each source should be, as a minimum, + 5% of the stated value and traceable to a primary standard, such as that maintained by the National Bureau of Standards.

(e) The method, including a sample calculation, used to convert instrument readings to units of activity, e.g., microcuries.

Item 8 - Waste Disposal

The applicant should describe the procedures for disposing of radioactive material.

(a) Sealed Sources

Sealed sources containing radioactive material should be returned to the manufacturer or transferred to another licensee authorized to possess the specific quantity and form being transferred. Please note that the loss and subsequent abandonment of a radioactive source down-hole constitutes disposal, and must be indicated in disposal records.

(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 LAC 33:XV.

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

A commonly used method of disposal is transfer to a commercial firm licensed to received radioactive wastes.

Spills should be cleaned up and, if possible, injected into the well. Any wash water used to clean up or decontaminate equipment should be treated as radioactive waste.

If wash water is discharged into a sanitary sewerage system, the dilution of the activity by the sewerage must be such that the limit established for such disposal by LAC 33:XV.462 is not exceeded. If you do not have the capability of assaying the wash water for the concentration of containment in microcuries per milliliter, the amount of tracer material actually used on the job and the water consumption must be used to determine that limits are not exceeded.

If wash water is discharged into a holding tank, then the surface of the fluid in the holding tank shall be surveyed after each such decontamination operation, and if any activity above background is noted, the tank shall be posted with a radiation warning sign alerting everyone concerned of the possible hazard.

Whatever methods of waste disposal are used, records reflecting the final disposition of all radioactive materials must be maintained for inspection by the Department.

Item 9a - Health Physics Program

The applicant should describe the radiation protection program that will be implemented to ensure safe use of radioactive materials. The applicant should submit a copy of the operating and emergency procedures that individuals will follow in the use of radioactive material. Appendix A describes the elements of an acceptable radiation protection program for the use of sealed sources. Similarly, Appendix B describes the elements of an acceptable radiation protection program for tracer use of radioactive materials.

Item 9b - Physical Facilities

The applicant should describe the facilities to be used to ensure security and safe storage of materials. Sources of radiation must be stored in a manner which will minimize danger from explosion and/or fire. This provision is considered necessary to reduce the probability of damage to sources of radiation stored in the proximity of explosives frequently used in well-logging operations, and in the event of fire. U. S. Department of Transportation regulations prohibit the storage and transportation of radioactive materials with Class A and other specified explosives.

In describing available facilities, the applicant should submit the information requested in the following; subitem (a) for sealed source programs, and/or subitem (b) for tracer studies programs.

(a) Sealed Source Programs

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. Laboratories or field office facilities that are to be maintained as restricted areas for survey instrument and logging tool calibration and repairs should be described.

(b) Tracer Operations

1) Facilities and equipment for sample preparation. If tracer samples are not to be purchased in ready to use form, laboratory or field office facilities that are to be maintained as restricted areas for sample preparation should be described. Sketches are helpful. Hoods, sinks, trays with absorbent materials, remote handling tools, rubber gloves, etc, that will be available at these laboratory sites should also be described.

2) Storage provisions. The description of storage facilities should include drawings or sketches of rooms, buildings, pits, etc. showing shielding materials (concrete, steel, lead, 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 milliroentgens per hour at 18 inches from the exterior surface of the storage facility in order to meet the criteria for an

unrestricted area.

In addition to the permanent storage facility, please provide a detailed description of the precautions that will be taken for storage of material at temporary jobsites. This should include the following:

(a) A detail of the storage vault or container that is provided on transporting vehicles, including dimensions and shielding information.

(b) Posting of temporary storage facilities.

(c) Precautions that will be taken to prevent unauthorized removal of radioactive material from temporary storage facilities.

(d) Precautions that will be taken during transport. Transport containers shall be physically secured to the transporting vehicle to prevent accidental loss, tampering, or unauthorized removal.

Item 10 - Health Physics Instrumentation

A radiation survey instrument is required for all oil well logging operations. Each radiation survey instrument should be calibrated at intervals not to exceed 6 months and after each instrument servicing.

Instrumentation and survey methods used during tracer studies should be sufficiently sensitive to detect the radioisotopes being monitored. A thin-window (less than 2 mg/cm^2) GM detector must be used for beta-emitting radioisotope tracer contamination surveys.

The applicant should specify for each type of radiation detection instrument available to the program the manufacturer's name and model numbers, and 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. For instruments to be used for surveys, the instrument must have a capability of measuring a minimum of 0.1 milliroentgens per hour.

The applicant should submit details if the use of a logging tool as a survey instrument is proposed, including the radiation detected and the sensitivity range.

Instrument calibration provisions should be detailed in the application. The applicant should state the calibration frequency, and describe the methods and procedures for calibration of survey and monitoring instruments as well as any other instruments and systems used in the

radiation protection program such as measuring instruments used for assay, bioassay and/or sealed-source leak-test samples.

If instrument calibration will be performed by an organization other than the applicant, the name of the organization and the calibration frequency should be included in the application.

If an applicant wishes to calibrate instruments, the following information should be submitted:

(a) The type (radioisotope, manufacturer and model number) and activity of the source to be used and the manufacturer and model number of the device.

(b) The specific procedures to be used for calibration, including radiation safety procedures to be followed for use of the source. These procedures should include sample calculations to demonstrate an understanding of how to establish the exposure rate at a given distance and sample calculations to demonstrate an understanding of how to correct for source decay.

(c) The name and pertinent experience of each individual who will perform instrument calibration.

Item 11 - General Instrumentation

List any other radiation detection instruments available which are not routinely used for health physics surveys or monitoring.

Item 12 - Medical Supplements

Not applicable.

Item 13 - Industrial Radiography Supplements

Not applicable.

Item 14 - If a representative of another company assisted the applicant in completing the application, the name and company affiliation should be listed.

THE APPLICATION MUST BE SIGNED AND DATED

The application must be signed and dated by an official representative of the applicant, e.g., President, Department of 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.

FORM DRC-13

SCHEDULE OF RADIOACTIVE MATERIALS

Complete the required information under this schedule for all radioisotopes to be possessed and used in studies performed by the applicant.

Example:

Element	Mass No.	Maximum Possession Activity	Chemical Form	Physical State	Use	Attachment
I	131	30 mCi	NaI		Channel Location	B.3.a
Ir	192	60 mCi		Sand	Perforation Markers	D.1.b

SEALED SOURCES

Complete the required information under Sealed Source(s) and Device(s) for all radiation devices to be possessed at your facility.

Example:

Element	Mass No.	Number of Sources	Maximum Activity	Source Mfg./Model	Device Mfg./Model	Use
Cs	137	5	150 mCi	Isotopes, Inc. Model P-10	XYZ Corp. Model 7492-B	Well Logging

RADIOLOGICAL QUALIFICATIONS AND TRAINING

A resume' of the training and experience of each person who will supervise the use of radioactive material, who will use radioactive material without supervision, or who will have responsibilities for radiation safety should be submitted. User qualifications should include instructions in radiation safety practices appropriate for activities to be performed, and in company requirements, manuals and standard operating procedures, and radiation regulations, and on-the-job experience actually handling comparable materials. Descriptions of on-the-job training should include the degree of independent use, the types and quantities of materials handled, the company or other employer where the experience was gained, and the length of time over which the training occurred.

In addition, the qualifications of the Radiation Safety Officer should include familiarity with Louisiana Radiation Regulations and company requirements and procedures, general training in basic radionuclide handling techniques and safety practices, and on-the-job

experience actually handling comparable materials. Descriptions of on-the-job experience should include aspects such as the degree of independent use of radioactive materials, the types and quantities of radioactive materials handled, the types of surveys and other radiation safety duties performed, the name and address of the company or other employer where the experience was gained, and the length of time over which the experience was obtained.

IT Questions

Part of the application for a radioactive material license must include response to the "IT Questions. " The "IT Questions" were formulated by the Supreme Court in the Save Ourselves vs. Louisiana Environmental Control Commission, 452 So. 2d 1152 (La. 1984). The responses are intended to assure the Department that the activity and the site are suitable. The five questions are:

A. Have the potential and real adverse environmental effects of the proposed facility been avoided to the maximum extent possible?

B. Does a cost-benefit analysis of the environmental impact costs balanced against the social and economic benefits of the proposed facility demonstrate that the latter outweighs the former?

C. Are there alternative projects which would offer more protection to the environment than the proposed facility without unduly curtailing non-environmental benefits?

D. Are there alternative sites which would offer more protection to the environment than the proposed facility without unduly curtailing non-environmental benefits?

E. Are there mitigating measures which would offer more protection to the environment than the facility as proposed without unduly curtailing non-environmental benefits?

ADDENDUM TO PERMIT APPLICATIONS:

The “ADDENDUM TO PERMIT APPLICATIONS PER LAC 33:I.1701. This form must be completed before a license can be issued. This form can be found at : http://www.deq.louisiana.gov/portal/tabid/240/Default.aspx

APPENDIX A

RADIATION PROTECTION PROGRAM - SEALED SOURCES

Procedures should be established to ensure compliance with the provisions of LAC 33:XV, Chapter 10, "Notices, Instructions and Reports to Workers; Inspection," and Chapter 4, "Standards of Protection Against Radiation." The procedures 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

   LAC 33:XV requires that surveys be made to determine if radiation hazards exist during the use of radioactive 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 time, locating lost or dropped sources, and monitoring during any down-hole recovery operations are activities that will require surveys.

   The logging tool and well site should be surveyed for contamination when logging tools are removed from the hole and after the source has been removed from the logging tool. The survey may be performed with a survey meter or a logging tool (after the source has been removed). Leak test wipes should be surveyed with a low-range survey meter for gross contamination to determine safe handling before mailing or otherwise forwarding for assay. Such surveys can be made with a thin-window (less than 2 mg/cm^2) detector held close to a dry smear sample immediately after it is taken in the work area.

2. Quarterly Inventory

   Each licensee or registrant should conduct a quarterly physical inventory to account for all sources of radiation.

   Records must be maintained for inspection by the Department, and should include

the quantities and kinds of sources of radiation, the location where sources of radiation are assigned, the date of the inventory, and the name of the individual conducting the inventory.

3. Utilization Records

Each licensee should maintain current records, which would be kept available for inspection by the Department, showing the following information for each source of radiation:

(a) make, model number, and a serial number of each source of radiation used;

(b) the identity of the well-logging supervisor or field unit to whom assigned; and

(c) locations where used and dates of use.

The word "record" has been used instead of "log" so as not to imply a requirement that a specific log be maintained. Other records normally kept on sources of radiation would appear to be adequate if they contain the information required.

4. Inspection and Maintenance

Each licensee should conduct, at a six-month interval, a program of inspection and maintenance of source holders, logging tools, source handling tools, storage containers, and transport containers to assure proper labeling and physical condition. Records of inspection and maintenance shall be maintained for inspection by the Department.

If any inspection conducted reveals damage to labeling or components critical to radiation safety, the device must be removed from service until repairs have been made.

Each source, source holder, or logging tool containing radioactive material shall bear a durable, legible, and clearly visible marking or label, which has, as minimum, the standard radiation caution symbol, without the conventional color requirement, as required by LAC 33:XV.453 and 2018. This labeling should be on the smallest component transported as a separate piece of equipment.

5. Records Management Program

Provisions for maintenance and management review of utilization records and records of surveys, quarterly inventories, personnel exposures, leak tests and

employee training should be established. Job log sheets or other standard forms that facilitate recordkeeping of field operations should be submitted. Procedures for ordering or shipping materials, for receipt of materials, and for notification of responsible persons upon receipt should also be established.

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

Procedures for posting and controlling access to work areas that comply with the Chapter 4 of LAC 33:XV should be established. When radiation levels that exceed 2 milliroentgens per hour are created, methods for controlling access to operational areas should be established. All unnecessary personnel should be restricted from the areas. During each logging operation, the logging supervisor or other designated employee shall maintain direct surveillance of the operation to protect against unauthorized and/or unnecessary entry into a restricted area, as defined in Chapter 1 of LAC 33:XV. A restricted area usually exists for only a relatively short period to time, i.e., during the loading of the tool and insertion into the hole. "Caution - Radiation Area" signs should be posted when radiation levels exceed 5 milliroetgens in any one hour. Physical surveys or established distances form sources may be used to establish radiation areas and the need for personnel monitoring in a particular area.

7. Transportation of Radioactive Material

The transport of radioactive materials over public roads by licensees is subject to the regulations of the Department of Transportation. Chapter 15 of LAC 33:XV requires that DOT regulations be followed for transport of radioactive materials when transport is intra-state. 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 should be established to assure safe transport and should include at least the following: (a) method 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, and (c) placarding vehicles on all four sides with "Radioactive" when "Radioactive Yellow-III" labeled packages age being transported as required by regulations of the Department of Transportation (49 CFR 172.504).

When vehicles are used for temporary storage, the requirements of Chapter 4 of LAC 33:XV are applicable. Security from unauthorized removal, posting the "Caution - Radioactive Material", and radiation levels (verified by surveys) not exceeding DOT limits are acceptable practices.

8. 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) Storage Precautions. Each source of radiation must be provided with a storage and/or transport container. The container shall be provided with a lock, or tamper seal for calibration sources, to prevent unauthorized removal of, or exposure to, the source of radiation. Failure to lock transport and storage containers is a common cause of unnecessary exposure to personnel and/or the loss or theft of these sources. Tamper seals may be used instead of locks for calibration sources. The requirement that transport and/or storage containers be locked should reduce risks without imposing undue restrictions.

(b) Procedures for transporting sources to job and well sites and for storing sources in transit and onsite. Transport containers should be physically secured to the transporting vehicle to prevent accidental loss, tampering or unauthorized removal. Surveys of radiation levels around vehicles and storage sites, securing and positioning sources and containers, inspection of equipment, posting, and records to be kept should be covered.

(c) Precautionary procedures for loading the 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 area; 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.

(d) The number, type, and length of handling tools. The company must provide and require the use of tools that will assure remote handling of sealed sources other than low-activity calibration sources. 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 BY HAND.

(e) Personnel monitoring provision. 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. Any personnel monitoring device, such as a film or TLD badge, should be assigned to a specific person; i.e., these devices are not to be worn by different individuals during the period of issuance by the monitoring service company.

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

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

(h) Procedures to be followed in the event a source is lost down hole. The well-logging company should not perform wireline service operations with a sealed source unless, prior to commencement of the operation, they have a written agreement with the well operator, well owner, drilling contractor, or land owner that in the event a sealed source is lodged downhole, a reasonable effort at recovery will be made. Instruction should cover notification of owners, management, and the Radiation Licensing Section. Prevention of damage to the source during retrieval efforts, monitoring at the surface for the presence of radioactive contamination with a radiation survey instrument or logging tool during logging tool recovery operations, notification of the Department immediately by telephone if radioactive contamination is detected at the surface or if the source appears to be damaged, provisions for controlling exposures, personnel monitoring, provisions for permanently sealing the source in place, the setting of a whipstock or other deflection device and permanently marking the well when the source cannot be recovered should be included.

(i) Emergency procedures. These instructions should cover procedures to follow in case of vehicle accidents, fire, or explosion, ruptured sources, or similar emergency situations. The instructions should describe immediate actions to be taken to prevent further contamination of personnel, equipment, and facilities and evacuation of the area. The instructions should specifically state the names and telephone number of responsible persons to be notified in case of an emergency (owners, management, and the Department). LAC 33:XV.486 contains a number of specific requirements for the occasions and methods for reporting incidents.

9. Sealed Source Leak Testing

Well-logging sealed sources (and any sealed calibration sources) must be tested for leakage and contamination at intervals not to exceed six (6) months. When the supplier does not certify that such tests have been performed within six months, the sources should not be used until tested. The test must be capable of detecting the presence of 0.005 microcurie of removable 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 must be maintained for inspection by the Department. Leaking sources must be withdrawn from use.

If a test reveals the presence of 0.005 microcurie or more of removable contamination, a report shall be filed with the Department in accordance with LAC 33:XV.492.

APPENDIX B

RADIATION PROTECTION PROGRAM - TRACER STUDIES

Procedures should be established to ensure compliance with the provisions of LAC 33:XV, Chapter 10, "Notices, Instructions and Reports to Workers; Inspections," and Chapter 4, "Standards for Protection Against Radiation." The procedures should be specific and adequate to provide protection against potential radiation hazards associated 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.

1. Survey Program

LAC 33:XV requires that surveys be made to determine if radiation hazards exist during the use of radioactive 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.

Radiation surveys must be made and recorded at the jobsite or well-head for each tracer operation. These surveys shall include measurements of radiation levels before and after the operation. Survey records should be maintained for inspection by the Department.

For operations involving tracer use of radioactive material, a survey program should include monitoring, with an appropriate survey meter, of personnel (hands,

feet, clothing) and all tools, equipment and facilities at job sites for contamination and effectiveness of clean up. Such surveys can be made with a thin-window (less than 2 mg/cm^2) GM detector. Procedures should be established to minimize the chance for inadvertent spread of contamination by the contamination survey or other activities to be performed, and to determine which areas require greater attention during decontamination. Reasonable efforts should be made to remove all residual contamination. Acceptable levels of residual contamination should be established.

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. If this method of disposal is used, records must be maintained to meet the requirements of LAC 33:XV.104.

Operations with tracers may require surveys to evaluate the adequacy of storage facility shielding to determine if restricted areas must be established and posted. Chapter 4 of LAC 33:XV specifies radiation levels for unrestricted areas. Any accessible external surface of the storage facility or enclosure must meet the requirements for an unrestricted area.

2. Quarterly Inventory

Each licensee or registrant should conduct a quarterly physical inventory to account for all sources of radiation. Records must be maintained for inspection by the Department, and should include the quantities and kinds of sources of radiation, the location where sources of radiation are assigned, the date of the inventory, and the name of the individual conducting the inventory.

3. Utilization Records

Each licensee should maintain current records, which would be kept available for inspection by the Department, showing the following information for each source of radiation:

(a) a description of each source of radiation used;

(b) the identity of the well-logging supervisor or field unit to who assigned;

(c) locations where used and dates of use; and

(d) in the case of tracer materials and radioactive markers, the utilization record should indicate the radionuclide and activity used in a particular well.

The word "record" has been used instead of "log" so as not to imply a requirement that a specific log be maintained. Other records normally kept on sources of radiation would appear to be adequate if they contain the information required.

4. Inspection and Maintenance

Each licensee should conduct, at a six month interval, a program of inspection and maintenance of logging tools, source handling tools, storage containers, transport containers, and injection tools to assure proper labeling and physical condition. Records of inspection and maintenance shall be maintained for inspection by the Department.

If any inspection conducted reveals damage to labeling or components critical to radiation safety, the device must be removed from service until repairs have been made.

5. 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.

6. 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 Chapter 4 of LAC 33:XV. 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. During each logging operation, the logging supervisor or other designated employee should maintain direct surveillance of the operation to protect against unauthorized and/or unnecessary entry into a restricted area, as defined by Chapter 1 of LAC 33:XV. A restricted area usually exists for only a relatively short period of time, i.e., during the tracer sample preparation and injection into the hole. "Caution - Radiation Area" signs should be posted when radiation levels will exceed 5 mR/hr.

7. Transportation of Radioactive Material

The transport of radioactive materials over public roads by licensees is subject to the regulations of the Department of Transportation. Chapter 15 of LAC 33:XV requires that DOT regulations be followed for transport of radioactive materials when the 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/hr, and (c) placarding vehicles on all four sides with "Radioactive" when "Radioactive Yellow-III" labeled packages are being transported as required by regulations of the Department of Transportation (49 CFR 172.504).

When vehicles are used for temporary storage, the requirements in Chapter 4 of LAC 33:XV are applicable. Security of unauthorized removal, posting the "Caution - Radioactive Material," and radiation levels (verified by surveys) not exceeding DOT limits are acceptable practices.

8. 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 applications. Management should institute review procedures to assure that the established radiation safety program is followed.

Instruction covering tracer operations should be specific for each different type of study and 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 tracer study.

(b) General safety equipment. Protective gloves and other appropriate protective clothing and equipment shall be used by all personnel handling

radioactive tracer material. Precautions shall be taken to avoid ingestion or inhalation of radioactive material. A description of protective clothing (such as rubber gloves, coveralls, respirators, and face shields), auxiliary shielding, absorbent material, injection equipment, secondary containers, plastic bags for storing contaminated clothing, tissue, handling tools, etc. that will be available at well sites should be submitted.

(c) 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.

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

(e) Procedures to be used for picking up, receiving, and opening packages containing radioactive material. Provisions should be made such that the requirements of LAC 33:XV.455 are met.

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

(g) 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 name and telephone numbers of responsible persons (owners, management, and the Department) to be notified in case of an emergency. LAC 33:XV.486 contains a number of specific requirements for the occasions and methods for reporting incidents.