IOWA DEPARTMENT OF PUBLIC HEALTH

GUIDE FOR TRAINING LIMITED RADIOLOGIC TECHNOLOGISTS

PURPOSE

The Iowa Department of Public Health (IDPH) has established the minimum training standards for limited radiologic technologists. This guide should aid in making application for a training program that will meet IDPH standards. It will also assist in developing the curriculum and classroom and clinical training. This guide does not apply to x-ray equipment operators in podiatry or bone densimetry.

The appendices to this guide serve to provide additional information on specific subject areas. Model procedures that the applicant may adopt are provided. The applicant may use the model procedures as an outline to develop alternative procedures for review by the IDPH staff.

After review of this guide, if you have specific questions, you may contact:

The Iowa Department of Public Health Lucas State Office Building, 5th Floor 321 East 12th Street, Des Moines, Iowa 50319-0075

Or, you may call 515-281-0415.

Submit the application and appendix A to the IDPH.

APPLICABLE REGULATIONS

In addition to 641-chapter 42(136C), other regulations pertaining to the technologist are found in Chapters 38, 40, and 41 of the IDPH Radiation Machines and Radioactive Materials Rules. You can find the electronic version by going to www.idph.state.ia.us and click on "Index". Click on the letter "P" and select Permits to Practice.

DEFINITIONS

"Radiologic technologist" means an individual, excluding x-ray equipment operators in podiatry and bone densitometry, who performs radiography of the human body as ordered by an individual authorized by Iowa law to order radiography.

"General radiologic technologist" performs radiography of any part of the human body.

"Limited radiologic technologist" performs radiography for the chest, spine, extremities, shoulder or pediatrics, excluding CT and fluoroscopy.

"Radiography" means a technique for generating and recording an x-ray pattern for the purpose of providing the user with an image(s) during or after termination of the exposure.

"Student" means an individual enrolled in and participating in formal education.

"Chest" allows the permit holder to perform radiography of the lung fields including the cardiac shadow, as taught in the limited radiography formal education standards. Chest radiograph techniques shall not be manipulated for the evaluation of the shoulder, clavicle, scapula, ribs, thoracic spine and sternum.

"Extremities" allows the permit holder to perform radiography for body parts from:

- 1. The distal phalanges of the foot to the head of the femur, including its articulation with the pelvis girdle. True hip radiographs are prohibited.
- 2. The distal phalanges of the hand to the head of the humerus. These projections may include the acromioclavicular or glenoid-humeral areas. The radiograph shall not include any of the views in the shoulder category unless the individual holds a limited permit that includes the shoulder category.

"Spines" allows the permit holder to perform radiography of the spine in approved areas only: Cervical vertebrae, thoracic (dorsal) vertebrae, and lumbar vertebrae to include the articulations with the sacrum and coccyx and the sacral articulation with the pelvic girdle. True pelvis radiographs or other projections performed with the image receptor positioned perpendicular to the long axis of the torso are prohibited under this category.

Excerpted from Chapter 42 Rules.

641—42.31(136C) Standards for formal education for limited radiologic technologists.

42.31(1) The formal education may be a single offering that meets all standards of all categories, or it may be offered individually specific to the category the provider wishes to offer.

42.31(2) The following are the minimum standards:

- a. A principal instructor shall:
- (1) Be an Iowa-licensed chiropractor teaching spine and extremities categories only; or
- (2) Be an Iowa-permitted general radiologic technologist and have at least two years of current experience in radiography; or
- (3) Hold a current ARRT registration and have at least two years of current experience in radiography if the clinical site is located outside of Iowa.
 - b. A clinical instructor shall:
 - (1) Be an Iowa-licensed chiropractor teaching spine and extremities categories only; or
- (2) Be an Iowa-permitted general radiologic technologist and have at least two years of current experience in radiography; or
- (3) Be an Iowa-permitted limited radiologic technologist in the category of instruction and have at least two years of current experience in radiography; or
- (4) Hold a current ARRT registration and have at least two years of current experience in radiography if the clinical site is located outside of Iowa.
 - c. Clinical instructors shall be supervised by the principal instructor.
 - d. A principal instructor may also act as clinical instructor, if applicable.
 - e. Classroom and clinical standards are listed below:

Category	Classroom Hours	Clinical Practice Projections	Clinical Competency Projections
Core: completed by all trainees	60		
Chest	20	30 PA or LAT	5 PA, 5 LAT
Upper extremity	20	30 (any projections)	10 (only 2 of any projection allowed)
Lower extremity	20	30 (any projections)	10 (only 2 of any

			projection allowed)
Shoulder	20	20 (any projections)	6 (only 2 of any projection allowed)
Spine	20	30 (any projections)	10 (only 2 of any projection allowed)
Pediatric: add on to chest	8 of initial pediatrics	20 (any projections)	2 PA, 2 LAT
Pediatric: add on to upper extremity	8 of initial pediatrics	20 (any projections)	10 (only 2 of any projection allowed)
Pediatric: add on to lower extremity	8 of initial pediatrics	20 (any projections)	10 (only 2 of any projection allowed)

- (1) All competency testing for limited radiography shall be directly supervised by the principal or clinical instructor.
- (2) Clinical instructors shall directly supervise all students before the student's competency for a specific projection is documented and indirectly supervise after the student's competency for a specific projection is documented.
- (3) Current permit holders completing formal education to add a category do not need to repeat the core curriculum.
- **42.31**(3) Department approval is required before implementing any formal education or making any changes to a formal education offering.
 - **42.31(4)** Administrative items for all formal education:
- *a.* The department reserves the right to audit or evaluate any aspect of the formal education or student progress.
 - b. The department may at any time require further documentation.

COMPLETION OF THIS COURSE OF STUDY SHOULD PREPARE THE STUDENT TO DEMONSTRATE COMPETENCY IN THE FOLLOWING AREAS:

- Radiation protection of patients and workers including monitoring, shielding, units of measurement
 and permissible levels, biological effects of radiation, and technical considerations in reducing
 radiation exposure and frequency of retakes;
- Technique and quality control to achieve diagnostic objectives with minimum patient exposure to include X–ray examination, X–ray production, films, screens, holders and grids, technique conversions, film processing, artifacts, image quality, film systems and control of secondary radiation for the specified category;
- Patient care including, but not limited to, aseptic techniques, emergency procedures and first aid;
- Positioning, including normal and abnormal anatomy and projections for the specific category and verification of patient examinations;
- Radiographic equipment and operator maintenance to include X-ray tubes, grids, standardization of equipment, generators, preventive maintenance, basic electricity, film processors and maintenance, collimators, X-ray control consoles, tilt tables, ancillary equipment, and electrical and mechanical safety;

- Special techniques limited to those required by the specific category; and
- Clinical experience sufficient to demonstrate competency in the application of the above as specified by the department.

ONCE THE TRAINING IS COMPLETED:

Upon the completion of the training program, the following must be submitted to the agency:

- 1. A statement of competency from the principal or clinical instructor.
- 2. Completion certificate for the training program.
- 3. The application to take the certification exam and the \$110 fee.

Records of training should be retained for three years.

FINAL TESTING OF STUDENT(S)

IDPH contracts with the American Registry of Radiologic Technologists for the limited certification examination. Upon notification of training completion, the trainee should submit an application for testing. The student will receive a packet detailing the testing process and how to schedule the test. The test results will be sent to IDPH and IDPH will notify each trainee of the results. 70% is required to pass the test.

IOWA DEPARTMENT OF PUBLIC HEALTH

Bureau of Radiological Health Lucas State Office Bldg, 5th Fl, 321 East Court, Des Moines, IA 50319

APPLICATION FOR LIMITED RADIOLOGIC TECHNOLOGIST TRAINING PROGRAM

1.	INSTITUTION NAME AND ADDRESS:
2.	Person to be contacted about application:
	Name:
	Phone: Fax:
3.	Individual(s) to be in training program (full name).
	Describe the training area areas in alading alconous and alinical training. List the
app Wri	roximate hours involved, the text that will be used, testing and tracking methods. itten or oral exams, simulations, or observations can be used to evaluate competency.
5.	Individuals responsible for training program. List the name and credentials of those individuals who will actively participating in the student's training.
6.	Principal Instructor's Signature: (general radiologic technologist or doctor in charge)
	Date:
7.	Administrator's Signature and title: (this may be the same as in Item 6)
	Date:
Titl	e
4. app Wri Co 5.	Individual(s) to be in training program (full name). Describe the training program including classroom and clinical training. List the roximate hours involved, the text that will be used, testing and tracking methods. itten or oral exams, simulations, or observations can be used to evaluate competency. Individuals responsible for training program. List the name and credentials of those individuals who will actively participating in the student's training. Principal Instructor's Signature: (general radiologic technologist or doctor in charge) Date: Date: Date:

APPENDIX A

Please select at least one of the following in each category:

1.	 I will use the textbook, <u>Radiography Essentials for Limited Practice</u>. I will use the following textbooks:
2.	I will be teaching: [] chest [] extremities [] spines [] pediatrics [] shoulder
3.	The principal instructor is a: [] Iowa-licensed chiropractor (spines and extremities only) [] Iowa-permitted general radiologic technologist with at least 2 years of current experience [] Hold current ARRT registration and 2 years of current experience if site is outside of Iowa
4.	The clinical instructor is a: [] Iowa-licensed chiropractor (spines and extremities only) [] Iowa-permitted general radiologic technologist with at least 2 years of current experience [] Iowa-permitted limited radiologic technologist with at least 2 years of current experience [] Hold current ARRT registration and 2 years of current experience if site is outside of Iowa.
5.	[] Clinical instructor will be supervised by the principal instructor.[] Principal instructor will act as clinical instructor.
6.	[] Competency testing will be supervised by the principal instructor.[] Competency testing will be supervised by the clinical instructor.
7.	 [] I will use the sample curriculum in Appendix B [] I have enclosed the curriculum to be used that differs from Appendix B.
8.	 [] I will use the sample outline of topics to be covered in Appendix C. [] I have enclosed an outline of topics to be covered that differ from Appendix C.
9.	 [] I will use the record forms in Appendixes F, G, and H. [] I have enclosed record forms to be used in this training.

APPENDIX B

SAMPLE CURRICULUM

All student(s) shall be provided with a description of the training program which includes course syllabi (classroom and clinical) with appropriate performance criteria for satisfactory completion.

I. Instructional Plan

The instructional plan must document learning experiences and curriculum sequencing to develop the necessary competencies for completion of the program. The curriculum shall include learning opportunities for students to develop personal and professional attributes and values relevant to practice.

A radiologic technologist education program should foster:

- 1. Development of skills in problem-solving, critical-thinking, and decision-making, in oral and written communication; in human relations; in patient services; and some familiarity of applicable medical law and ethics;
- 2. A commitment to make a significant contribution to the healthcare team;
- 3. An appreciation and respect for cultural diversity;
- 4. A holistic caregiver's perspective;
- 5. Understanding of departmental organization and function in relation to the healthcare delivery system as a whole; and
- 6. Understanding of the value and responsibilities entailed in being a professional.
- II. Education in health and basic sciences that will provide cognitive learning experiences as a foundation to understanding and performing clinical responsibilities.
- III. Academic instruction for the professional radiologic technology curriculum shall include as a minimum the following content areas:
 - 1. Methods of patient care,
 - 2. Radiation safety and protection,
 - 3. Radiation physics,
 - 4. Imaging equipment and processors/processing,
 - 5. Medical terminology,
 - 6. Human structure and function,
 - 7. Radiation biology,
 - 8. Radiographic procedures,
 - 9. Evaluation of radiographs,
 - 10. Computer applications for radiologic sciences,
 - 11. Radiographic pathology, and
 - 12. Quality Improvement.
- IV. Supervised clinical education, experience, and discussions shall include the following:
 - 1. Patient care and patient record keeping;
 - 2. Radiation safety techniques that will minimize radiation exposure to the patient, public, fellow workers and self;
 - 3. Participation in a quality control program;
 - 4. Performance of an appropriate number and variety of procedures to achieve desired clinical competencies; and
 - 5. Clinical correlation of radiographic procedures.

APPENDIX C

OUTLINE OF TRAINING TOPICS

After completing the program, each student should have attained a level of knowledge and skill to be capable of performing the following tasks.

I. Patient preparation:

- 1. verifying patient identification, determining pregnancy status, and reviewing written orders for the procedure;
- 2. obtaining a pertinent history and checking for contraindications;
- 3. ensuring that informed consent has been obtained when necessary;
- 4. explaining the procedure to the patient;
- 5. checking patient clothing and linen for objects that may cause artifacts in the images or the proposed measurements;

II. Patient Care:

- 1. acquiring adequate knowledge of the patient's medical history to understand and relate to the patient's illness and the pending procedures;
- 2. providing for proper comfort and care of the patient before, during and after a procedure;
- 3. establishing and maintaining good communication with each patient (i.e., making introductions, explaining the procedures, answering questions);
- 4. providing functionally safe and sanitary conditions for the patient in compliance with universal protection policies;
- 5. recognizing and responding to an emergency condition; and
 - a. initiating a call for assistance;
 - b. monitoring and recording physiologic data (i.e., ECG, pulse rate, respiratory rate);
 - c. administering cardiopulmonary resuscitation when necessary; and
 - d. maintaining intravenous fluids, oxygen, and other life-support assistance until an emergency code team arrives.

III. Administrative procedures:

- 1. maintaining an adequate volume of medical/surgical supplies and film to ensure that a patient procedure can be performed whenever necessary;
- 2. scheduling patient procedures;
- 3. determining the appropriate sequence for executing multiple procedures;
- 4. maintaining appropriate records of patient reports, and other required records;
- 5. revising and developing policies and procedures in conjunction with administration; and
- 6. participating in the quality assurance program.

IV. Radiation Safety:

- 1. using personnel monitoring devices; and
 - a. reviewing personnel exposure records in relation to maximum permissible dose limits;
 - b. taking appropriate measures to reduce exposure when necessary; and
 - c. notifying proper authorities of excessive exposure upon occurrence.
- 2. notifying appropriate authorities when changes occur in the radiation safety program;
- 3. reviewing and complying with regulations; and
- 4. maintaining required records.

V. Radiation protection procedures:

1. selecting and using proper shielding to reduce radiation exposure;

- 2. using proper methods of selecting technique;
- 3. using time, distance and shielding;
- 4. use of exposure reduction techniques;
- 5. proper use of beam restriction, filtration, positioning and image receptor systems; and
- 6. proper scatter control techniques (grids, air gap, reverse cassette, etc.).

VI. Understanding orders, requests and diagnostic reports:

- 1. Radiographic orders and requisitions components
 - a. Procedure ordered
 - b. Patient history
 - c. Clinical information
- 2. Diagnostic reports
 - a. Contents
 - b. Interpretation

VII. Radiographic Procedures (see appendix E).

VIII. Imaging and processing

- 1. Radiographic density;
- 2. Radiographic contrast;
- 3. Recorded detail;
- 4. Distortion;
- 5. Exposure latitude;
- 6. Beam-limiting devices;
- 7. Beam filtration;
- 8. Scatter and secondary radiation;
- 9. Control of exit radiation;
- 10. Technique formulation;
- 11. Exposure calculation;
- 12. Image receptor handling and storage;
- 13. Characteristics of image receptors;
- 14. Image receptor holders and intensifying screens;
- 15. Processing area considerations (location, access, lighting, safety, etc.);
- 16. Processing of the images;
- 17. Digital processing;
- 18. Artifacts and
- 19. Silver recovery.

IX. Imaging equipment (not all areas may be appropriate for limited radiography)

- 1. X-ray circuit;
- 2. Radiographic equipment;
- 3. Diagnostic x-ray tubes;
- 7. Electronic imaging and;
- 8. Quality control.

XI. Image analysis

- 1. Imaging standards;
- 2. Image quality factors;
- 3. Procedural factors and:
- 4. Corrective action.

XII. Radiation Production and characteristics

- 1. Structure of the atom;
- 2. Nature of radiation;
- 3. X-ray production and;
- 4. Interaction of photons with matter;

XIII. Radiation biology

- 1. Biophysical events;
- 2. Radiation effects and;
- 3. Radio-sensitivity and response.

XIV. Radiographic pathology

- 1. Definitions/terminology;
- 2. Classifications (examples, sites, complications, prognosis);
- 3. Trauma diagnosis and;
- 4. Causes of disease processes (pathological, traumatic, surgical, healing, and genetic).

XV. Computers in radiologic sciences.

XVII.Permit to Practice process.

APPENDIX D

TEXTBOOKS FOR LIMITED RADIOLOGY TRAINING

The following list is not all-inclusive. However, it does indicate some of the more commonly used and available textbooks covering the subject matter.

RECOMMENDED FOR THE LIMITED TRAINING PROGRAM:

<u>Radiography Essentials for Limited Practice</u>, Long, Frank, Ehrlich. 3rd Edition. Available through Elsevier. Plus accompanying workbook.

OTHER RESOURCES THAT MIGHT BE USEFUL:

Ethical and Legal Issues for Imaging Professionals, Towsley-Cook, Young

Merrill's Atlas of Radiographic Positions and Radiologic Procedures, Ballinger and Frank

Fundamentals of Chest Radiology, Meholic, Ketai, and Lofgren

Radiographic Anatomy, Positioning and Procedures Workbook Set, Hayes

Limited Radiography, Campeau and Phelps

<u>LIMITED PRACTICE RADIOGRAPHY COURSE</u>, REVISED 2000, Developed by Radiography Safety Curriculum Committee (available through Community College Book Stores).

APPENDIX E RADIOGRAPHIC PROCEDURES

I. THORAX

- 1. Chest
- 2. Chest, age 6 years or younger
- 3. Chest, decubitus

II. EXTREMITIES

- 1. Finger or thumb
- 2. Hand
- 3. Wrist
- 4. Forearm
- 5. Elbow
- 6. **Humerus**
- 7. **Foot**
- 8. Tibia and Fibula
- 9. Ankle
- 10. **Knee**
- 11. Patella
- 12. Femur
- 13. Trauma Extremity
- 14. Extremity, age 6 years or younger
- 15. **Toes**
- 16. Os Calcis
- 17. Shoulder

IV. SPINE

- 1. Cervical Spine
- 2. Thoracic Spine
- 3. Lumbosacral Spine
- 4. Scoliosis Series
- 5. Sacrum
- 6. Coccyx
- 7. Sacroiliac Joints

VIII. GENERAL PATIENT CARE

- 1. **CPR**
- 2. Vital Signs (blood pressure, pulse, respiration, temperature)
- 3. O_2 Administration

IX. AGE APPROPRIATE PROCEDURES

- 1. **Pediatric**
- 2. Adolescent
- 3. Adult
- 4. Geriatic

APPENDIX F

EXAMINATION EVALUATION FORM FOR FINAL COMPETENCY

Student name	Type of Examination	
Performance Objective: Given a patie	ent and the necessary equipment, the	student will demonstrate the ability to:
Examination Preparation - cassettes, holding devices, etc - laundry stocked in the room a - room and table ready for patie	nd the bathroom	 ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No
necessary supplies availableequipment set properlyemergency equipment availab	le for use if necessary	 ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No
Examination Performance - patient dressed properly for ex checks orders - explains procedure to patient - assists patient onto table or ex takes patient history and recor gives clear and concise patien - positions equipment and patie - makes exposure properly - watches patient closely - works with speed and efficient - is aware of and practices good	amination area rds it for physician t instructions nt properly	Yes No Yes No
Exam Completion - critiques final examination - checks study with Physician a - produces diagnostic study - places completed exam in pro - returns patient to indicated are - replaces supplies as necessary - maintains a clean and neat wo - makes sure all information is o	per area ea (their room, ER, OPT, etc.) orking area	☐ Yes ☐ No
The evaluator's signature verifies th	at the procedure was completed satis	sfactorily.
a.	D. (

APPENDIX G STUDENT DAILY RECORD – RADIOLOGY

0, 1,		
Student name:		

DATE	PATIENT NO.	EXAMINATION	EVALUATOR

Appendix H

LIMITED RADIOLOGIC TECHNOLOGIST FINAL CLASSROOM EVALUATION

TOPIC	DATE	SIGNATURE
Basic anatomy and pathology.		
Radiation biology.		
Radiation protection and radiation protection standards and codes.		
Film and processor knowledge.		
Equipment knowledge.		
Positioning and technique.		
Records and administrative procedures.		
Medical ethics.		
Patient care.		
Computer applications		
Quality control and quality assurance		
STUDENT NAME	SOCIAL S	ECURITY NUMBER
INSTITUTION NAME		