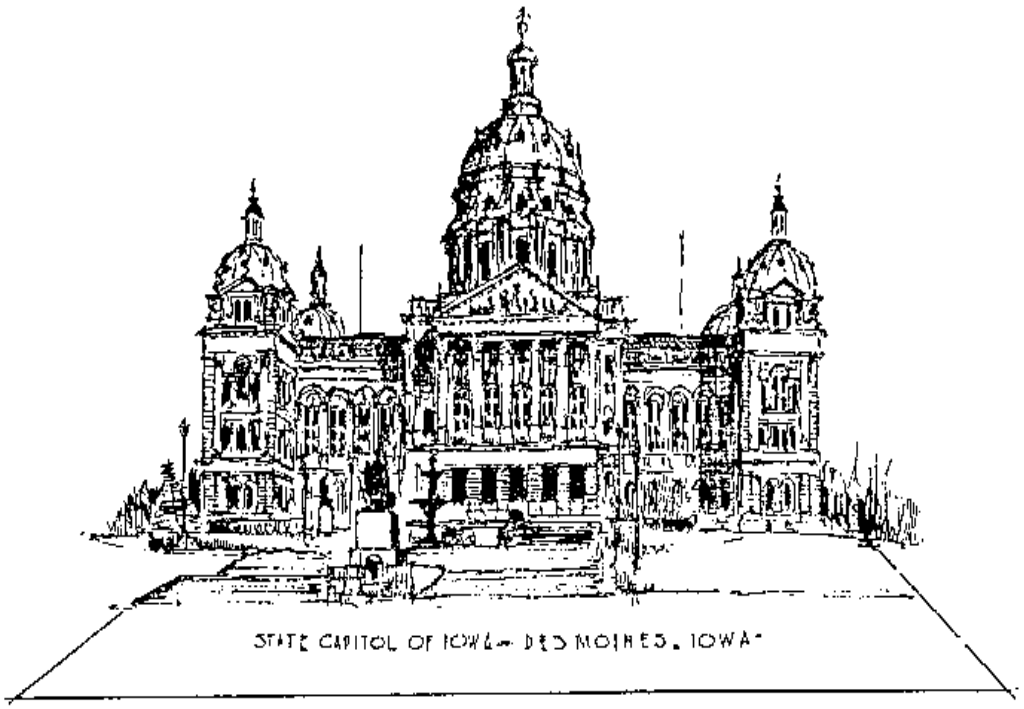
IOWA DEPARTMENT OF PUBLIC HEALTH

INDUSTRIAL RADIOGRAPHY EXPOSURE DEVICES REGULATORY GUIDE



Iowa Department of Public Health
Bureau of Radiological Health
Radioactive Materials Section
Lucas State Office Building, 5th Floor
321 East 12th Street
Des Moines, Iowa 50319-0075

IDPH REGULATORY GUIDE FOR INDUSTRIAL RADIOGRAPHY EXPOSURE DEVICES

INDUSTRIAL RADIOGRAPHY EXPOSURE DEVICES

1. INTRODUCTION

1.1 PURPOSE OF GUIDE

This guide is designed to describe the type and extent of information needed by the IDPH to evaluate an application for the use of sealed sources used in industrial radiography. The term radiography as used in this guide means the examination of the structure of materials by nondestructive methods that use gamma-emitting radionuclides. The radionuclides most commonly used are Cobalt-60 and Iridium-192.

The information in this guide is not a substitute for training in radiation safety or for developing and implementing an effective radiation safety program. You should carefully study this guide and all the regulations identified in this guide and then complete the application. The IDPH may request additional information when necessary to provide reasonable assurance that you have established an adequate radiation protection program.

1.2 APPLICABLE REGULATIONS

In addition to 641-45, other regulations pertaining to the industrial radiography exposure devices are found in Chapter 38, 39, and 40 of the Radiation Machines and Radioactive Materials Rules. You may go to www.idph.state.ia.us and click on Health Protection and Environmental Health. Follow the links to the Bureau of Radiological Health. The regulatory guides can be found by further following the links to Radioactive Materials.

1.3 AS LOW AS IS REASONABLY ACHIEVABLE (ALARA) PHILOSOPHY

Paragraph 641-40.1(3) states "...Every reasonable effort should be made to maintain radiation exposures and releases of radioactive material in effluents to unrestricted areas as low as is reasonably achievable (ALARA)." As an applicant, you should consider the ALARA philosophy in the development of work plans involving radioactive materials.

The success of an ALARA program depends on the cooperation of each person who works at your facility. Management should make a formal policy commitment to the ALARA philosophy and implement that commitment with adequate resources.

The Radiation Safety Officer (RSO) and management are required to audit the by-product material program to ensure the continued safe use of by-product material. The RSO is also responsible for the day-to-day operations of the radiation safety program.

A model ALARA management program is contained in Appendix A to this guide. Applicants are required to consider the ALARA philosophy in the development of plans for radioactive materials.

2. FILING AN APPLICATION

You should apply for a license by completing form 229-0514, "Application for Radioactive Materials License." Complete Items 1 through 5 and 14/15 on the form itself. For Items 6 through 12, submit the information on supplementary pages. Identify and key each sheet or document with the item number on the application. All typed pages, sketches, and, if possible, drawings should be on 8 1/2 X 11 inch paper to facilitate handling and review. If larger drawings are necessary, they should be folded to 8 1/2 X 11 inches. You should complete all items in the application in sufficient detail for the IDPH to determine that your equipment, facilities, training and experience, and radiation safety program is adequate to protect the health and safety of the public as well as your employees.

Please note that license applications are available for review by the general public in the IDPH offices. Do not submit proprietary information unless necessary. If submittal of such information is necessary, please clearly specify the proprietary information. Failure to do so may result in disclosure of propriety information to the public or substantial delays in processing your application.

Do not submit personal information about your individual employees unless it is necessary. For example, the training and experience of individuals should be submitted to demonstrate their ability to manage radiation safety programs or to work safely with radioactive materials. Home addresses and home telephone numbers should be submitted only it they are part of an emergency response plan. Dates of birth, social security numbers, and radiation dose information should be submitted only if specifically requested by IDPH.

Submit one copy of your application to the Bureau of Radiological Health, Iowa Department of Public Health, Lucas State Office Building, 5th Floor, 321 East 12th Street, Des Moines, Iowa 50319-0075. Retain one copy because the license will be issued based on the statements and representations in your application and supplements to it as well as the requirements in the regulations. The statements and representations you make as if they were regulations will bind you.

3. CONTENTS OF AN APPLICATION

The following comments apply to the indicated items of IDPH Form 229-0514. The appendices serve to provide additional information on certain subject areas, to provide a model procedure you may adopt in response to an item on the application form, or to provide a procedure for review by the IDPH staff.

If you have specific questions after careful review of this guide, contact the IDPH material licensing staff at Iowa Department of Public Health, Radioactive Materials Section, Lucas State Office Building, 5th Floor, 321 East 12th Street, Des Moines, Iowa 50319-0075, or call 515-281-3478.

ITEM 1.a. -- APPLICANT'S NAME AND MAILING ADDRESS

The applicant should be the corporation or other legal entity applying for the license.

The address specified here should be the mailing address for correspondence. This may or may not be the same as the address at which the material will be used as specified in Item 1.b.

ITEM 1b. -- LOCATIONS OF USE

You should specify each location of storage or use by the street address, city, and state or other descriptive address (such as 5 miles east on Highway 10, Anytown, Iowa) to allow us to easily locate your facilities. A post office box address is not acceptable. Also specify if the location is only for storage of sources and devices. If you will conduct operations at temporary job sites, you should specify "temporary job sites in Iowa." If a device will be used in a permanent facility or facilities, you should give the specific address of each.

ITEM 2. -- PERSON TO BE CONTACTED ABOUT APPLICATION

You should provide the name and telephone number of the individual who knows your proposed radioactive materials program and can answer informational questions only about the application. This individual, usually the Radiation Safety Officer (RSO) or a principal user of radioactive materials, will serve as the point of contact during the review of the application and during the period of the license. If this individual is not your full-time paid employee, specify your relationship with this individual. Notify the IDPH if this individual changes. Unless the contact person is the RSO, a contact change is for information only. It would not be considered an application for a license amendment.

Any requests from the IDPH concerning additional commitments, procedures, or for changes to the application will be addressed to the CEO with a copy to the RSO. The CEO can designate a different person if the authorization to make commitments on behalf of the licensee is provided in writing to IDPH.

ITEM 3. -- LICENSE INFORMATION

For a new license or renewal of an existing license, check the appropriate block. Provide the license number where indicated for amendments or renewals.

ITEM 4. -- INDIVIDUAL USERS

List the names of all individuals that will serve as Radiographer Trainer and their IDPH, ASNT, or other Agreement State ID card number. Each user must be approved in accordance with 641-45.1(10) “Training and Testing for Radiographic Personnel.”

ITEM 5. -- THE RADIATION SAFETY OFFICER

State the name and training and experience of the person who is designated by management to serve as the Radiation Safety Officer (RSO) and who will be responsible for the day-to-day radiation safety program. The RSO’s qualifications and specific duties shall be in accordance with 641-45.1(10)”d.” The RSO must be a full-time employee of the licensee. Even if the licensee employs a consultant to assist the RSO, the licensee is still responsible for the day-to-day operation of the radiation safety program as required by the license.

The Radiation Safety Officer (RSO) is responsible for ensuring that the licensee's radiation safety program is implemented in accordance with approved procedures. Therefore, the RSO needs independent authority to stop operations that are considered unsafe. The RSO also needs sufficient time and commitment from management to fulfill certain duties and responsibilities to ensure that radioactive materials are used only by authorized individuals and in a safe manner.

ITEM 6 -- RADIOACTIVE MATERIAL

Using the format of Table I as an example, provide the following information:

1. Identify the manufacturer of the radiographic exposure device and any source changers in which the sealed sources will be used or exchanged.
2. Identify the model number of each device.
3. Identify each radioisotope that will be used in the radiographic exposure device or source changer.
4. Identify the manufacturer of each sealed source that will be used in the radiographic exposure device or source changer.
5. Identify the model number of each source.
6. Specify the amount of radioactive material that will be in each sealed source. Sources exceeding 200 millicuries of Iridium-192 and 100 millicuries of Cobalt-60 will not routinely be approved for temporary job-site use. To use these sources at temporary job sites, provide specific information concerning
   - where the sources will be used,
   - the conditions of use, and
   - how surveillance will be conducted to prevent entry into the restricted area.

   Operating and emergency procedures should provide special guidance governing the use of such sources with particular emphasis on area surveillance.

You should consult with your supplier to be sure that your sources and devices conform to the sealed source and device designations of the US Nuclear Regulatory Commission (NRC) or Agreement State and meet the requirements of 641-45.3(4).

NOTE: It is the practice of IDPH to provide flexibility in the number of identical sealed source/device combinations you may want to possess at any one time. Therefore, it is not necessary for you to specify the number of identical source/device combinations.

ITEM 7. -- PURPOSE FOR WHICH LICENSED MATERIAL WILL BE USED

Confirm that each sealed source, device, and source/device combination possessed will be possessed and used in accordance with the conditions specified in the Sealed Source and Device registration certificate. For information on the SSD registration certificates, contact IDPH.

Confirm that associated equipment is compatible with the exposure devices, source changers, and sealed sources containing by-product material.

Confirm that only radiographic exposure devices, source assemblies or sealed sources and all associated equipment that meets the requirements specified in 641-45.3(4) will be used in radiographic operations.

For each source, indicate:

- the source manufacturer
- the source model number
- the radioisotope
- the maximum activity (usually in curies)
- the exposure device manufacturer

- The exposure device model number
- the source changer manufacturer
- the source changer model number

Table I is ***an example*** of the format and the information that should be provided.

Table 1 - Industrial Radiography Source, Exposure Device, and Changer Information		
Source Manufacturer	Amersham	Source Production and Equipment Co., Inc. (SPEC)
Source Model Number	A424-9	T-5F
Radioisotope	Iridium-192	Iridium-192
Maximum Activity (Ci)	100 Curies	100 Curies
Exposure Device Manufacturer	Amersham	Source Production and Equipment Co., Inc. (SPEC)
Exposure Device Model Number	660B	150
Source Changer Manufacturer	Amersham	Source Production and Equipment Co., Inc. (SPEC)
Source Changer Model Number	650L	C-1

ITEM 8. -- INDIVIDUALS RESPONSIBLE FOR RADIATION SAFETY PROGRAM

Submit a description or chart of the overall organization pertaining to the radiography program. Specify the name and title of each individual who has responsibility for management or supervision of the program.

ITEMS 9 THROUGH 11

Your responses to these items should consist of one sentence that says you will follow the model procedure in the appropriate Appendix, or that you have enclosed your procedure for IDPH review. Before you respond to an item, read the introductory paragraphs of the referenced appendix. Lengthy responses should be appended as attachments and reference the corresponding item number.

If you edit a model procedure solely to name specific individuals, equipment by serial number, room numbers, or other site-specific information, there is no need to submit that procedure for

review. Procedures should allow for replacement of identical equipment, personnel, and survey meters.

ITEM 9. -- TRAINING

No licensee shall allow any individual to act as a radiographer, radiographer trainee, or radiographer trainer until the individual meets the requirements in 641-45.1(10)"a", "b", or "c."

Describe your training program for individuals who work in the vicinity of radioactive material. See Appendix B of this guide.

Describe the annual refresher-training program, including topics to be covered and how the training will be conducted.

Submit a description of your program for inspecting the job performance of each radiographer and radiographer trainee at intervals not to exceed six months.

Submit a description of the training given to ancillary personnel. Confirm that initial training will be provided and specify the frequency of refresher training.

ITEM 10. -- FACILITIES AND EQUIPMENT

ITEM 10.1. -- ANNOTATED DRAWING FOR STORAGE OF DEVICES

Submit an annotated drawing of the room or rooms and adjacent areas where radiographic exposure device will be stored. Include the following:

1. The scale. Use the same scale (preferably 1/4 inch = 1 foot) for all drawings.
2. The type, thickness, and density of shielding materials on all sides of storage area (including the floor and roof).
3. Types of posting and their locations.
4. The locations of entranceways and other points of access into the installation.
5. Security controls to prevent unauthorized access.
6. A description of the nature of the areas adjacent to the installation, and the distance to these areas.
7. The results of radiation-level calculations or actual radiation measurements adjacent to, above, and below the installation.

ITEM 10.2. -- ANNOTATED DRAWING FOR PERMANENT INSTALLATION

Permanent radiographic installations requiring high radiation area entrance controls of the type described in 641-40.42(1)"b' and "c" must also meet the requirements of 641-45.1(9).

1. Submit the same information for use areas required in 10.1 for storage areas.
2. Describe the visible, audible signal system. Identify its location and describe how it meets the requirements of 641-45.1(9) "a" and "b".
3. Submit the results of radiation level calculation or actual radiation measurements adjacent to, above, and below the installation. For determination of installation adequacy, provide information showing that the radiation level in all directions around the installation, including the roof, will not exceed 2.0 mrem (0.02 mSv) in any one hour. Identify the type of source including isotope, amount, and the position of the source within the installation for the calculations or measurements. Take into account the

highest quantity of radioactive material that will be used in the installation and any limitations on source positioning in the installation.

Variances will be considered if construction requirements preclude shielding the roof to meet the 2.0 millirem (0.02 mSv) in any one hour. Provide the following information to obtain approval for a variance:

a. Means of access to the roof.
b. Procedures for ensuring that no individual is on the roof or could gain access to the roof during performance of radiography.
c. A commitment that the roof will be posted with "Caution (or Danger) Radiation Area" signs.
d. The steps taken to minimize radiation on the roof.

A radiation level on the roof that exceeds 100 millirem (1.0 mSv) per hour at 30 cm from the surface will not be considered acceptable. This level constitutes a high radiation area and requires special precautions such as visible-audible signal system required by 641-45.1(9).

4. Identify limitations on positioning of sources or type and amount of radioactive material that may be used in the installation to ensure that areas adjacent to, above, and below the installation will be unrestricted areas during performance of radiography.

ITEM 10.3. -- SURVEY EQUIPMENT

Describe your survey instruments. Instrumentation must cover the range from 2.0 milliroentgens (0.02 mSv) per hour to 1.0 roentgen (10 mSv) per hour and be calibrated according to 45.1(5)"b." Electronic calibrations alone are not acceptable. Records of equipment problems and maintenance performed must be retained for three years. Battery changes are not considered "maintenance."

In order to assure that the radiation surveys are accomplished, you must maintain an adequate number of appropriate radiation survey instruments that are both calibrated and operable at each location where radioactive material is present.

If you are using an outside contractor to calibrate your survey instruments, provide the name, address, and license number of the company or individual. If you are calibrating your own instruments, request the specific regulatory guide for calibrating instruments from the IDPH.

ITEM 11. -- RADIATION SAFETY PROGRAM

You, as the licensee, are responsible for the conduct of your radiation safety program and for all actions of your employees. In addition to the information above, review the following appendices carefully. Commit to the specific appendix, submit your own procedures using the appendix as a guide, or indicate "not applicable."

Appendix A	Guidance for maintaining occupational radiation exposure as low as reasonable achievable (ALARA)
Appendix B	Training
Appendix C	Personnel monitoring program
Appendix D	Reserved
Appendix E	Operating and Emergency Procedures
Appendix F	Model procedure for leak-testing sealed sources
Appendix G	Radiation Safety Program Audit
Appendix H	Model Six-month Radiographer/Radiographer Trainee Inspection Checklist

Appendix I Transportation

ITEM 11.1. -- LEAK TESTING OF SEALED SOURCES

641-45.3(5)"b" requires that each sealed source shall be tested for leakage at intervals not to exceed 6 months. The leak test should be performed at 6-month intervals. The instrumentation should be sufficiently sensitive to detect 0.005 microcurie of radioactivity.

The options for leak testing are:

1. Engage the services of a consultant or commercial facility to take samples, evaluate the samples, and report the results to you.
2. Use a commercial leak-test kit. You take the smear and send the smear to the kit supplier, who reports the results to you.
3. Perform the entire leak-test sequence yourself, including the smears and measurement.

For Option 1, specify the name, address, and license number of the consultant of commercial organizations.

For Option 2, specify the kit model number and the name, address, and license number of the kit supplier. In your application, you should state that the test samples will be taken by the individuals specified in Item 8 who are responsible for your radiation safety program. Commit to Appendix F.1.

For Option 3, indicate how the test sample will be taken. Specify the instrumentation that will be used for measurement. An instrument capable of making quantitative measurements should be used. Hand-held survey meters will not normally be considered adequate for measurements. Include a sample calculation for conversion of the measurement data to microcuries. You should also specify the individual who will make the measurement and his or her qualifications. The individual should have prior experience in making quantitative measurements, and this experience should be documented in your application. Commit to Appendix F.1 and F.2.

ITEM 11.2. -- MAINTENANCE

641-45.1(8)"a" requires each licensee to inspect radiographic exposure devices, storage containers, and source changers before each day or shift of use. 641-45.1(8)"b" requires the licensee conduct a program, of inspection and maintenance of radiographic exposure devices, storage containers, and source changers to ensure proper functioning of components important to safety. Inspections and maintenance should be accomplished at intervals not to exceed three months or before use (if stored for any longer period). As a minimum, this program shall cover the items listed in Chapter 45, Appendix B of the Iowa Radiation Machines and Radioactive Materials Rules. You must commit to a program of inspection and maintenance and submit the procedures.

ITEM 11.3. -- TRANSPORTATION OF DEVICES TO FIELD LOCATIONS

641-39.5(5) requires that transport of licensed material be carried out in accordance with the applicable requirements of the Department of Transportation (DOT).

It is your obligation to obtain a copy of the DOT regulations on transportation of radioactive materials. The requirements for package labeling are in subpart E of 49 CFR Part 172 of the

DOT regulations. General requirements for shipping and packaging radioactive material are in Subpart I of 49 CFR Part 173 of the DOT regulations. The address to write for a copy of these regulations is:

US Government Bookstore
120 Bannister Road
Kansas City, MO 64137
(816) 765-2256

You should state that packaging and transport of the device will be carried out in accordance with the applicable DOT regulations.

The following items should be covered in the instructions to personnel:

- Labeling containers appropriately (i.e., when to use labels Radioactive White I, Radioactive Yellow II, or Radioactive Yellow III.)
- Securing the exposure device or storage container within the transport vehicle.
- Preparation of shipping papers. The instructions should specify that the papers must be completed before transporting licensed material and must be accessible in the driver's compartment at all times.
- Placarding both sides, the front, and the back of the vehicle with "RADIOCTIVE" placards if the package being transported requires a Radioactive Yellow III label.
- If an exposure device is transported in an overpack, the procedures should include instructions that the overpack must be properly marked with the shipping name and identification number, and labeled (Radioactive White I or Radioactive Yellow II).

ITEM 11.4. -- INVENTORIES

State that you will conduct inventories, at intervals not to exceed three months, to account for all sealed sources and devices containing depleted uranium received and possessed under your license. You should maintain records of the inventories for at least two years from the date of the inventory. The records should include the radionuclide and amount of material in each source; the manufacturer's name, model number, and serial number of each device containing depleted uranium or by-product material; location of each device and date of inventory.

ITEM 11.5. -- ANNUAL AUDIT OF RADIATION SAFETY PROGRAM

641-40.10(3) requires the annual audit. This will be reviewed during inspections.

Note: If you incorporate the items listed in Appendix B.1. of Chapter 45 in your audit checklist, it will meet the requirements of 641-40.10(3).

ITEM 11.6. -- OPERATING AND EMERGENCY PROCEDURES

You should state on your application that you will provide the operating and emergency procedures to each person who uses the device. Submit the detailed operating and emergency procedures to the IDPH for review. You should cover the topics required by 641-45.3(6)"a". See Appendix E for sample operating and emergency procedures.

ITEM 12. -- WASTE MANAGEMENT

641-40.70(136C) specifies that general requirement for disposal of licensed material (i.e., the radioactive source). Because of the nature of the licensed material contained in devices, your only option for disposal is to transfer the material to an authorized recipient as specified in paragraph 641-40.70(1)"a." You should state that disposal will be by transfer of the radioactive material to a licensee specifically authorized to possess it.

Authorized recipients are the original suppliers of the device, a commercial firm licensed by an Agreement State or the NRC to accept radioactive waste from other persons, or another specific licensee authorized to possess the licensed material. No one else is authorized to dispose of your licensed material.

ITEM 13. -- LICENSE FEES

1. An application fee paid in full is required by 641-38.8(2) for all new licenses and amendments. Fee information is available in the above rule or our web site at www.idph.state.ia.us. An application received without a fee or with an inadequate fee may be returned to you. Fees for processed applications are not refundable. Make check or money order payable to the IDPH.

2. An annual fee will be assessed based on the license category and is due by September 1st of each year. IDPH sends a billing invoice in July of each year for the annual fee.

3. Review 39.4(26) “Financial Assurance and Recordkeeping for Decommissioning.” Submit financial assurance as described or provide information that exempts the facility.

ITEM 14/15 -- CERTIFICATION

A senior partner, the president, director, or chief executive officer must sign the application. Identify the title of the office held by the individual who signs the application.

If the senior partner, president, director, or chief executive officer wishes another person other than himself to sign the application, a delegation of authority must be enclosed. It should be that the person signing the application has authority to commit the facility to the conditions of the application and any amendments submitted later.

4. AMENDMENTS TO A LICENSE

After you are issued a license, you must conduct your program in accordance with (1) the statements, representations, and procedures contained in your application, (2) the terms and conditions of the license, and (3) the IDPH rules.

It is your obligation to keep your license current. You should anticipate the need for a license amendment as far in advance as possible. If any of the information provided in your application is to be modified or changed, submit an application for a license amendment signed by the person delegated in Item 14/15 and include the appropriate amendment fee.

The licensee may not place into effect any amendment until receiving written verification from the IDPH that the amendment has been approved.

An application for a license amendment may be prepared either on the application form 229-0514 or in letter form. Your application should identify your license by number and should clearly describe the exact nature of the changes, additions, or deletions. References to previously submitted information and documents should be clear and specific and should identify the pertinent information by date, page, and paragraph. For example, if you wish to change the responsible individual, your application for a license should specify the new individual's name, training, and experience. The qualifications of the new responsible individual should be equivalent to those specified in Item 8 of this guide.

5. RENEWAL OF A LICENSE

An application for the renewal of a license should be filed at least 30 days before the expiration date. This will ensure that the license does not expire before the final action on the application has been taken by the IDPH as provided for in paragraph 641-39.4(34). The application for the renewal should not reference material that was previously submitted.

If you do not wish to renew your license and cannot dispose of all the licensed radioactive material in your possession before the expiration date, you must request a license renewal for storage only of the radioactive material. The renewal is necessary to avoid violating IDPH regulations that do not allow you to possess licensable material without a valid license.

6. IMPLEMENTATION

The information in this regulatory guide is guidance, not requirement. The IDPH reviews each application to ensure that users of byproduct material are capable of complying with IDPH's regulations. This guide provides one set of methods approved by the IDPH for meeting the regulations and represents the minimum acceptable standards.

7. INSPECTIONS

IDPH conducts initial inspections of new radiological programs between six months and one year after licensed material is received and operations have begun. Subsequent routine inspections of licenses are normally scheduled after the initial inspection. The routine inspections are scheduled at intervals corresponding to frequency, which is indicated in the IDPH Radioactive Materials Fee Schedule.

APPENDIX A

GUIDANCE FOR MAINTAINING OCCUPATIONAL RADIATION EXPOSURE
AS LOW AS REASONABLY ACHIEVABLE (ALARA)

ALARA is achieved through:

1.) Evaluating jobs to reduce occupational doses;
2.) Ensuring adequate controls are in place to prevent public dose; and
3.) Providing instruction to workers to ensure they understand ALARA principles.

If you chose to use the model procedure contained in this appendix, state in your application that, "We will establish and implement the model ALARA program published in Appendix A of INDUSTRIAL RADIOGRAPHY REGULATROY GUIDE." Submit the signed Model ALARA Program shown on the next page.

If you prefer, you may develop your own ALARA program for IDPH review. If you do so, you should consider for inclusion all the features in the model program and carefully review the requirements of 641-40.10(136C). State in your application, "We have established a ALARA program for your review that is appended as Appendix A" and submit your program.

Model ALARA Program

_____
(Licensee's Name)

_____
(Date)

1. Management Commitment

   a. We, the management of this facility, are committed to the program described in 641-40.10 for keeping individual and collective doses as low as reasonably achievable (ALARA). In accord with this commitment, we hereby describe an administrative organization for radiation safety and will develop the necessary written policies, procedures, and instruction to foster the ALARA concept within our facility.

   b. We will perform a formal annual review of the radiation safety program, including ALARA considerations. This will include reviews of operating procedures and past dose records, inspections, etc., and consultations with the radiation safety staff and outside consultants.

   c. Modifications to operating and maintenance procedures and to equipment and facilities will be made if they will reduce exposures, unless the cost, in our judgment, is considered unjustified. We will be able to demonstrate, if necessary, that improvements have been sought, that modifications have been considered, and that they have been implemented when reasonable. If modifications have been recommended but not implemented, we will be prepared to describe the reasons for not implementing them.

   d. In addition to maintaining doses to individuals as far below the limits as is reasonably achievable, the sum of the doses received by all exposed individuals will also be maintained at the lowest practicable level. It would not be desirable, for example, to hold the highest doses to individuals to some fraction of the applicable limit if this involved exposing additional people and significantly increasing the sum of radiation doses received by all individuals.

2. Education Responsibilities for ALARA Program.

   The Radiation Safety Officer will schedule briefings and educational sessions to inform workers of ALARA program efforts.

_____ _____
(Date) (Management Representative Signature)

_____ _____
(Date) (Radiation Safety Officer 's Signature)

APPENDIX B

TRAINING

In addition to 641-40.111(136C)]

The following guidance may be used to develop a training program. If you use the frequency and subject listings to develop your training program, the application should state, “We will establish and implement the model training program that is published in Appendix B to the IDPH Regulatory Guide For Industrial Radiography Devices."

If you prefer, you may develop your own training program. If you do so, carefully review the requirements of 641-45.1(10) and 641-40.111(136C). State in your application, “We have established a training program for your review that is appended as Appendix B.” Provide a detailed outline of each topic covered in the course.

You should not assume that prior occupational training, certification, etc have adequately covered safety instruction. Site-specific training should be provided for all workers. Ancillary personnel whose duties require them to work near radioactive material (whether escorted or not) need to be informed of applicable topics listed in 641-40.111(136C).

The safety course for prospective radiographers requires at least 40 hours of classroom instruction. Regardless of whether you choose to implement the model program or one of your own, you should:

- Identify the course segments by title and instructor.
- Submit a description of each demonstration provided in the course.
- If any equipment or visual aids are used, provide a description. These may include filmstrips, videotapes, movies, dummy sources, survey instruments, and handling equipment.
- Provide a copy of books, training manuals, workbooks, and handouts used in the course. If these resources are available commercially, you may provide the title, author(s), and publishing companies.
- Submit a copy of a typical examination together with the correct answers to the examination questions. Indicate the passing grade and describe the re-instruction to be given in areas in which individuals are found deficient. Indicate the frequency at which the test will be periodically changed. Provide the security measures taken to protect the examination and the answers. The examination should include at least three questions on each topic addressed in Appendix A of Chapter 45 to ensure that the student has demonstrated an understanding of each topic.

Records of training will include the date of training. These records will be retained for 3 years.

INSTRUCTOR QUALIFICATIONS:

Identify the instructor who will instruct in the classroom, and the topics in which they will provide instruction.

Submit specific information about the qualifications of the instructors. Include the location and date of their training in the principles of radiation, radiation safety. Identify their industrial radiography experience. The person who instructs individuals in the classroom on the principles of radiation and radiation safety should have a knowledge and understanding beyond that obtainable in a course similar to the one provided to the radiographers. Alternatively, that person should possess a thorough understanding of the operation of radiographic equipment (e.g., a manufacturer's service representative).

MODEL PROCEDURE

Personnel will be instructed:

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

Instruction for individuals in attendance will include the following subjects:

1. Applicable regulations and license conditions.
2. Areas where radioactive material is used or stored.
3. Potential hazards associated with radioactive material in each area where the employee will work.
4. Appropriate radiation safety procedures.
5. Licensee’s in-house work rules.
6. Each individual’s obligation to report unsafe conditions to the RSO.
7. Appropriate response to emergencies or unsafe conditions.
8. Worker’s right to be informed of occupational radiation exposure.
9. Locations where notices, copies of pertinent regulations, and copies of the current license (including applications and applicable correspondence).
10. Review of operating procedures.
11. Question and answer period.

APPENDIX C

PERSONNEL MONITORING PROGRAM

In addition to 641-40.36, 40.37, and 45.1(12)”b”(1)

You may use the following program to monitor personnel external exposure. If you chose to use the model procedure contained in this appendix, state in your application that, “We will establish and implement the model Personnel Monitoring program published in Appendix C of INDUSTRIAL RADIOGRAPHY REGULATROY GUIDE."

If you prefer, you may develop your own personnel-monitoring program for IDPH review. If you do so, you should consider for inclusion all the features in the model program and carefully review the requirements of 641-Chapters 40 and 45. State in your application, “We have established a personnel monitoring program for your review that is appended as Appendix C” and submit your program.

MODEL PROCEDURE

1. The RSO will promptly review all exposure records to look for workers whose exposure is unexpectedly high or low.
2. All individuals who are occupationally exposed to ionizing radiation on a regular basis will be issued a film badge that will be processed by a contract service on a monthly basis.
3. All individuals who are exposed to radiation on an occasional basis such as secretarial personnel and service personnel who deliver packages will not normally be issued exposure monitors.
4. Submit the name, address, and license number of the company who will process the personnel monitoring.
5. Monitoring devices should be stored in a cool, dry place away from possibility of accidental exposure.

APPENDIX D

(RESERVED)

APPENDIX E

OPERATING AND EMERGENCY PROCEDURES

You may use the following model procedure to leak-test sealed sources. If you follow the model procedure for Operating and Emergency Procedures, you may say on your application, "We will establish and implement the model procedure for Operating and Emergency Procedures that was published in Appendix E to the IDPH Regulatory Guide For Industrial Radiography Devices."

You may develop your own procedure for review. If you do so, you should consider for inclusion all the features in the model and carefully review the requirements of the Iowa Rules. Say on your application, "We have developed operating and emergency procedures for your review that is appended as appendix E," and submit your operating and emergency procedures.

THE FOLLOWING ARE MODEL OPERATING AND EMERGENCY PROCEDURES:

A. Handling and Use of Sources of Radiation

Procedures should include systematic procedures for the handling and use of devices containing sources of radiation so that an individual will not receive an exposure in excess of the limits specified in 641-Chapter 40.

B. Methods and Occasions for Conducting Radiation Surveys

The procedures should identify

- when surveys will be made,
- what should be surveyed,
- the acceptable radiation levels.

Necessary surveys include:

1. Surveys that verify that the source has been returned to the shielded position. These surveys are accomplished after each exposure. This survey should include both the source tube, if one is used, and the device.

2. Surveys of the restricted area perimeter. NOTE: It is not necessary to perform a survey of the perimeter of the high radiation area. Exposure levels may be determined by calculation, 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 of transportation vehicles and around vehicles used for transporting sources and devices.

5. Determination that sources are in safe storage positions before securing radiographic exposure devices or storage containers.

6. Determinations that the containers prepared for shipment comply with the regulations of the Department of Transportation.

NOTE: All but the first item above must be documented and records maintained for inspection by the Agency. Exposure levels should be expressed in milliroentgens per hour.

C. Methods of Controlling Access to Radiographic Areas

1. Procedures should ensure that a second radiographer observes the operations and is capable of providing immediate assistance to prevent unauthorized entry.

2. Include procedures to control access to areas in which radiographic operations are being performed such as posting, constant surveillance of perimeter of the restricted area, and steps to follow when unauthorized personnel enter the restricted area.

D. Methods and Occasions for Locking and Securing Radiographic Exposure Devices, Storage Containers and Sealed Sources

1. 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, other methods may be preferred.

2. You should state that the radiographic exposure device will be stored in a locked enclosure such as the transport vehicle, store room, closet, shed, etc., in a way that will prevent access by unauthorized persons. You should keep in mind that the radiographic exposure device needs to be in storage or physically watched by an authorized user at all times. It is not acceptable for a radiographic exposure device to be chained to a post or left lying unattended at the place of use during lunch or breaks, because the radiographic exposure device would then be accessible to unauthorized persons.

3. Instructions and procedures for storage of sources and devices at both permanent and temporary job sites including posting of storage areas, 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

1. Procedures should state that personnel are required to wear direct-reading pocket dosimeters, alarm rate-meters, and personnel monitoring devices (film badges, TLDs, or OSDs) when they are engaged in radiographic operations. Personnel should be instructed to charge pocket dosimeters at the start of each workday so that the dosimeters are capable of reading full scale. Readings should be recorded at the beginning and end of each workday. Alarm rate-meters should be tested at the start of each shift to ensure that the alarm functions properly (sounds). Include instructions about how and where dosimetry devices are to be stored when not in use.

2. Instructions for action taken in the case a pocket dosimeter is lost, damaged, or found to be off-scale.

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

1. The transportation of radioactive material over public highways in exposure devices or storage containers is subject to the regulations in 641-39.5(5) and the US Department of Transportation Regulations (DOT).

2. 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.

3. 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 (mR) per hour. Although it is not specifically required for transport, there are occasions when the vehicle may be used for storage. In that case, the area outside the vehicle should be considered an unrestricted area so that a specification of the radiation level of 2 mR per hour at 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.

G. Minimizing Exposure of Individuals in the Event of an Accident

These procedures must contain clear and specific instructions concerning emergencies. In general, the steps to be taken by radiography personnel should 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

Procedures should be provided with the name of appropriate personnel to contact in case of an accident or unusual occurrence. IDPH telephone numbers should be included.

I. Maintenance of Records

Procedures should contain instructions to radiography personnel, outlining the records that must be maintained 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

These procedures should contain specific instructions for the radiographer to perform daily inspections of radiographic equipment. These checks may not be as detailed as the quarterly inspection and preventive maintenance but should, in general, follow the guidelines recommended by the manufacturer of the equipment. A checklist 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.

K. Identifying and Reporting Defects and Noncompliance.

If radiography personnel discover any malfunction or defect in radiography equipment, instructions should require management notification so that it can take appropriate reporting action.

APPENDIX F

MODEL PROCEDURE FOR LEAK-TESTING SEALED SOURCES

You may use the following model procedure to leak-test sealed sources. If you follow the model procedure for taking leak-test samples for analysis by a contractor, you may say on your application, "We will establish and implement the model procedure for leak-testing sealed sources that was published in Appendix (F.1 and/or F.2) to the IDPH Regulatory Guide For Industrial Radiography Devices."

You may develop your own procedure for review. If you do so, you should consider for inclusion all the features in the model and carefully review the requirements of Iowa Rules. Say on your application, "We have developed a leak-test procedure for your review that is appended as Appendix F," and submit your leak-test procedure.

F.1 MODEL PROCEDURE FOR TAKING LEAK-TEST SAMPLES

1. Make a list of all sources to be tested. This should include at least the isotope, the activity on a specified date, and the physical form.

2. If you will be testing sources stronger than a few millicuries, set out a survey meter, preferably with a speaker, so you can monitor your exposure rate.

3. Prepare a separate wipe sample for each source. A cotton swab, injection prep pad, filter paper, or tissue paper is suitable. Number each wipe so you will know for which source it is to be used. Samples should be taken as follows:

    a. For small sealed sources, it may be easier to wipe the entire accessible surface area. Pay particular attention to seams and joints.
    b. For larger sealed sources and devices, take the wipe near the radiation port and on the activating mechanism.
    c. If you are testing radium sources, they should also be checked for radon leakage. Submerging the source in a vial of fine-grained charcoal or cotton for a day can do this. Then remove the source and analyze the absorbent sample as described below. A survey should be done to be sure that sources are adequately shielded during the leak-test period.

F.2. MODEL PROCEDURE FOR ANALYZING LEAK TEST SAMPLES

The samples will be analyzed as follows:

1. Select an instrument that is sufficiently sensitive to detect the levels listed in 40.32. For beta sources, a proportional flow counter, liquid scintillation counter, or thin-end-window GM survey meter may be appropriate. For gamma sources, A GM instrument or a scintillation detector with either a ratemeter or scaler may be appropriate. Dose calibrators used in nuclear medicine are not sufficiently sensitive.

2. To estimate the detection efficiency of the analyzer used to assay the wipe samples, assay a check source that has the same isotope as the sealed source and whose activity the supplier certifies. If one is not available, it will be necessary to use a certified check source with a different isotope that has a similar spectrum. If calculations demonstrate that the instrument is not sufficiently sensitive to detect 0.005 microcurie, a different instrument must be used.

3. Assay the wipe sample. It must be in the same geometry relative to the detector as was the certified check source.

4. Record the wipe sample in counts per minute. Then calculate and record the estimated activity in microcuries on the wipe sample.

5. Continue the same analysis procedure for all wipe samples.

6. If the wipe sample activity is 0.005 microcurie or greater, notify the RSO. The source must be withdrawn from use to be repaired or disposed of in accordance with IDPH rules.

7. Record model number and serial number (if assigned) of each source tested, radionuclide and estimated activity, measured activity of each test sample in microcuries, description of method used to test each sample, date of test, and signature of RSO. Maintain records for 5 years.

APPENDIX G

MODEL ANNUAL AUDIT CHECKLIST

ORGANIZATIONAL STRUCTURE

a.	Matches license conditions	☐ N/A	☐ Yes	☐ No
b.	Temporary sites authorized	☐ N/A	☐ Yes	☐ No

RADIATION SAFETY OFFICER

a.	Named on license	☐ N/A	☐ Yes	☐ No
b.	Fulfills duties as RSO [641-45.1(10)"*d*"(3)]	☐ N/A	☐ Yes	☐ No
c.	Meets requirements [641-45.1(10)"*d*"]	☐ N/A	☐ Yes	☐ No

RADIOGRAPHER TRAINERS

a.	Trainers listed in license	☐ N/A	☐ Yes	☐ No
b.	Have appropriate ID card [641-45.1(10)"c"]	☐ N/A	☐ Yes	☐ No
c.	Radiographers have ID card [[641-45.1(10)"*b*"]	☐ N/A	☐ Yes	☐ No
d.	Radiographer Trainees have trainee status card [641-45.1(10)"a"(3)]	☐ N/A	☐ Yes	☐ No

AUDIT HISTORY

a.	Last audit conducted on: _____			
b.	Deficiencies identified.	☐ N/A	☐ Yes	☐ No
c.	Were they corrected?	☐ N/A	☐ Yes	☐ No

SCOPE OF PROGRAM

a.	Are there multiple authorized locations of use?	☐ N/A	☐ Yes	☐ No
	If multiple locations authorized, list locations audited.	☐ N/A	☐ Yes	☐ No
b.	Have there been radiation safety program changes? [39.4(31)"c"]	☐ N/A	☐ Yes	☐ No
	If yes, list changes.			

TRAINING, RETRAINING, AND INSTRUCTION TO WORKERS

a.	Instructions to workers provided. [40.111]	☐ N/A	☐ Yes	☐ No
b.	Training program conducted according to license commitments.	☐ N/A	☐ Yes	☐ No
c.	Radiographers are familiar with:			
	1. The rules contained in 641 Chapter 45 and the applicable sections of 641-Chapters 38, 39, and 40	☐ N/A	☐ Yes	☐ No
	2. The appropriate conditions of the license or registration	☐ N/A	☐ Yes	☐ No
	3. The operating and emergency procedures	☐ N/A	☐ Yes	☐ No
d.	Copies are furnished to radiographer trainees and radiographers [641-45.1(10)"a"(1)]	☐ N/A	☐ Yes	☐ No
e.	Specific training			
	1. Written tests completed by all radiographers and radiographer trainees.	☐ N/A	☐ Yes	☐ No
	2. Oral tests	☐ N/A	☐ Yes	☐ No

3.	All radiographers completed on-the-job training	☐ N/A	☐ Yes	☐ No
4.	Periodic training program implemented	☐ N/A	☐ Yes	☐ No
5.	Records maintained [641-45.1(10)"e"]	☐ N/A	☐ Yes	☐ No

OPERATING AND EMERGENCY PROCEDURES

a.	Procedures are current	☐ N/A	☐ Yes	☐ No
b.	Procedures contain all required information	☐ N/A	☐ Yes	☐ No

INTERNAL AUDITS

a.	Audits/inspections of each radiographer and radiographer trainees conducted at 6-month intervals or after as appropriate [641-45.1(11)]	☐ N/A	☐ Yes	☐ No
b.	Equipment check before use each day [641-45.1(8)"*a*"]	☐ N/A	☐ Yes	☐ No
c.	Equipment inspection and maintenance performed at 3 -month intervals [641-45.1(8)"*b"*]	☐ N/A	☐ Yes	☐ No
d.	Records maintained [641-45.1(8)"*b"*]	☐ N/A	☐ Yes	☐ No

FACILITIES

a.	Facilities are as described in the license application.	☐ N/A	☐ Yes	☐ No
b.	Permanent radiographic installations meet the requirements of 641-45.1(9)	☐ N/A	☐ Yes	☐ No
1.	Visible and audible radiation signals	☐ N/A	☐ Yes	☐ No
2.	Visible signal actuates if entry is attempted when source is exposed	☐ N/A	☐ Yes	☐ No
3.	Audible signal actuates if entry is attempted when source is exposed	☐ N/A	☐ Yes	☐ No
4.	System tested daily with radiation source	☐ N/A	☐ Yes	☐ No
5.	Records maintained for two years [641-45.1(9)"*b*"]	☐ N/A	☐ Yes	☐ No
c.	Entrance controls are as described in 641-40.42	☐ N/A	☐ Yes	☐ No
d.	High radiation areas posted [641-40.62(1)]	☐ N/A	☐ Yes	☐ No
e.	Storage and use of radioactive material			
(1)	Adequate method to prevent unauthorized individuals from entering restricted area.	☐ N/A	☐ Yes	☐ No
(2)	Radioactive material secured to prevent unauthorized removal or access. [40.55"a"]	☐ N/A	☐ Yes	☐ No
f.	Sources locked in devices [641-45.3(2) and 641-45.3(4)"c"(1)	☐ N/A	☐ Yes	☐ No
g.	Devices secured to prevent tampering or unauthorized removal [641-40.55; 45.3(3)]	☐ N/A	☐ Yes	☐ No

EQUIPMENT

a.	Radiography devices, source assemblies and source changers in use meet requirements [641-45.3(4)]	☐ N/A	☐ Yes	☐ No
b.	Associated equipment in use complies with requirements [641-45.3(4)]	☐ N/A	☐ Yes	☐ No
c.	Awareness that associated equipment must comply with 641-45.3(4)	☐ N/A	☐ Yes	☐ No
d.	Source changers and storage containers have radiation level less than 200 hr/hr (2 mSv) on surface and 10 mrem/hr (0.1 mSv) at one meter	☐ N/A	☐ Yes	☐ No
e.	Equipment exempted by specific license condition is used in accordance with license commitments and authorization	☐ N/A	☐ Yes	☐ No

MATERIAL

a.	Isotope, chemical/physical form, quantity and use as authorized	☐ N/A	☐ Yes	☐ No
b.	All sealed sources not fastened to or contained in an exposure device are tagged	☐ N/A	☐ Yes	☐ No
c.	During radiographic operations, sources are secured in shielded position each time source is returned to that position [641-45.3(7)"*b*"]	☐ N/A	☐ Yes	☐ No

d.	Leakage and contamination tests	☐ N/A	☐ Yes	☐ No
e.	Sealed sources			
	1. Leak test method approved	☐ N/A	☐ Yes	☐ No
	2. Leak tests performed at 6-month interval [641-45.3(5)"*b*"]	☐ N/A	☐ Yes	☐ No
	3. Leakage is less than 0.005 microcuries (185 Becquerels (Bq))	☐ N/A	☐ Yes	☐ No
f.	Depleted uranium (DU) shielding with S-tubes			
	1. Test every 12 months [34.27]	☐ N/A	☐ Yes	☐ No
	2. DU is less than 0.005 microcuries (185 Bq)	☐ N/A	☐ Yes	☐ No
g.	Records maintained for 3 years	☐ N/A	☐ Yes	☐ No
h.	Inventories			
	1. Conducted quarterly (not to exceed 3 months) [641-45.1(6)]	☐ N/A	☐ Yes	☐ No
	2. Contain all required information	☐ N/A	☐ Yes	☐ No
	3. Most recent inventory conducted on _____			
i.	Utilization Logs			
	1. Utilization logs maintained [641-45.1(7)]	☐ N/A	☐ Yes	☐ No
	2. Contain **all** required information	☐ N/A	☐ Yes	☐ No
j.	Survey instruments.			
	(1) Appropriate operable survey instruments available and used [641-45.1(5)"a" and 45.3(7)"a"]	☐ N/A	☐ Yes	☐ No
	(2) Calibration every six (6) months [641-45.1(5)"b"(1)]	☐ N/A	☐ Yes	☐ No
	(3) Records maintained for three years. [641-45.1(5)"c"]	☐ N/A	☐ Yes	☐ No

RADIOLOGICAL PROTECTION PROCEDURES

a.	Individual has understanding of procedures.	☐ N/A	☐ Yes	☐ No
	(1) In general, rules for safe use.	☐ N/A	☐ Yes	☐ No
	(2) In emergency procedures	☐ N/A	☐ Yes	☐ No

RECEIPT AND TRANSFER OF RADIOACTIVE MATERIAL

a.	Procedure for opening packages adequate. [40.65(5)]	☐ N/A	☐ Yes	☐ No
b.	Incoming packages monitored for external radiation levels. [40.65(2)"b" and 40.65(3)]	☐ N/A	☐ Yes	☐ No
c.	Transfers performed, as required. [39.4(41)]	☐ N/A	☐ Yes	☐ No
d.	Records of receipt surveys. [40.82(1)]	☐ N/A	☐ Yes	☐ No
e.	Records of receipt, transfer, & disposal of radioactive material. [38.4(1)]	☐ N/A	☐ Yes	☐ No

AREA SURVEYS

a.	Area or facility surveys conducted to show compliance with [641-40.26, 40.27, and 40.36]	☐ N/A	☐ Yes	☐ No
b.	Records maintained [641-40.82(1)]	☐ N/A	☐ Yes	☐ No
c.	Survey after each exposure, including device, guide tube, ensuring source has returned to the shielded position [641-45.3(7)]	☐ N/A	☐ Yes	☐ No
d.	Survey of device when place in storage to ensure source is in shielded position	☐ N/A	☐ Yes	☐ No
e.	Protection of members of the public	☐ N/A	☐ Yes	☐ No
f.	Adequate surveys made to demonstrate			
	1. The TEDE to the individual likely to receive the highest dose does not exceed I 00 mrem (0.1 mSv) in a year, or	☐ N/A	☐ Yes	☐ No
	2. That if an individual were continuously present in an unrestricted area, the external dose would not exceed 2 mrem (0.02 mSv) in any hour and 100 mrem (1.0 mSv) in a year	☐ N/A	☐ Yes	☐ No
g.	Unrestricted area radiation levels do not exceed 2 mrem (0.02 mSv) in any one hour	☐ N/A	☐ Yes	☐ No
h.	Records maintained [641-40.82(1) and 40.87]	☐ N/A	☐ Yes	☐ No

PERSONNEL RADIATION MONITORING

a.	Film badges, TLDs, OSDs			
	1. Supplier NVLAP approved. [40.36(3)"a" and "b"]	☐ N/A	☐ Yes	☐ No
	2. Dosimeters exchanged at required frequency	☐ N/A	☐ Yes	☐ No
	3. Dosimetry records maintained [641-40.86(1) and 45.1(12)"*e*"]	☐ N/A	☐ Yes	☐ No
b.	Dosimeters			
	1. Read and recorded at start of each shift [641-45.1(12)"*b*"(4)]	☐ N/A	☐ Yes	☐ No
	2. Daily readings recorded	☐ N/A	☐ Yes	☐ No
	3. Dosimeters checked for response (±20%) at intervals not to exceed 12 months	☐ N/A	☐ Yes	☐ No
	4. Off-scale dosimeter procedure and records [641-45.1(12)"*b*"(5)]	☐ N/A	☐ Yes	☐ No
c.	Alarm Ratemeters			
	1. Checked that alarm functions properly at start of each shift [641-45.1(12)"*f*"]	☐ N/A	☐ Yes	☐ No
	2. Preset at 500 mrem (5 mSv) per hour [641-45.1(12)"*f*'(2)]	☐ N/A	☐ Yes	☐ No
	3. Calibrated to ±20% at intervals not to exceed 12 months [641-45.1(12)"*f*'(4)]	☐ N/A	☐ Yes	☐ No
	4. Records maintained [641-45.1(12)"*f*'(4)]	☐ N/A	☐ Yes	☐ No
d.	Dose(s) exceeded regulatory limits. [40.15]	☐ N/A	☐ Yes	☐ No
e.	ALARA program implemented. [41.2(7)"a"]	☐ N/A	☐ Yes	☐ No
f.	Written description of ALARA program available. [41.2(7)"d"]	☐ N/A	☐ Yes	☐ No
g.	Workers monitored as required [641-40.37 and 45.45.1(17)]			

WASTE DISPOSAL

a.	Radioactive material disposed of as authorized. [40.70(1)]	☐ N/A	☐ Yes	☐ No

NOTIFICATION AND REPORTS

a.	Notifications and reports provided to individuals. [40.112]	☐ N/A	☐ Yes	☐ No
b.	Reporting theft or loss compliant with rules. [40.95]	☐ N/A	☐ Yes	☐ No
c.	Compliant regarding overexposures notification of incidents. [40.96]	☐ N/A	☐ Yes	☐ No
d.	Compliant regarding reporting of excessive levels and concentrations. [40.97]	☐ N/A	☐ Yes	☐ No
e.	Termination reports furnished, if requested by workers. [40.112(5)]	☐ N/A	☐ Yes	☐ No

POSTING AND LABELING

a.	Radiation Areas posted. [40.61(1)]	☐ N/A	☐ Yes	☐ No
b.	High Radiation Areas posted. [40.61(2)]	☐ N/A	☐ Yes	☐ No
c.	Use or storage areas posted "Caution Radioactive Material." [40.61(5)]	☐ N/A	☐ Yes	☐ No
d.	Containers or devices labeled. [40.63]	☐ N/A	☐ Yes	☐ No
e.	Notice to Workers posted. [40.110(1) and (2)]	☐ N/A	☐ Yes	☐ No
f.	Notice to Employees posted. [40.110(3)]	☐ N/A	☐ Yes	☐ No

TRANSPORTATION (641-39.5) AND 49 CFR 171-178

a.	Authorized packages used.	☐ N/A	☐ Yes	☐ No
b.	DOT-7A performance test records on file. [173.415(a)]	☐ N/A	☐ Yes	☐ No
c.	For special form sources, performance test records on file. [173.476(a)]	☐ N/A	☐ Yes	☐ No
d.	Packages properly labeled. [172.403(b)]	☐ N/A	☐ Yes	☐ No
e.	Packages properly marked. [172.301(a)]	☐ N/A	☐ Yes	☐ No
f.	Proper shipping papers prepared. [172.200]	☐ N/A	☐ Yes	☐ No

g. Shipping paper contains emergency response telephone number. [172.201(d)] ☐ N/A ☐ Yes ☐ No

APPENDIX H

MODEL SIX-MONTH RADIOGRAPHER/RADIOGRAPHER TRAINEE INSPECTION CHECKLIST

Date:	Time:
Radiographic Location:	
Radiographer/Radiographer Assistant:	
Device Model No.:	Serial No.:

Survey Meter Functionality:		☐ Yes	☐ No
Calibrated:		☐ Yes	☐ No
Daily/Source for operation:		☐ Yes	☐ No
Dosirnetry:	OSD/TLD/Film Badge Pocket/Dosimeter:	☐ Yes	☐ No
	Calibrated:	☐ Yes	☐ No
Alarming Dosimeter:		☐ Yes	☐ No
	Calibrated:	☐ Yes	☐ No

☐ Were other individuals working within the restricted area wearing film badges/TLDs/OSDs dosimeters and alarm dosimeters?

☐ Was the restricted area posted with a "CAUTION (or DANGER) RADIATION AREA" sign(s)?

☐ Was the restricted area properly controlled to prevent unauthorized entry?

☐ Was the high-radiation area posted with a "CAUTION (OR DANGER) HIGH RADIATION AREA" sign(s)?

☐ Was the utilization log properly filled out?

☐ Did the radiographer/Radiographer assistant have sufficient knowledge of safety rules? (Ascertained by oral questions)

☐ Was the radiographer working with proper inspected and operable equipment?

☐ Did the radiographer/radiographer assistant properly survey the source projector?

☐ Did the radiographer properly supervise the radiographer assistant?

☐ Was the source projector properly locked and secured to prevent unauthorized removal?

☐ Was the restricted area properly controlled?

☐ Was the high radiation area under continuous direct observation except where entry had been prevented?

☐ Were radioactive isotopes stored properly and kept locked to Prevent removal?

☐ Was the storage area posted with a "CAUTION (or DANGER) RADIOACTIVE MATERIAL" sign(s)?

☐ Did the radiographer/radiographer assistant possess and use a copy of the operating and emergency procedures and (State or NRC) rules and regulations for protection against radiation?

☐ Were there any other safety items found to be lacking? If yes, explain in Remarks.

Remarks:

APPENDIX I

TRANSPORTATION

The following are the major areas in DOT regulations most relevant for transporting radiographic exposure devices and source exchangers that are shipped as Type B quantities are:

A. Table of Hazardous Materials and Special Provisions - 49 CFR 172.101

1. 49 CFR 172. 101 - Hazardous Materials Table [proper shipping name, **hazard class,** identification number]

2. Table 2, Appendix A, 49 CFR 172.101 - List of Hazardous Substances and Reportable Quantities [for radionuclides]

B. Shipping Papers - 49 CFR 172.200

1. 49 CFR 172.201 - General entries [on shipping papers]

2. 49 CFR 172.202 - Description of hazardous material on shipping papers

3. 49 CFR 172.203 - Additional description requirements

4. 49 CFR 172.204 - Shipper's certification [if applicable]

C. Package Markings - 49 CFR 172.300

1. 49 CFR 172.301 - General marking requirements for non-bulk packaging

2. 49 CFR 172.304 - Marking requirements

3. 49 CFR 172.310 - Radioactive material [Type B]

4. 49 CFR 172.324 - Hazardous substances in non-bulk packaging [designation of "reportable quantities" with the letters **"RQ"]**

D. Package Labeling - 49 CFR 172.400

1. 49 CFR 172.400(a) - General labeling requirements

2. 49 CFR 172.403 - Radioactive materials [types and contents of labels]

3. 49 CFR 172.406 - Placement of labels

E. Placarding of Vehicles - 49 CFR 172.500

1. 49 CFR 172.504 - General placarding requirements

2. 49 CFR 172.516 - Visibility and display of placards

3. 49 CFR 172.556 - RADIOACTIVE placard

F. Emergency Response Information - Subpart G

1. 49 CFR 172.600 - Applicability and general requirements

2. 49 CFR 172.602 - Emergency response information

3. 49 CFR 172.604 - Emergency response telephone number

G. Training - Subpart H

1. 49 CFR 172.702 - Applicability and responsibility for training and testing [for HAZMAT employees]

2. 49 CFR 172.702 - Training requirements (includes types of training, when it must be conducted, need for refresher training every 3 years, record keeping)

H. Shippers - General Requirements for Shipments and Packaging - 49 CFR 173

1. 49 CFR 173.25 - Requirements for use and labeling of overpacks

2. 49 CFR 173.403 - Definitions

3. 49 CFR 173.411 - General design requirements

4. 49 CFR 173.413 - Additional design requirements for Type B packages

5. 49 CFR 173.416 - Authorized Type B packages [includes packaging certification requirements]

6. 49 CFR 173.441 - Radiation levels

7. 49 CFR 173.471 - Additional requirements for Type B packages approved by NRC

8. 49 CFR 173.476 - Approval of special form radioactive materials [includes requirement for documentation of special form status]

I. Carriage by Public Highway - 49 CFR 177

1. 49 CFR 177.817 - Shipping paper [location of shipping papers during transport]

2. 49 CFR 177.842 - Class 7 (radioactive) material [includes requirement for blocking and bracing during transport]

SUMMARY OF REVISIONS

Revision	Section	Description
INDUSTRIAL RADIOGRAPHY REGULATROY GUIDE (01/15/99)	Item 5	Editorial Change
	Item 7	Modified
	Item 9	Annual Refresher Training criteria
	Item 10	Added sub-item 7
	Item 10.2	Modified sub-item 3
	Item 10.3	Editorial Change
	Item 11.2	Submittal of maintenance procedures
	Item 11.3	Training requirements for transportation
	Item 11.4	Modified to add Depleted Uranium
	Appendix G	Modified sub-item C
01/18/01	Section 7	Added information concerning inspections.
03/13/03	Section 1.2	Change address for web access to IDPH rules and publications.
07/01/05	ALL	Changed address for the Bureau of Radiological Health
09/07/10	Sections 3.13 & 7	Removed references to renewal and inspection fees. Added reference to annual fee.