Radioactive Material License Guide

FOR THE USE OF SEALED SOURCES, DEVICES, AND RADIATION-PRODUCING MACHINES FOR THE PERFORMANCE OF INDUSTRIAL RADIOGRAPHY

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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 provide guidance in the preparation of an application for a Louisiana radioactive material license for possession and use of sealed sources and devices and the preparation of an application for registration of radiation-producing machines for performance of industrial radiography. Industrial radiography as used in this guide means the examination of the macroscopic structure of materials by non-destructive methods utilizing sources of radiation.

Except for those sections clearly applicable to only sealed radioactive sources, both radiation machines and sealed radioactive sources are covered by this guide.

The following Louisiana Radiation Regulations apply to industrial radiography 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.

A. Chapter 1, "General Provisions"

B. Chapter 3, "Licensing of Radioactive Material"

C. Chapter 4, "Standards for Protection Against Radiation"

D. Chapter 5, "Radiation Safety Requirements of Industrial Radiographic Operations"

E. Chapter 10, "Notices, Instructions and Reports to Workers, Inspections"

NOTE: If radiation machines will be used, Chapter 2, "Registration of Radiation Machines and Facilities" also applies.

AS LOW AS REASONABLY ACHIEVABLE

The applicant should, in addition to complying with the requirements set for in the Louisiana Radiation Regulations, make every reasonable effort to maintain radiation exposures 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 radiographers.

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 shielded position after each exposure and that radiation machines are indeed "off". The necessity of performing adequate surveys should be emphasized during initial classroom training, on-the-job training and refresher training of radiographers.

The use of collimators whenever possible and the habit of taking advantage of available shielding at temporary jobsites are also items that contribute to maintaining low occupational exposures. Again, these items can and should be addressed during initial training, on-the-job training, and refresher training.

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 try to establish and correct the cause.

Refer to Appendix E as a sample of an ALARA program that must be submitted with your application

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 Department's 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 Department. Registrations require an application fee, however, payment for registrations do not have to be submitted at this time.

FILING AN APPLICATION

An application for registration of a radiation-producing machine should be filed on Form DRC-6. An application for a license should be filed on Forms DRC-11 and DRC-13. These forms will be found at the back of this guide. In addition to Form DRC-6, information concerning training, health physics program, physical facilities and operating and emergency procedures must be submitted. The application for a new license should contain all the information specified on the application forms. The space provided on the forms is limited, therefore, the contents of the application should be submitted on additional sheets as necessary.

The application should be completed in duplicate. The original should be mailed to the Registrations & Certifications – Radiation Section, Permits Division, P. O. Box 4313, Baton Rouge, LA 70821-4313. The other copy should be retained by the applicant.

CONTENTS OF APPLICATION

The following discussion deals with specific items on the application forms, and any section of the application which is not applicable should be so designated.

Material submitted on a separate attachment should be clearly identified.

FORM DRC-6

Form DRC-6 is self-explanatory.

FORM DRC-11

Application for Radioactive Material License

Item 1 - Enter the name of the company, the mailing address and the telephone number.

Item 2 - Check new license, renewal, or amendment.

Item 3 - If the mailing address in Item 1 is a P. O. Box, or if different from the location where industrial radiography sources are usually stored, then enter the street address, city or other descriptive address (such as 5 miles east on Highway 90, Anytown, State). If radioactive material is to be used at temporary jobsites in Louisiana, offshore or out-of-state, then indicate by checking the appropriate box(es).

Item 4 - Radiation Program Personnel:

A qualified individual should be designated the responsibility of radiation protection. For additional guidance concerning the radiation safety officer, please refer to Appendix A of this guide. Primary users or individuals charged with the supervision of radioactive material should also be listed in this area. Example: List your designated Instructors and radiographers.

Item 5a - Film Badge:

The name of the film badge, thermoluminescent dosimeter (TLD) , or optically-stimulated luminescense dosimeter (OSL) supplier should be provided. The frequency of exchange of a film badge, TLD, or OSL should be specified. The minimum exchange frequency is monthly. You should state in an attachment that if the film badge, TLD or OSL is lost or damaged, the worker shall cease work immediately until a replacement film badge, TLD, or OSL is provided and the exposure is calculated for the time period from issuance to loss or damage of the film badge, TLD, or OSL. Commit that each film badge or thermoluminescent dosimeter shall be assigned to and worn by one individual.

You should also state that alarm ratemeters are used and the following are instituted:

a) The ratemeters be checked and recorded to ensure the alarm functions properly prior to use at the start of each shift;

b) Be set to give an alarm signal at the preset dose rate of 500 millirems/hour;

c) require special means to change the preset alarm function; and

d) be calibrated at periods not to exceed one year for correct response to radiation.

Item 5b - Pocket Chamber or Dosimeter:

The manufacturer, model, number and range of pocket dosimeters to be used should be provided. Pocket dosimeters shall have a range of 0 to at least 200 mR and shall be recharged at least daily or at the start of each shift. Commit that pocket dosimeters will be checked for correct response to radiation at periods not to exceed one year. You should indicate that if an individual's pocket dosimeter is discharge beyond its range (off-scale), operations by that individual shall cease and the individual's film badge, TLD, or OSL shall be processed immediately and the individual shall not

return to work with a source of radiation until a determination of the radiation exposure has been made.

Items 5c and 5d - Not applicable.

Item 6a - Contamination Surveys:

Contamination surveys are not routinely required when only sealed sources are used; however, cross-contamination of equipment from leaking radiography sources is a real possibility, and a contamination check should be performed immediately if a leaking source has been discovered.

Please provide the Department with an outline of the contamination surveys that will be performed when needed.

Item 6b - Radiation Area Surveys:

The permanent storage facility should be surveyed periodically to insure that exposure rates in unrestricted areas do not exceed the limits specified in LAC 33:XV.421. Please specify the frequency at which surveys will be made. At the time of the quarterly inventory will be acceptable.

The operating and Emergency Procedures should identify when a survey should be made, specifically, what should be surveyed, and acceptable radiation levels for the survey.

In general, a survey should be performed each time the source is manipulated or moved.

For more information concerning the requirements for radiation surveys for industrial radiography, your attention is directed to Chapter 5 of LAC 33:XV and Attachment B of this guide.

Item 6c - Not applicable.

Item 7 - Leak Tests:

Distributors of sealed sources usually supply a certificate with each source, giving the results and date of the last leak test performed on a source. If such a certificate is not received, the source is not to be used until a leak test has been performed and the results of the test received showing that the source is not leaking or contaminated. Thereafter, the source must be tested for leakage and contamination at intervals not to exceed six (6) months. Records of the testing of each source identifying the source tested, date of the test, and the results of the test in units of microcuries, must be maintained for inspection by the Department.

The leak testing of sealed sources may be performed only by persons who are specifically authorized by the Department to do so. In establishing a program for leak testing, you may choose one of three approaches:

A. You may utilize the services of a consultant or a commercial organization licensed by the Department, the Nuclear Regulatory Commission or any other Agreement State to perform leak tests. The name of consultants or commercial organization must be specified.

B. You may be licensed by the Department to use a commercially available leak test kit. Your application should specifically identify each kit you may wish to use by designating the kit's supplier and the kit model number.

C. You may be licensed by the Department to perform your own leak tests, including taking and evaluating the wipes. Should you desire to conduct your own leak test, you should submit the following information:

1) A description of the instrumentation to be used in evaluating the wipe, including its sensitivity and accuracy, and a description of your calibrating and standardizing procedures with a sample calculation showing conversion of results to the required microcurie units. Survey instruments are generally not designed for such measurements and may not be acceptable for this use.

2) A description of the material to be used in taking the wipes and the points on the equipment which will be wiped; the radiation safety procedures to be followed during the sampling process and the method for handling and disposing of the wipes.

NOTE: Samples are not taken directly from the surface of the radiographic source.

(3) A description of the training and experience that qualifies a person who will take or evaluate the wipes.

Item 8 - Waste Disposal:

Waste disposal can usually be accomplished by returning all waste to the manufacturer. If it is desired to use another firm or individual other than the manufacturer of sealed sources for waste disposal, then this firm or individual must hold a specific license to perform such services. Sealed sources may only be transferred to a person or firm holding a specific license for receipt or

disposal of radioactive material.

Item 9a - Health Physics Program:

In an attachment to the license application, describe in detail the method and procedure for control of the radioactive material. This should include an outline of the delegation of responsibility, precautions, and instructions to be given to all personnel and a format for record-keeping and a method of checking the receipt and disposal of all radioactive materials, including the utilization of all industrial radiography sources.

The radiation program administration section should be a summary describing the delegation of responsibility, the radiation safety officer's functions, the methods of ensuring the proper use of radioactive material, and how the administrative program will work to prevent any violations of the Louisiana Radiation Regulations, license or registration conditions, and operating and emergency procedures.

LAC 33:XV.575 requires each licensee to provide radiography personnel with operating and emergency procedures. The purpose of the procedures is to provide radiographic personnel with clear and specific instructions in the topics outlined in Appendix A of Chapter 5 of LAC 33:XV and other duties and responsibilities which radiography personnel may have.

The operating and emergency procedures for personnel should not contain information that does not apply specifically to the duties of radiography personnel (for example, training program descriptions, management control programs.) The operating and emergency procedures manual should be as concise as possible, containing clear and specific instructions in the duties of the radiography personnel only tailored to fit the program proposed in the application and should be complete and self-contained in a single document. Information contained in equipment manuals and other publications should be extracted and placed into the operating and emergency procedures.

There is no specific format for operating and emergency procedures. A sequential set of instructions which covers radiography operations form the beginning of the work day to the end of the work day is an acceptable format.

For additional comments that may be helpful with respect to the topics to be covered in the operating and emergency procedures, please see Appendix B to this guide.

Item 9b - The Department will not authorize permanent storage of industrial radiography sources in areas zoned as residential.

Please describe the permanent storage facility for radioactive material. This

description should include the following:

A. A description of the storage vault including a drawing with dimensions and shielding details. Survey information, if available, should be supplied.

B. A description of the security measures provided to prevent unauthorized removal of devices containing radioactive material.

C. A description of the building in which the storage vault is located, its relationship to other buildings in the area (especially to occupied office areas) and a description of the security provided by the building to prevent any unauthorized entry into the storage vault.

D. Posting of the vault and the storage 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:

1) A detailed description of the storage vault or container that is provided on transporting vehicles, including dimensions and shielding information.

2) Posting of temporary storage facilities.

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

If a permanent, shielded facility will be used for performance of radiography, a detailed description of the facility should be submitted which includes the following:

A. Drawing or sketches of the facility and its surroundings, including (1) dimensions of each enclosed area, (2) thickness, density and type of shielding material on all sides, above and below, (3) identification of entrance ways, and (4) a description of the nature of, and distance to all areas adjacent to, above and below each exposure area.

B. A description of the area safeguards such as locks, signs, warning lights and interlocking systems for each enclosed exposure area and adjacent area.

C. The results of calculations of radiation level measurements showing maximum anticipated radiation levels in all areas adjacent to each exposure area including the roof or ceiling. The type of source,

activity of the source, and position of the source within the facility, should be identified.

The objective of a shielded facility is to permit the performance of radiography within the facility so that areas outside the facility may be considered unrestricted areas and will meet the radiation level limitations in LAC 33:XV.401. See LAC 33:XV.589 for additional requirements.

Item 10 - Health Physics Instrumentation:

Instruments should be identified by manufacturer, model number and range of instrument. For instruments to be used for surveys, the instrument must have a capability of measuring a minimum of 2 milliroentgens per hour through 1 Roentgen per hour.

LAC 33:XV.543 requires that radiation survey instruments used in radiographic operations be calibrated at intervals not to exceed three (3) months and after each instrument servicing. The small check source that is incorporated into several models of survey instruments is not acceptable for calibration purposes.

If instrument calibration will be performed by an organization other than the applicant, the name of the organization 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 that will perform instrument calibration.

Item 11 - General Instrumentation:

List any other instruments used for radiation detection other than those mentioned in Item 10 such as audible or digital pocket dosimeters.

Item 12 - Not applicable.

Item 13a - Training Program for Industrial Radiography Personnel; Periodic Retraining:

An applicant for a radiography license must have an adequate program for the training of radiographers. Even if initial radiation safety training is provided by an outside entity, the licensee must have an in-house training program to provide the necessary training for radiographers in the operating and emergency procedures and use of equipment.

A *radiographer*, as defined by the Louisiana Radiation Regulation, means "any individual who has successfully completed the training, testing and documentation requirements contained in LAC 33:XV.575.A". LAC 33:XV.575 specifies that no licensee or registrant shall permit any individual to act as a radiographer as defined in Chapter 5 until such individual:

(1) Has been instructed for at least 40 hours in the subjects outlined in II, II, and III, Appendix A of this Chapter, and has demonstrated understanding thereof pursuant to LAC 33:XV.575.A.6. Both the instructor and the course of instruction must be approved by the Department prior to the time of instruction;

(2) has completed on-the-job training supervised by one or more radiographer instructors:

a) the instructor shall be authorized on the license or certificate of registration;

b) the on-the-job training shall include at least:

i) 200 hours of active participation in radioactive materials industrial radiography operations for an individual to perform industrial radiography utilizing radioactive materials, and/or

ii) 120 hours of active participation in X-ray industrial radiography operations for an individual to perform industrial radiography utilizing X-rays;

c) the hours of on-the-job training do not include safety meetings or classroom training or the use of a cabinet X-ray unit; and

d) the form DRC-20, available from the Department, or the equivalent, must be submitted documenting the on-the-job training and confirmation of certification;

(3) has received copies of and instructions in the regulations contained in Chapter 5 and the applicable sections of LAC 33:XV, Chapters 4 and 10, appropriate license(s), and licensee's or registrant's operating and emergency procedures and has demonstrated understanding thereof pursuant to LAC 33:XV.575.A.5 and 6;

(4) has demonstrated competence pursuant to LAC 33:XV.575.A.5 and 6 to use the sources of radiation, radiographic exposure devices, related handling tools, and radiation survey instruments which may be employed in his assignment;

(5) has successfully completed a company-specific written examination and field test covering the subjects listed in LAC 33:XV.575.A.3 and 4; and

(6) has successfully completed within the last five years a radiation safety examination administered by the Department or its agent. The examination must be successfully completed at least once every five years.

Please note the regulations say nothing about the individual's ability to produce an acceptable radiograph or to interpret radiographs, and is in no way related to ASNT levels. In other words, the Department's requirements for a radiographer are based strictly on the individual's radiation safety training and ability to safely use sources of radiation. Once an individual is considered a radiographer under the Louisiana Radiation Regulations, he may still not be qualified from your standpoint to meet all of your customer's needs in providing quality radiographs. However, at least he should be able to run your film safely.

Also, please note that the Department does not specifically require that all employees be called by the title, "radiographer." However, if an individual is found in the field using sources of radiation, related handling tools and radiation survey instruments without the direct personal supervision of an instructor, then this individual must meet the requirements specified in LAC 33:XV.575, and a Form DRC-20 must be on file with the Department from you, which certifies that the individual has met the requirements of LAC 33:XV.575.

A *radiographer trainee* is any individual who has successfully completed the training, testing and documentation requirements contained in LAC 33:XV.575.A.1, had 40 hours of on-the-job training in industrial radiography operations, as part of a three-person crew composed of an instructor, a radiographer, and the radiographer trainee applicant, and have submitted a DRC-20 to the Department, completing the section on trainee status. Before

an individual can be allowed to work as a trainee, he must have received written confirmation from the Department that the individual is acceptable to be a radiographer trainee and this documentation must be kept with the trainee at all times during industrial radiography operations. A trainee may be considered part of a two-man crew, but must work only under the direct supervision of an instructor who is specified on the license or registration. Trainee status will only be granted once per individual for a period of one year. Radiographer trainee status may be extended for an additional 12 consecutive months provided the trainee has taken the industrial radiography radiation safety examination administered by the Department or its agent during the first 12 months of granting radiographer trainee status.

An *instructor* is "any individual who has been authorized by the Department to provide instruction to radiographer trainees in accordance with LAC 33:XV.575.A." An instructor must have met the requirements of LAC 33:XV.575.B, has one year of documented experience as a qualified radiographer, and has been named as a radiographer instructor on the license or registration certificate issued by the Department.

For additional information concerning instructor qualifications, please refer to Appendix C of this guide.

Applicants have three (3) choices concerning the training program that they will employ. The first is an in-house training program in which the applicant hires individuals that have no previous training or experience with the use of radioactive material and provides complete instructions in all topics outlined in Appendix A of Chapter 5. The second choice is a limited training program where the applicant hires previously trained radiographers and provides the necessary on-the-job training, operating and emergency procedures instruction and the necessary instruction in the use of radiographic equipment. An example of this would be the hiring of an individual who has received instruction at a vocational-technical school but with limited or no on-the-job training or experience in the use of radioactive material. The third choice is a very limited program where the applicant proposes to hire only qualified experienced radiographers who require minimal instruction in the applicant operating and procedures and use of equipment.

Please see Appendix C for additional information concerning the training programs mentioned above.

Item 13b - Internal Management Review Procedures and Control

Describe the internal inspection system or other management control. This should include a description of:

1. The qualifications of each person who is responsible for maintaining

such control.

2. The type and frequency of internal inspections to be made to comply with LAC 33:XV.575.C.

3. The responsibilities of each person in the program.

4. The procedures for recording and reporting deficiencies to appropriate management personnel.

5. The educational follow-up program to be utilized in correcting deficiencies noted during inspection.

The type and extent of the radiography programs to be conducted will usually determine the nature of the system and inspection frequency. Periodically, (at least quarterly inspections), of radiography operations shall be made by persons with authority in management on both and announced and unannounced basis. This person should have a thorough knowledge of equipment, procedures, and regulations and a level of competency at or above that expected of a radiographer. Management should make a continuing review of quarterly inventories, utilization logs, records of receipt and disposal of licensed material, records of personnel monitoring and surveys.

Item 13c - Organizational Structure

Active control over the radiography program must be exercised by management personnel in positions of authority. Submit a description of the overall organizational structure pertaining to the radiography personnel, including specific delegation of authority and responsibility for the program.

Each individual in the line of authority should be identified by name and his duties and responsibilities relating to the radiography program should be described in detail. The training and experience of each individual that qualifies him to perform his duties and accept his responsibilities should also be described. Appendix A describes duties that must be performed by the licensee's management personnel. The individual(s) assigned these duties may bear the title of Radiation Safety Officer, Radiation Protection Officer, or some similar designation.

Please answer the following:

A. Corporation:

1) Number of shares authorized, number of shares issued, stock value per share, total number of (a) shareholders and (b)

subscribers

2) Corporate officers: names of the 5 principal officers, their titles, and number of shares owned in the corporation.

3) If corporation directly or indirectly owned by another corporation or other legal entity, names and addresses of other corporations or legal entity and description of extent of control.

4) Names and addresses of any individual, corporation, or other legal entity that (a) owns 10% or more of the stock of applicant corporation issued and outstanding, or (b) subscribing to 10% or more of authorized but unissued stock of the corporation.

5) Name of state, district, territory or possession under laws applicant is incorporated under.

If a partnership, please answer:

1) Name and address of each individual or legal entity owning a partnership interest in applicant.

2) Percent of ownership or applicant partnership held by each individual or legal entity listed in A.1

3) Name of state, district, territory or possession under laws applicant partnership is organized under.

Other:

1) Description of nature of applicant and state, district, territory or possession under laws organized under.

2) Total number of members or persons holding an ownership in applicant, identifying each by name, address, and ownership interest.

Item 14 - Enter the name and the company affiliation of anyone other than an employee of your company who assisted in the preparation of this application.

DATE AND SIGN THE APPLICATION UNDER ITEM 14 AND SUBMIT THE ORIGINAL TO THE DEPARTMENT

FORM DRC 13

Schedule of Radioactive Materials

Sealed Sources - List all sources of radiation that are requested for use by the applicant, i.e., sources for industrial radiography cameras.

Sealed sources which the applicant wishes to possess and use should be listed by radioisotope, manufacturer, and model number. For sources of Iridium-192 in excess of 100 Ci nominal, please refer to Appendix D for additional requirements. The maximum amount of radioactivity in each source should be specified. The number of sources that the applicant desires to possess at any one time need not be specifically stated.

If sources are to be used for instrument calibration and are not the same sources that will be used for performance of radiography, specific information concerning manufacturer, model number and quantity of radioactive material should be specified.

The radiographic exposure devices that the sources will be used in should be designated by manufacturer and model number. The sources identified in Item 4 should be keyed to the devices in which they will be used.

If source exchangers will be used, each source exchanger should be identified by manufacturer and model number and should be keyed to the source-device combinations with which they will be used.

The suppliers of equipment should be contacted concerning the model number of sources, devices, and source changers to assure that the information contained in the application is accurate. Improperly identified equipment may require additional correspondence.

Uranium - Thorium - Plutonium - Depleted uranium used as shielding should be included in this section.

Radiological Qualifications and Training - Complete the requested information for all individuals listed under Item 4, "Radiation Program Personnel" on Form DRC-11. This information may be submitted on a separate attachment if desired, but the attachment must be referenced.

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

SUBMIT ONLY THE ORIGINAL TO THE DEPARTMENT

APPENDIX A

DUTIES AND QUALIFICATIONS OF AN RSO FOR INDUSTRIAL RADIOGRAPHY

The individual or individuals assigned the duty of maintaining active management of the radiation control program is generally expected to perform the following duties and to assist in maintaining exposures as low as reasonably achievable. The list is not intended to be all inclusive, nor should it be interpreted as a requirement that any one person assume all the listed duties. Information pertaining to the applicant's specific program should be submitted and include such duties as may be performed by management personnel such as the following:

A. Serving as the licensee's liaison with the Department on license or registration matters.

B. Develop and maintain up-to-date operating and emergency procedures.

C. Establish and maintain a personnel monitoring program.

D. Procure and maintain an adequate number of operable and properly calibrated radiation survey instruments.

E. Establish and conduct a training program for radiographers.

F. Examine and determine competency of radiographic personnel.

G. Maintain exposure devices, storage facilities and equipment.

H. Establish and maintain the internal inspection program.

I. Perform source replacement.

J. Establish and conduct a survey instrument calibration program.

K. Assume control and institute corrective action in emergency situations.

L. Investigate the cause of incidents and determine necessary preventive action.

M. Establish and maintain the licensee's record-keeping system.

In order for the Radiation Safety Officer to fulfill the requirements of the above duties, it is immediately apparent that his training and education must be at least equivalent to the requirements for an industrial radiographer. The Radiation Safety Officer must possess a thorough knowledge of equipment, procedures, and regulations, and a level of competency at, or above that expected of a radiographer. The licensee must determine who, in the

organization, meets these requirements and can fulfill these duties; and submit that person('s) resume(s) to the Department. As a general guideline, the Department expects a Radiation Safety Officer to be a qualified radiographer with at least two (2) years experience with the equipment and procedures that he is likely to encounter.

APPENDIX B

Operating and Emergency Procedures

The following are item by item comments on the topics outlined in LAC 33:XV.576:

A. The handling and use of sources of radiation to be employed such that no individual is likely to be exposed to radiation doses in excess of the limits established in Chapter 4:

Step-by-step instructions of the "cookbook type" for the use and handling of radiographic exposure devices and related equipment should be provided. When appropriate, the procedures should include instructions for use of collimators or other auxiliary shielding material.

If source exchange is to be performed by radiography personnel, step-by-step instructions for source exchanges, including surveys to be performed during the source exchange and before shipment should be provided. The acceptable radiation levels for the survey should be in the procedures.

If radiography personnel are to perform instrument calibration, step-by-step instructions, including radiation safety precautions and procedures to be followed, should be included in the operating and emergency procedures.

If the manufacturer's operating procedures will be followed, then these should be provided in your operating and emergency procedures manual, not merely referenced.

B. Method and occasions for conducting radiation surveys:

The procedures should identify when surveys shall be made, including what should be surveyed and the acceptable radiation levels for the survey. Surveys that need to be performed include:

1. After each exposure, to ensure that the source has been returned to the shielded position. This survey should include both the source tube, if one is used, and the device.

2. The perimeter of the restricted area. NOTE: It is not necessary to survey the perimeter of the high radiation area, in keeping with the ALARA concept.

3. Determination of radiation levels at the external surfaces of temporary storage facilities.

4. Determination of radiation levels in the cab and around vehicles used for transporting sources and devices. (EXAMPLE): Survey (at surface and at 6", all sides) upon removal from storage; if levels exceed regulatory limits, immediately return to storage and notify RSO; if levels OK, compare with last survey of device to ensure source in shielded position and meter OK; recommend recording survey results on utilization log.

5. Determination that the sources are in a safe storage position prior to securing a radiographic exposure device or storage container. Record survey results; exterior surfaces must be less than 2 mR/hr or 100 mR/hr in 7 days.

6. Determination that the containers prepared for shipment comply with the requirements in the Department of Transportation Regulations.

C. Methods for controlling access to radiography areas:

Instructions to radiographic personnel for the control of access to radiography areas should be specifically stated in the procedures. The primary method for access control is surveillance of the area by the radiographic personnel. To help personnel delineate the area that they must maintain surveillance over, a perimeter must be established. (Restricted - 2 mR/hour or at radiation area - 5 mR/hr). This is often done with ropes or other barricade material. It must be remembered, however, that this barricade material will probably not keep all individuals out of the radiography area, and therefore, radiography personnel must maintain constant surveillance of the area so that the source can be returned to the shielded position or the X-ray machine turned off if an unauthorized individual does enter the radiography area.

In addition to establishing the perimeter of the restricted area, the perimeter of the radiation area must be posted with "Caution, Radiation Area" signs. The "Caution, Radiation Area" sign may be posted at the perimeter of the restricted area. Again, it is understood that the use of signs will not necessarily keep individuals out, however, this will assist radiographic personnel in establishing the area over which they must maintain surveillance. If individuals are maintaining adequate surveillance over the radiation area and can prevent entry, then the high radiation area (100 mR/hr) does not have to be posted. This is in accordance with the definition of "high radiation area" which means "any area accessible to individuals in which there exists radiation at such levels that a major portion of the body could receive in any one hour, a does in excess of 100 millirems." In other words, if adequate surveillance is being maintained to prevent the entry into a high radiation area at temporary jobsites, it is generally not necessary to post that high radiation area. This is also in accordance with the ALARA concept due to unnecessary radiation that the radiographic personnel would receive, when trying to establish the high radiation area every time the source was moved from one location to another within the restricted area. However, there may be situation in which the high

radiation area must be posted, therefore instructions for posting the high radiation area must be provided.

Instructions for control of access to permanently established facilities should be separate from the instructions for temporary jobsite operations. These should include instruction in the use of control devices and warning devices that may be incorporated into the facility and the control of keys.

D. Methods and occasions for locking and securing radiographic exposure devices, storage containers and sealed sources:

The procedures should contain instructions to secure the source at the time of the survey to determine that the source has been returned to the shielded position after each exposure. This is usually accomplished by locking the device. However, there may be occasions when some other method might be preferred.

Instructions and procedures for storage of sources and devices at both permanent and temporary jobsites including posting of storage area, and surveys around the storage area should be in the procedures. Any area outside the storage area should be considered an unrestricted area.

E. Personnel monitoring and the use of personnel monitoring equipment:

The instructions should contain requirements for radiographic personnel to wear their personnel monitoring devices so that any exposure received will be accurately reflected by the devices. These instructions should contain directions for proper storage of personnel monitoring devices, exchange of personnel monitoring devices, charging of pocket dosimeter, and the frequent reading of pocket dosimeters. In addition, step-by-step instructions for action to be taken in case a pocket dosimeter is found to be off-scale should be in the procedures with the name of appropriate personnel to contact in such an incident.

F. Transportation to field locations, including packaging of sources of radiation in the vehicles, posting of vehicles, and control of sources of radiation during transportation and receipt procedures:

Receipt of Radioactive Material:

1) If RAM package is delivered by carrier to a facility, make arrangements for delivery; if to be picked up at carrier's terminal, must make arrangements for pickup within 72 hours of notification of package's arrival.

2) Radioactive material packages are to be surveyed ASAP after receipt at facility, no later than 3 hours after receipt if during normal working hours or 18 hours if after normal working hours.

3) If survey shows radiation levels on exterior surface is greater than 200 mR/hr or 10 mR/hr at 1 meter, must immediately notify delivering carrier and department.

4) Description of procedures for opening radioactive material packages must include: handled only by radiographer or under supervision of radiographer, wear dosimetry, and use operable and calibrated survey meter.

The transportation of radioactive material over public highways in exposure devices or storage containers is subject to the Chapter 15 of LAC 33:XV. and the U. S. Department of Transportation Regulations (DOT)

The Department recommends that the following instructions be provided; however, this will not insure compliance with all of the DOT requirements and is not intended to be a guide for compliance with DOT regulations.

The procedures should contain instructions on how exposure devices and storage containers should be secured within a transporting vehicle to prevent movement and possible damage to, or loss of, the exposure device or storage container.

There should be instructions for surveys in and around the vehicle. For the passenger compartment, it is recommended that the radiation level not exceed 2 milliroentgens per hour. Although it is not specifically required for transport, there are occasions when the vehicle may be used for storage and the area outside the vehicle should be considered an unrestricted area so that a specification of the radiation level of 2 milliroentgens per hour at a distance of 1 meter from any external surface of the vehicle should be provided. When a vehicle is used for storage, it must be posted with a "Caution, Radioactive Material" sign.

Placarding - If package TI requires Yellow III labeling, vehicle must be placarded on all four sides.

G. Minimizing exposure of individuals in the event of an accident:

Instructions to radiographic personnel should include emergency procedures in the event of an accident.

These procedures must contain clear and specific instructions concerning emergency situations. The steps to be taken by radiographic personnel should, in general, be limited to:

1. Surveying the area;

2. Establishing the restricted area;

3. Notifying appropriate persons; and

4. Maintaining direct surveillance and control over the area until the situation is corrected.

H. The procedure for notifying proper personnel in the event of an accident or unusual occurrence:

The operating and emergency procedures should contain the names and telephone numbers of the persons to be contacted.

I. Maintenance of records:

The operating and emergency procedures should contain instructions to radiographic personnel, outlining the records that must be maintained by them during the course of their work. This would include, but not necessarily be limited to, the following:

1. Dosimeter records;

2. Utilization records;

3. Survey records; and

4. Records of the daily inspection and maintenance of radiographic equipment.

J. The daily inspection and maintenance of radiographic exposure devices, storage containers, radiation machines, survey meters and personnel monitoring devices:

The procedures should contain specific instructions for the radiographer to perform daily inspections of radiographic equipment that he might use. These checks may not be as detailed as the quarterly inspection and preventive maintenance performed by management, but should in general, follow the guidelines recommended by the manufacturer of the equipment. A check list should be provided for the radiographer listing the items to be covered in the daily inspection. If the equipment manufacturer's procedures are to be followed, then this should be included as a part of the operating procedures, not merely referenced.

APPENDIX C

INDUSTRIAL RADIOGRAPHY PERSONNEL

A. In-House Training Program

If the applicant desires a broad training program, the Department must be provided with a narrative description of your complete training program. This narrative must cover the following items:

1. Initial Classroom Training:

A description of the manner in which each radiographer trainee will be instructed in all topics outlined in Appendix A of Part E of the Louisiana Radiation Regulations must be provided. It should include a detailed outline (more detailed than that in Appendix A) of the course content, including specifications of the approximate time to be spent on each major area of instruction. Please find below an example of the format of the outline that the Radiation Licensing Section requires:

TOPIC	TIME
I. Fundamentals of Radiation Safety	
A. Characteristics of Radiation	5 hours
1. The Atom	
2. Isotope	
3. Radioactive Decay	
4. Kinds of Radiation	
a. Alpha	
b. Beta	
c. Gamma	
d. Neutron	
5. Properties of Radiation	
a. Energy	
b. Ionization	

B. Units of Radiation and Quantity of Radioactivity — 5 hours

1. Activity

a. Curies
b. Millicuries
c. Decay curve

2. Radiation Dose

The outline should reflect the material that will be presented in your course and the approximate times that will be spent on each subject. The times and subjects given above are not intended to be the optimum, but are merely used as an example.

If the initial classroom training is given by an outside consultant, or outside service organization, the training course will not usually instruct the trainee with respect to an applicant's particular equipment, facility and procedures. Therefore, if outside training is to be used, instruction given to supplement that training with respect to the applicant's own equipment, facilities and procedures, and the method to be used to determine each trainee's competence should be included in the program description. If an outside consultant or outside service organization will be used, the name of the organization should be specified. Only outside consultants or outside service organizations that have specific authorization from the Department, the U. S. NRC or any other Agreement State to provide initial classroom training may be used.

2. On-the-Job Training

A period of on-the-job training, including observation of the individual engaging in the use of radiographic exposure devices and associated equipment by an instructor, should be described. The minimum time that will be spent and the content of on-the-job training should be specified. The instructor providing on-the-job training and supervising the individual during this period may be a person other than the one providing the initial classroom training. However, this person must be specified in your program and a resume for each proposed instructor must be submitted to the Department for authorization. These instructors should be the more experienced radiographers with a record of safe performance and should be listed on the license.

3. Periodic Refresher Training:

This should include a description of the content and frequency of training sessions given for the purpose of ensuring:

A. The knowledge and proficiency of radiographers and instructors with respect to new regulations, procedures, policies and equipment.

B. Continuing proficiency with present equipment and procedures.

It is expected that, as a minimum, periodic refresher training will be conducted at least annually.

4. Testing Procedures

A description of each test to be given should be submitted.

A written test is required for the initial classroom training. Written tests, oral examinations, demonstrations, or a combination of all may be used for other phases of the training program.

A description of a written test may be given by submitting a sample test with the answer for each question.

The effectiveness of any test is reduced if given so repeatedly that the students gain knowledge of its content. You should clearly indicate in your course description that each test is a sample only and that the test will be changed periodically at a stated minimum frequency.

Please specify what is considered a passing grade, the relative importance assigned to each question or area of performance, and the retraining procedures for those questions missed to ensure that a trainee has a thorough understanding of all subjects outlined in Appendix A of Part E.

A description of an oral examination should be given in the same form as a written examination.

Practical or on-the-job demonstration examining procedures may be described in terms of the areas of performance to be checked by the examiner such as performance of radiation surveys, posting and operation of equipment.

5. Instructor's Qualifications:

A resume of training and experience of each instructor must be submitted to

the Department. If an individual teaches only certain parts of the course, this should be specified. Example: If a radiographer is chosen to provide on-the-job training, then this should be clearly stated in the application. The Department reserves the right to evaluate instructors by administering examinations to them, attending their lectures, or administering examinations to individuals that have successfully completed their training courses. The person who makes the final determination of the adequacy of the individual's knowledge and competency should have a strong background of training and experience with radiation and radiographic operations.

6. Text Books and References:

A list of textbooks and references to be used must be submitted to the Department.

7. Records:

Records must be maintained to demonstrate that an individual has received all necessary instructions and on-the-job training prior to working as a radiographer. These records should include copies of tests given to each trainee, documentation of performance on oral and practical exams and the examiner's overall evaluation of the trainee's qualification to act as a radiographer. In addition to maintaining these records for inspection by the Department, the licensee must submit a Form DRC-20 to the Department, certifying that all of the requirements in LAC 33:XV.575 have been met. A copy of this form is attached to this licensing guide. This copy should be maintained in your files as an original and duplicated as necessary.

B. Limited Training Program:

If an applicant does not have the qualified personnel to present the initial classroom training, or if qualified personnel are available but do not have the time to devote to such an undertaking, the licensee may hire previously trained radiographers and provide the necessary on-the-job training, operating and emergency procedures instruction and necessary instructions in the use of radiographic equipment. In such a case, the narrative description of your training program should include the following items:

1. A description of the instruction that the individual will be given in the applicant's operating and emergency procedures. Please see paragraph A.5 for instructor's qualifications.

2. A description of the instruction that will be given in the use of applicant's authorized radiography and safety-related equipment. Please see paragraph A.5 for instructor's qualifications.

3. A detailed description of the test that will be used to determine the individual's knowledge and understanding of the regulations, the applicant's operating and emergency procedures, and the use of the applicant's equipment.

4. A period of on-the-job training, including observation of the trainee's use of radiographic devices and associated equipment by an instructor, should be described. Please see paragraph A.2 for additional information concerning on-the-job training.

5. A description of the periodic refresher training that will be given. Please see paragraph A.3 for additional information concerning refresher training.

6. Records - Records must be maintained documenting that the individual has received the initial classroom training and that he has received the appropriate training in the applicant's operating and emergency procedures and use of equipment. Documentation of the initial classroom training may be a copy of Form DRC-20 or some other statement from the individual who provides the instruction which certifies that the individual has successfully completed a course of instruction in topics outlined in Appendix A of Chapter 5 of LAC 33:XV.33. In addition, copies of any examination given to the radiographer, either written or oral, must be maintained for inspection by the Department. In addition to maintaining these records for inspection by the Department, the licensee must submit a Form DRC-20 to the Department, certifying that all requirements in LAC 33:XV.575 have been met. A copy of this form is attached to this guide.

C. Very Limited Program:

In cases where the radiography company is very small or does not have the personnel to provide appropriate training, or in cases where the radiography program is limited to a few individuals and personnel turnover is not anticipated, a training program may not be necessary, provided each individual has adequate training and experience. In such a situation, the application should request that specific individuals be named on the license in lieu of submitting details of a complete training program. The qualifications of each individual requested as a radiographer should be submitted along with documentation that the individual has received instruction in the use of authorized equipment and the applicant's operating and emergency procedures. A Form DRC-20 must accompany each request.

Even if the applicant does not have a formal training program, periodic refresher

training must be provided and a description of this periodic refresher training must be submitted to the Department. For addition detail concerning this item, please refer to paragraph A.3 of this appendix.

APPENDIX D

Due to an increasing number of requests from firms performing industrial radiography to use activities of Iridium-192 in excess of 100 Curies nominal, the Department has established the following conditions under which a license may be issued:

A. 1. That the applicant will always use a collimator approved by the Department unless prior approval from the Department is obtained to proceed otherwise.

2. The source activities in excess of 100 Curies nominal shall not be used offshore, on lay-barges or on cross-country pipelines.

3. That the applicant will agree to voluntary impoundment of such sources until their activities are below 100 Curies nominal in the event a violation or a regulation, condition or supporting statement of the applicant in relation to such sources is determined by the Department to have occurred.

Your application for activities in excess of 100 Curies nominal of Iridium-192 should include, but not necessarily be limited to, the following:

B. 1. Given the name of manufacturer and model number of device and source; isotopes and maximum activity desired; name and model number of collimator to be used.

2. Give an exact description of the type of work to be performed and the location(s) of such work. Diagrams and drawings will be helpful.

3. Given an explanation of why higher activities are needed. Please note that, in this regard, a shorter exposure time does not necessarily constitute adequate justification. Data on exposure times should be provided, giving comparisons with activities of 100 and 200 Curies nominal on various thicknesses of steel at specified distances.

4. Describe the precautions your company will take to insure that personnel exposures shall be maintained as low as reasonably achievable. This should include items such as: length of crankout (at least 35 feet), use of collimators, use of other auxiliary equipment, adequate surveillance of the side, and adequate posting of the site.

5. If high activity is critical in your proposed work, at what point in the decay curve (source activity) do you plan to replace the source? How will this be done?

6. What changes have you made in your operating and emergency

procedures in order to cope with disconnects or other emergency situations?

Upon receipt of the above information, the Department will be pleased to consider your request. We recognize that equipment is commercially available which will safety contain 200 Curies nominal of Iridium-192; however, our greatest concern is for the safety of personnel and by-standers when the source is exposed and in emergency situations.

APPENDIX E

ALARA PROGRAM

1. PURPOSE

Chapter 4 of LAC 33:XV, establishes standards for protection against radiation hazards. In addition to complying with the requirements of Chapter 4, every reasonable effort should be made to maintain radiation exposures as low as reasonably achievable (ALARA), taking into account the available technology, the economics of improvements, and other applicable considerations related to the use of ionizing radiation in industrial radiography.

The primary concept of the ALARA philosophy is that unnecessary exposure to radiation should be avoided. The objective is to reduce radiation exposures as far below regulatory limits as is reasonably achievable by means of good radiation protection planning and practice, as well as by a management commitment to policies that deter departures from good practices.

2. MANAGEMENT COMMITMENT

We, the management of
_____, are committed to the program described below for keeping radiation exposures (individual and collective) as low as reasonably achievable.

A. It will be a management priority that all radiographic personnel be make aware of our commitment to the ALARA philosophy and that they be instructed in the procedures and precautions to be used to keep their radiation exposure as low as possible. Management has established two Investigational Exposure Levels (IELs) below regulatory limits that, if reached, will initiate an investigation by the radiation safety officer (RSO) of the cause of the exposure and to determine what actions can by taken to reduce to probability of recurrence. The IELs are (1) 300 millirem per month, and (2) 600 millirem per quarter.

B. Management has delegated authority to the RSO to ensure adherence to ALARA principles. Management will support the RSO in instances where this authority must be asserted.

C. Management will make all reasonable modifications to procedures, equipment, and facilities to reduce exposures, unless the cost is considered to be unjustified. We will be able to demonstrate that improvements have been sought, that modifications have been considered, and that they have been implemented where reasonable. We will be prepared to describe the reasons for not implementing

modifications that have been recommended.

3. RADIATION SAFETY OFFICER RESPONSIBILITIES

A. The RSO will emphasize the ALARA philosophy in all training of radiographic personnel, and will encourage personnel to review current procedures and propose changes to reduce exposure levels.

B. The RSO will conduct weekly reviews of pocket dosimeter reports and monthly reviews of film badge (or TLD) reports for all radiographic personnel to determine if unnecessary exposures are being received. The RSO will sign and date each report reviewed.

C. The RSO will investigate in a timely manner the causes of all personnel doses equaling or exceeding the IELs listed above. If warranted, the RSO will take corrective actions to ensure that all unnecessary exposures are halted and recurrence is prevented. A report of each investigation and the actions taken, if any, will be recorded and maintained for inspection purposes.

INVESTIGATIONAL EXPOSURE LEVELS (IEL)

Monthly IEL	Quarterly IEL
300 millirem	600 millirem

D. At least annually, the RSO will conduct a formal ALARA audit of the company's radiation safety program. The audit will include reviews of the company's personnel exposure records, internal audits, and any incidents. The goal of the audit will be to assess trends in occupational exposure as an index of the ALARA program's success and to determine if modification of the company's radiation safety program is needed. A summary of the results of each ALARA audit, including a description of actions proposed and taken, will be documented by the RSO, discussed with management, and signed and dated by both. A report on each audit will be maintained on file for inspection purposes for 2 years from the date of the audit.

The undersigned certify that the program set forth above has been implemented.

Signature (RSO)	Signature (Management)
Name and Title	Name and Title