
III. DENTAL X-RAYS

The following list of "helpful hints" has been compiled for the dental assistant. However, its general good sense makes it useful to anyone administering radiation. Many of these axioms may seem to have more to do with technique than (directly) with safety, but the technician must always bear in mind that a major cause of overexposure is the need to repeat x-rays that could have been done right the first time.

A lead apron should be placed on the patient to protect the patient from unnecessary exposure.

Have the patient remove eyeglasses, dentures, partials, earrings, and/or other removable metal objects which may produce scatter or block film images that could cause a retake.

Communicate with the patient for better cooperation when placing a film in a particular area.

The patient needs to be reminded to hold still during exposure.

A position-indicating device (PID) may be used to take x-rays more accurately.

The long cylinder (or "long cone") technique can also be used to limit exposure to the part needed.

The film should always be placed with the plain white side facing the cylinder; otherwise a herringbone pattern will appear.

The raised dot (dimple) on the film should always go towards the occlusal or incisal edges.

The film should not be creased; a crease will cause distortion or artifacts to appear on the processed x-ray.

A fast speed film in the "D" group is suggested to lessen patient exposure.

The operator should always stand behind a barrier to observe the patient through a window or mirror and **NEVER** stand in the line of sight of the x-ray source tube during exposure.

Dental x-ray film (prior to exposure) should be stored in a shielded container, such as a lead or lead-lined box, if it is kept in the room where x-ray exposures are performed, and at normal or lower temperature. Manufacturer's expiration date should be noted.

Radiographs (processed films) should be labeled and stored away from light, heat and moisture in order to preserve the diagnostic images.

Darkroom Procedure

Label the picture mount and envelop before turning ON the safe light.

Keep the darkroom counter clean and dry.

The safelight used in the darkroom should be no more than a 7-watt bulb.

Make sure your developing chemicals are fresh.

The solutions and the water should be at room temperature, between 68-72° F.

For offices that use an automatic processor for developing dental x-rays, be sure that you are familiar with the appropriate procedures for your processor. Don't guess.

For manual processing:

Place film in developer for prescribed time.

Rinse.

Place in the fixer for prescribed time.

Rinse.

Dry.

In all steps, use the times recommended by the manufacturer, appropriate to the temperature of your solutions.

IV. RADIATION HAZARDS

The Delaware Radiation Control Regulations specify the maximum permissible dosage limits, shown in Section VII of this manual, for persons whose occupations require them to be near or proximal to radiation sources, as well as for members of the general public.

Special precautions are needed for the radiographer, because the effects of radiation exposure are cumulative. However, by observing the standard safety precautions as discussed in this Manual, all of which keep the radiographer well away from the x-ray beam, experience has proved that the radiographer will be exposed to less than 25% of the maximum permissible dose in any three-month period.

Potential hazards to the patient, which could unintentionally increase his exposure during application of medical or dental radiography, are:

- * Excessive voltage (kVp), which will damage more deep cells than needed. Care must be taken to set the voltage appropriate for the body part.
- * Excessive current (mA) which will cause excessive cell damage. The first symptom is usually skin burns or surface reddening. It may also cause film overexposure; a dark image with poor contrast.
- * Excessive exposure time, which will have the same effect as excessive current.
- * Underexposure (low current and/short time), which will produce a light, underexposed, non-diagnostic film. This requires one or more retakes, perhaps the greatest source of patient overexposure. (This is one area where "technique" and "safety" overlap.)
- * Scattered radiation from improperly adjusted or maintained equipment, which will cause unnecessary--and often unsuspected--exposure to the patient (and also to staff members and others). Note that the intensity of scattered radiation decreases with the square of the distance, and about 1000-fold for each scattering event.

Potential hazards to the operator or third parties:

- * Scattered radiation (See above).
- * Holding x-ray films in place by hand while the exposure is being performed.
- * Failure to stand behind a protective barrier several feet from the useful beam.
- * Positioning the x-ray tube so that its primary (useful) beam is pointed at a non-shielded occupied area (such as a waiting room or a secretary's office).

V. OPERATING HAZARDS

This list may seem to cover some things that have already been discussed in earlier parts of this Manual. It is presented here from the perspective of the operator. Remember--as the operator, you must protect yourself as well as your patients. **SAFETY IS EVERYONE'S RESPONSIBILITY!**

- A. Persons other than the patient should not be allowed in the restricted area. (Except for mobile or portable systems, where special rules and precautions apply.)
- B. Failure of operator and other staff to be in a protected area. (Again, except for mobile or portable systems, as above.) The barrier may be in a normal interior wall; distance should be at least several feet from the tube head and out of sight of the tube head.
- C. Holding films in place by hand during exposure.
- D. If the film must be hand-held, it should be done by a relative or friend of the patient, NOT someone who routinely may be exposed to radiation. The holding person must be provided with shielding (a lead apron).
- E. Holding the tube housing or the position-indicating device by hand during exposure.
- F. Misalignment of the primary beam.
- G. Failure to accurately align the primary beam with the film or image receptor.
- H. Failure to process exposed film appropriately. (Usually, that means failure to follow the film manufacturer's recommendations, including chemical solutions and temperature control. Developing apparatus needs as much attention as the x-ray apparatus.)
- I. Using film with unnecessarily slow speed, requiring excessive exposure. The most general-hence, most important means of minimizing patient exposure is the use of the optimal film speed consistent with diagnostic quality.
- J. Malfunctioning equipment. Examples could be inadequate filtration or collimation, or a faulty timer. If an operator has ANY REASON to doubt the equipment is operating properly, he/she must resolve that doubt promptly by taking the problem to knowledgeable individuals.
- K. Failure to take an adequate medical/dental history, including such items as:
 - ▶ Is the patient pregnant? Trying to become pregnant?
 - ▶ Has the patient had radiation therapy?
 - ▶ Are recent x-rays of the area of interest available, so that new exposures do not need to be made?
- L. Using over-age x-ray film. Film which has passed its expiration date (as indicated by the manufacturer on the box) will have lost speed and is likely to be underexposed, thus failing to yield a picture of diagnostic quality. That event, of course, forces a retake, leading to additional patient exposure.
- M. Failure to store developed x-ray pictures under conditions that are protected from heat, light, and moisture. Such neglect causes the pictures to deteriorate, forcing the Licensed Practitioner to order retakes.

- N. In general, failure to follow the "Safety Rules and Operating Procedures" that apply to the radiation machine in use. Each operator is responsible for understanding and complying with these rules and procedures, as tailored to the situation in his own workplace. Actually, these rules and procedures are the first thing to be consulted by any operator who is unsure of proper procedure, because they are - when properly written - specific to his equipment and location.

VI. FEDERAL STANDARDS

The Consumer-Patient Radiation Health and Safety Act of 1981 (Title IX of Public Law 95-35) directs the U.S. Department of Health and Social Services to issue standards for the credentialing of individuals who perform radiologic procedures. Details are found in the Federal Register, 42CFR Part 75, published on July 12, 1985, which became final on Jan. 13, 1986. Portions of this document are attached to this manual as Appendix I; refer especially to its Appendix G. "Standards for Licensing Dental Hygienists and Dental Assistants in Dental Radiography."

VII. DELAWARE REGULATIONS

A. *Office of Radiation Control*

The Office of Radiation Control (ORC) of the Division of Public Health, Department of Health and Social Services, is the Delaware agency that administers the Delaware Radiation Control Regulations (DRCR) and the Radiation Technologist/Technician Certification Regulation (RTCR), acting on behalf of Delaware's Authority on Radiation Protection.

B. *Posting Requirements*

The following items are required by appropriate sections of the DRCR to be posted in every radiation machine facility:

1. Registration Certificate for a Radiation Machine Facility, Form ORC-R21, (Appendix II)
2. Notice to Employees, "Standards for Protection Against Radiation, Notices, Instructions and Reports to Workers, Inspections," ORC-R20, Appendix III.
3. Any Notice (s) of Violations received by the Facility.
4. Technique Chart: post at each x-ray button. (Appendix IV)
5. Warning Label (Appendix V)
6. Individual Radiation Technician/Technologist Certificate issued by the Delaware Authority on Radiation Protection.

C. *Availability of Key Information*

The Delaware Radiation Control Regulations require that the following items may be posted, but in any case must be provided in a readily accessible location for all persons using radiation machines:

1. A copy of your facility's **SAFETY RULES AND OPERATING PROCEDURES**, prepared in conformance with the ORC's "Guide for the Preparation of Safety Rules and Operating Procedures for Dental Facilities", or ORC-R19, "Guide for Preparation of Safety Rules and Operating Procedures for the Healing Arts".) See Appendices VI and VII.
2. A copy of the Delaware Radiation Control Regulations provided at time of registration.
3. All information required by DRCR shall be available and kept current. See Appendix VIII.
4. Each facility must have a written policy for evaluating the exposure to individuals in instances where the examination is not specified in its technique chart, or where the patient and/or the film is supported by a human holder.

In addition, you should keep a copy of the RTCR, which is part of this Manual.

D. *Monitoring Requirements (DRCR D.202)*

Each licensee or registrant shall supply appropriate personnel monitoring equipment to, and shall require the use of such equipment by:

1. Each individual who enters a restricted area under such circumstances that he receives, or is likely to receive, a dose in any calendar quarter in excess of 25% of the applicable value specified in Section D.201, see below..
2. Each individual under 18 years of age who enters a restricted area under such circumstances that he receives, or is likely to receive, a dose in any calendar quarter in excess of 5% of the adult values specified, see below:

<u>Specific Reference</u>	<u>Maximum Permissible Doses</u>
D201 Whole body: head and trunk, active Blood-forming organs; gonads	1250mR/QTR (Equivalent to 5000mR/year, or 5 Rem/yr)
Skin of whole body	12500mR/QTR
Hands and forearms/Feet and ankles	12500mR/QTR
D207: Pregnant Radiation Workers	500mR during gestation period
D301: General Public	100 mR/year

Exception: when radiography is ordered by Licensed Practitioner.

Note that mR denotes dose in millirem, R denotes dose in Rem
1000 mRem = 1.0 Rem

Patient exposure is assessed by the Office of Radiation Control in terms of the Entrance Skin Exposure (ESE), measured in milliroentgens (mR). This is radiation exposure measured at or near the surface of the patient's skin at the location of the useful beam.

E. *Equipment Registration and Inspection*

Section B of the DRCR requires registration of all radiation source facilities with the ORC. Important requirements of this regulation are summarized as follows:

1. If equipment is added to or deleted from this facility, the registration must be updated and renewed.
2. New equipment should not be placed in service until the ORC has been inspected the equipment and accepted the manner in which it has been installed.
3. A Radiation Technologist/Technician must be prepared to operate the equipment during any ORC inspection, and to demonstrate familiarity with the safety rules and with the operating procedures.

F. *Assessment of Procedures*

During the periodic ORC inspections of radiation facilities, procedures and techniques will be evaluated and rated by ORC inspectors, along with the positioning, safety, and operability of the equipment itself.

RECOMMENDED RADIOGRAPHIC STUDY MATERIALS

The following book was provided to the reference librarians at the following public libraries: Newark, Wilmington, Dover, Lewes, and Seaford:

1. The “State of Florida Examination Booklet for State Medical Examinees”

The following book was provided to the reference librarians at the following public libraries: Newark, Wilmington, New Castle, Dover, Smyrna, Lewes and Seaford:

2. The DANB Review, 3rd Edition, “The Official Preparation Tool for DANB’s National Certification and Knowledge-Based Certificate of Competency Programs, 2005. “

The following can be obtained from the listed publishers and/or at bookstores:

1. Merrill’s Atlas of Radiographic Positions and Radiologic Procedures, Phillip W. Ballinger, C. V. Mosby Company, Volume 1 and 2;
2. Complete Review of Radiography, K.M. Marzano and P.D. Lyons, Delmar Publishing, ISBN #0-8273-4233-0;
3. Limited Radiography, Frances E. Campeau and M. Jeana Phelps, Delmar Publishers, Inc., ISBN #0-8273-3335-8;
4. Mosby’s Comprehensive Review of Radiography, William J. Callaway; Mosby-Yearbook, Inc., ISBN #0-8151-1389-7;
5. Prep Program Review and Exam Preparation-Radiography; D. A. Saia; Appleton & Lange, ISBN #0-8385-8244-3;
6. Medical Radiography Pre-Test Self Assessment and Review, Linda LeFave, M.Ed., R.T.(R)(M), McGraw-Hill, ISBN #0-07-052078-X
7. Principles of Imaging Science and Protection, Thompson, Hattaway, Hall and Dowd, W.B. Saunders Company, ISBN #7216-3428-1
8. Delmar Learning: www.edumed.com Online Radiologic Technology Courses

Radiographic references are listed in the Exam Candidate Guides or Factsheets issued by the testing firms who administer the examinations. In addition, Study Guides may be available for an additional fee from some testing firms that administer examinations; refer to the Exam Candidate Guide for the specific examination of interest.

APPENDIX I

50710 Federal Register/Vol. 50, No. 238/Wednesday, December 11, 1985

DEPARTMENT OF HEALTH AND
HUMAN SERVICES

Public Health Service

42 CFR Part 75

Standards for the Accreditation of Educational Programs for and the Credentialing of Radiologic Personnel.

AGENCY: Public Health Service, HHS.

ACTION: Final rule making

SUMMARY: These regulations establish standards for the accreditation of educational programs for radiologic personnel, and for the Credentialing of such persons. These standards are part of the implementation of the Consumer-Patient Radiation Health and Safety Act of 1981 (Title IX of Pub. L. 97-35), which required their promulgation by regulation. The standards are voluntary for States and mandatory for Federal agencies.

EFFECTIVE DATE: These regulations are effective January 13, 1986.

SUPPLEMENTAL INFORMATION:

The Consumer-Patient Radiation Health and Safety Act of 1981 (the Act) is Subtitle I of Title IX of the Omnibus Budget Reconciliation Act of 1981, Pub. L. 97-36. In accordance with section 979 of the Act, the Secretary of Health and Human Services is adding a new Part 75 to Title 42 of the *Code of Federal Regulations*, entitled "Standards for the Accreditation of Educational Programs for and the Credentialing of Radiologic Personnel."

The Department published in the Federal Register on July 12, 1983, a Notice of Proposed Rule-Making (NPRM) that provided for a 120-day

One of the expressed purposes of the Act is to "insure that radiologic procedures are consistent with rigorous safety precautions and standards." Section #72(2). The comments submitted revealed that attempts to use radiologic personnel standards to improve patient safety are exceedingly complex. In addition, the act requires that the standards be mandatory for Federal agencies employing radiologic personnel.

These regulations establish minimum standards for accreditation of educational programs for selected radiologic personnel and standards for Credentialing selected Radiologic personnel, as required by the Act. The standards apply to non-Federal personnel only to the extent to which States adopt them. Licensed practitioner (doctors of medicine, osteopathy, dentistry, podiatry, and chiropractic) are especially excluded from coverage by the Act. In addition, the Department has also chosen to exclude licensed pharmacists.

Compliance by the States with the standards is voluntary. However, the Secretary is required by Section 961(d) of the Act to monitor the States' compliance and to report to the Congress on January 1 of each year the status of that compliance.

50710 Federal Register/Vol. 50, No. 238/Wednesday, December 11, 1985

Appendix G ...Standards for Licensing Dental Hygienists and Dental Assistants in Dental Radiography.

The following section describes basic elements to be incorporated in Credentialing programs of States that choose to require personnel who perform radiologic procedures.

Currently, Dental Hygienists are credentialed through individual State Licensure processes, all of which includes assessment of competence in dental radiography. In all States, Dental Hygienists are required to be licensed prior to practicing. The existing State dental hygiene Licensure processes meet the intent and purpose of the Consumer-Patient Radiation Health and Safety Act of 1981 and the standards for licensing Dental Hygienists in dental radiography set forth below.

A. Licensure/Permit

1. To those who have passed a Licensure or designated dental radiography examination, a license

or permit shall be issued by the State entity responsible for Credentialing dental personnel.

2. License or permits shall be renewed at periodic intervals.

B. Eligibility

1. An individual shall provide proof of graduating student status or graduation from an accredited or approved dental hygiene or dental assisting education program.

2. For dental assistants, special eligibility to take the examinations shall be provided to applicants with appropriate combinations of training and/or experience.

C. Examination

An attention-referenced examination in dental radiography shall be utilized to test the knowledge and competencies of applicants.

D. Continuing Competency

The Dental Hygienist or Dental Assistant shall be required to maintain continuing competency in the area in which he/she is practicing.

E. Policies and Procedures

An organization that seeks to be recognized for the certifying of personnel shall adopt definite policies to ensure validity, objectivity, and fairness in the certifying process. The National Commission for Health Certifying Agencies (NCHCA) has published suitable criteria for a certifying organization to adopt with respect to policies for: (1) Determination of appropriate examination content (but not the actual content for any specific occupation); (2) construction of examinations; (3) administration of examinations; and (4) fulfilling responsibilities to applicants. An organization (whether an NCHCA member or not) that adopts these or equivalent articles will meet all of the requirements of the section of these standards.

(FR doc "85-29363 Filed 12-10-85 8:45 am)

BILLING CODE 4180-16m

NOT OFFICIAL COPY - DRAFT EXAMPLE OF FEDERAL REGISTER.

APPENDIX II

OFFICE OF RADIATION CONTROL

NOTICE OF
R E G I S T R A T I O N
NON-TRANSFERABLE

EXPIRATION DATE: 07/31/2007

EFFECTIVE: 08/01/2005

REGISTRATION NO: 1234

**JOHN DOE
123 MAIN STREET
WILMINGTON, DE 19800**

ATTN: RADIATION SAFETY OFFICER

PURSUANT TO THE RADIATION CONTROL ACT,
16 DEL.C., CHAPTER 74 AS AMENDED, THE DELAWARE
RADIATION CONTROL REGULATIONS, AND A DULY
FILED APPLICATION, REGISTRATION IS HEREBY
ISSUED TO THE REGISTRANT DESIGNATED ABOVE.
THIS REGISTRATION IS HEREBY MADE PUBLIC AND IS
SUBJECT TO ALL APPLICABLE RULES, REGISTRATIONS,
ORDERS, AND NOTICES NOW OR HEREAFTER IN EFFECT.

Director
Division of Public Health

**POST IN A CONSPICUOUS PLACE
FOR PUBLIC VIEW**

Form ORC-R21

APPENDIX III

**DELAWARE DIVISION OF PUBLIC HEALTH
OFFICE OF RADIATION CONTROL**

NOTICE TO EMPLOYEES

**STANDARDS FOR PROTECTION AGAINST RADIATION; NOTICES,
INSTRUCTIONS AND REPORTS TO WORKERS; INSPECTIONS**

IN PART D OF THE DELAWARE RADIATION CONTROL REGULATIONS, THE AUTHORITY ON RADIATION PROTECTION HAS ESTABLISHED STANDARDS FOR YOUR PROTECTION AGAINST RADIATION HAZARDS. IN PART J, DELAWARE RADIATION CONTROL REGULATIONS, THE AUTHORITY ON RADIATION PROTECTION HAS ESTABLISHED CERTAIN PROVISIONS FOR THE OPTIONS OF WORKERS ENGAGED IN WORK UNDER AN AGENCY LICENSE OR REGISTRATION.

YOUR EMPLOYER'S RESPONSIBILITY

Your employer is required to--

1. Apply these regulations to work involving sources of radiation.
2. Post or otherwise make available to you a copy of the Delaware Radiation Control Regulations, and the operating procedures which apply to work you are engaged in, and explain their provisions to you.
3. Post Notice of Violation involving radiological working conditions, proposed imposition of civil penalties and orders.

YOUR RESPONSIBILITY AS A WORKER

You should familiarize yourself with those provisions of the Delaware Radiation Control Regulations, and the operating procedures which apply to the work you are engaged in. You should observe their provisions for your own protection and protection of your co-workers.

WHAT IS COVERED BY THESE REGULATIONS

1. Limits on exposure to radiation and radioactive material in restricted and unrestricted areas;
2. measures to be taken after accidental exposure;
3. personnel monitoring, surveys and equipment;

APPENDIX III (cont.)

4. caution signs, labels, and safety interlock equipment;

5. exposure records and reports;
6. options for workers regarding Agency inspections; and
7. related matters.

REPORTS ON YOUR RADIATION EXPOSURE HISTORY

1. The Delaware Radiation Control Regulations require that your employer give you a written report if you receive an exposure in excess of any applicable limit as set forth in the regulations of the license. The basic limits for exposure to employees are set forth in Sections D.201, D.202, and D.203 of the regulations. These sections specify limits on exposure to radiation and exposure to concentrations of radioactive material in air.
2. If you work where personnel monitoring is required, and if you request information on your radiation exposures,
 - (a) Your employer must give you a written report, upon termination of your employment, of your radiation exposures, and
 - (b) Your employer must advise you annually of your exposure to radiation.

INSPECTIONS

All licensed or registered activities are subject to inspection by representatives of the Office of Radiation Control. In addition, any worker or representative of workers who believes that there is a violation of the Delaware Radiation Control Act, the regulations issued thereunder, or the terms of the employer's license or registration with regard to radiological working conditions in which the worker is engaged, may request an inspection by sending a notice of the alleged violation to the Office of Radiation Control. The request must set forth the specific grounds for the notice, and must be signed by the worker as the representative of the workers. During inspections, Agency inspectors may confer privately with workers, and any worker may bring to the attention of the inspectors any past or present condition which he believes contributed to or caused any violation as described above.

POSTING REQUIREMENT

COPIES OF THIS NOTICE MUST BE POSTED IN A SUFFICIENT NUMBER OF PLACES IN EVERY ESTABLISHMENT WHERE EMPLOYEES ARE EMPLOYED IN ACTIVITIES LICENSED OR REGISTERED, PURSUANT TO PART B OR PART C, BY THE OFFICE OF RADIATION CONTROL, TO PERMIT EMPLOYEES WORKING IN OR FREQUENTING ANY PORTION OF A RESTRICTED AREA TO OBSERVE A COPY ON THE WAY TO OR FROM THEIR PLACE OF EMPLOYMENT.

APPENDIX IV

TECHNIQUE CHART

<u>Exam</u>	<u>kVp</u>	<u>mA</u>	<u>Time</u>	<u>Distance</u>
Child BW	90	15	2/10 sec.	8"
Adult BW	90	15	3/10 sec.	8"
Adult PA	90	15	4/10 sec.	9"

NOTE: THIS IS ONLY AN EXAMPLE!

APPENDIX V

WARNING LABEL

WARNING: This x-ray unit may be dangerous to patient and operator unless safe exposure factors and operating instructions are observed.

APPENDIX VI

OFFICE OF RADIATION CONTROL
DELAWARE DIVISION OF PUBLIC HEALTH
GUIDE FOR THE PREPARATION OF SAFETY RULES
AND OPERATING PROCEDURES FOR DENTAL FACILITIES

I. Introduction

The model procedures in this regulatory guide are generalized and must be made specific for each facility. Registrants must thoroughly review their written procedures since they will be held to the stipulations of their safety rules and operating procedures by Delaware Radiation Control Regulations (DRCR). These procedures must be posted or provided to all persons using the radiation machines.

II. Safety Rules and Operating Procedures

These instructions are provided to you in accordance with DRCR. The intent of this guide is to minimize radiation exposure of x-ray personnel and patients without interfering with the practice of the healing arts.

A. All x-ray examinations and retakes shall be ordered by (Name of Doctor)_____.

B. Operation of X-ray Equipment

1. A restricted area is to be maintained by the operator. The restricted area is the room in which the x-ray equipment is located. The only person allowed in the restricted area is the subject to be x-rayed (except for mobile or portable systems).
2. During each exposure:
 - (a) Employees shall stand in a protected area;
 - or (b) employees shall stand outside the exposure room;
3. Neither the dentist nor any employee should hold patients or films during exposures. If an individual must be used for the purpose of holding films or a patient, appropriate protective devices (lead gloves, apron, etc.) shall be used.
4. Neither the tube housing nor the Position Indicating Device (PID) shall be hand held during any exposure.
5. The primary beam shall be aligned with the film by utilizing the spacer frame or "PID".
6. The film manufacturer's recommendations, including maintenance of the developing solutions at a constant temperature, should be used for processing film as a matter of good practice to keep patient exposure to a minimum consistent with good diagnostic films.

"These Guides are issued to describe and make available to the public acceptable methods of implementing specific parts of Delaware Radiation Control Regulations. The Guides are not substitutes for regulations, and compliance with them is not required; however, other acceptable methods or solutions shall be available.

C. Personnel Monitoring

1. Where personnel monitoring equipment is provided for each individual who uses or operates any radiation producing machine, each employee shall wear his/her assigned monitor. These devices are to be stored away from radiation. The control badge shall be kept in an area free of radiation. (Name of individual) is responsible for maintaining exposure records and exchanging personnel monitors on a prearranged schedule. Exposure records will be kept (location). Exposure records will be made available to individuals who use or operate any radiation machines upon request.
2. No adult employee shall be allowed to receive radiation exposure in excess of 1250 millirem per calendar quarter. (. No employee under the age of 18 shall be allowed to receive radiation exposure in excess of 125 millirem per calendar quarter. In the event of radiation incident or an excessive exposure, the Office of Radiation Control shall be notified. The address is: Delaware Division of Public Health, Office of Radiation Control, 417 Federal Street, Dover, Delaware 19901. The telephone number is 302-744-4546.

D. A copy of Delaware Radiation Control Regulations is available, and operators shall be familiar with pertinent sections of parts A, B, D, F and J.

E. The x-ray machines are equipped with devices to limit the radiation exposure to patients and employees; these devices include filters which reduce unnecessary low energy radiation from the primary beam and collimators which restrict the size of the x-ray beam. Employees shall not alter, remove, tamper with, or in any way defeat these devices.

F. For offices using cephalometric units, the following statement should be included:

For cephalometric units, the useful beam shall be confined to the area of clinical interest or to the size of the film used.

APPENDIX VII

OFFICE OF RADIATION CONTROL DELAWARE DIVISION OF PUBLIC HEALTH GUIDE FOR THE PREPARATION OF SAFETY RULES AND OPERATING PROCEDURES FOR HEALING ARTS FACILITIES

I. Introduction

The model procedures in this regulatory guide are generalized and must be made specific for each facility. Registrants must thoroughly review their written procedures since they will be held to the stipulations of their safety rules and operating procedures by Delaware Radiation Control Regulations (DRCR). These procedures must be posted or provided to all persons using the radiation machines.

Procedures should be signed and dated on the last page.

II. Safety Rules and Operating Procedures

These instructions are provided to you in accordance with DRCR. The intent of this guide is to minimize radiation exposure of x-ray personnel and patients without interfering with the practice of the diagnostic quality.

A. All x-ray examinations shall be ordered by
(Name of Doctor)_____ .

B. "Retakes" shall be ordered by (Name of Doctor)_____ .

C. Operation of X-Ray Equipment

1. A restricted area is to be maintained by the operator using "Caution Radiation Area" signs and/or other methods designated by the registrant. (Area(s) to be specified by the registrant and inserted at this point) .
2. During each exposure, operators shall stand behind a protective barrier or have protective aprons.
3. The useful beam shall be restricted to the area of clinical interest or to the size of film used.
4. The useful beam shall be aligned with the film by using the _____
(specify technique).
5. A technique chart which gives the appropriate exposure factors (mA, kVp, time, etc.) shall be provided near the control panel.

"These Guides are issued to describe and make available to the public acceptable methods of implementing specific parts of the Delaware Radiation Control Regulations. The Guides are not substitutes for regulations, and compliance with them is not required; however, other acceptable methods or solutions shall be available.

APPENDIX VII (cont.)

6. When a patient must be held in position for radiography, mechanical supporting and restraining devices should be used. If the patient must be held by an individual, that individual shall be protected with appropriate shielding devices such as protective gloves and apron, and shall be so positioned that no part of his/her body will be struck by the useful beam unless protected by 0.5 mm lead equivalent.

In no case shall a pregnant female be used for the purpose of holding or restraining a patient. (This is not a regulation, but every effort should be made to avoid unnecessary exposure of the fetus).

7. Except when it interferes with the area of clinical interest, gonadal shields with a minimum of 0.25 millimeters lead equivalence shall be used. This applies to adults of child-bearing age and all children.
8. The film manufacturer's recommendations, including maintenance of the developing solutions at a constant temperature, shall be used for processing film, (This is not a regulatory requirement, but is a statement of accepted good practice to keep patient exposure to a minimum consistent with good diagnostic films).

D. Personnel Monitoring

1. Personnel monitoring equipment is provided for each individual who uses or operates any radiation producing machine. Each employee shall wear his/her assigned monitor. The devices are to remain (location)_____ when not in use. The control badge (when it is supplied) shall be placed in an area free of radiation. (Name of individual) is responsible for maintaining exposure records and exchanging personnel monitors on a prearranged schedule. Exposure records will be kept (location)_____. Exposure records will be made available to occupationally exposed individuals upon request.
2. No adult employee shall be allowed to receive whole body radiation exposure in excess of 1250 millirem per calendar quarter. No employee under the age of 18 shall be allowed to receive radiation exposure in excess of 125 millirem per calendar quarter. In the event of radiation incident or an excessive exposure, the Office of Radiation Control shall be notified. The address is: Delaware Division of Public Health, Office of Radiation Control, 417 Federal Street, Dover, Delaware 19901. The telephone number is 302-744-4546.

- E. A copy of Delaware Radiation Control Regulations is available (location) and operators shall be familiar with pertinent sections A, B, D, F and J.

- F. The x-ray equipment in this facility was installed following the manufacturer's specifications. The equipment has appropriate collimation which, if used properly, will limit the size of the useful beam to the area of clinical interest. In addition, this equipment has aluminum or equivalent filtration which will remove unnecessary low-energy radiation from the x-ray beam and shall not be removed or altered except for mammography.

G. Mobile Procedures (If Applicable)

1. The operator shall stand behind a protective shield, or at least twelve feet from the patient and well away from the useful beam. If a protective shield is not used, the operator shall wear a lead apron.
2. The useful beam shall not be directed toward other patients that may be present in the room. Other patients should not be located closer than 2 meters from the tube head.

APPENDIX VIII

DELAWARE RADIATION CONTROL REGULATIONS SECTION F

Information and Maintenance Record And Associated Information.

The registrant shall maintain the following information for each x-ray system for inspection by the Agency:

- (i) Maximum rating of technique factors;
- (ii) model and serial numbers of all certifiable components;
- (iii) aluminum equivalent filtration of the useful beam, including any routine variation;
- (iv) tube rating charts and cooling curves;
- (v) records of surveys, calibrations, maintenance, and modifications performed on the x-ray system(s) with the names of persons who performed such services;
- (vi) a scale drawing of the room in which a stationary x-ray system is located with such drawing indicating the use of areas adjacent to the room and an estimation of the extent of occupancy by an individual in such areas. In addition, the drawing shall include:
 - (a) The results of a survey for radiation levels present at the operator's position and at pertinent points outside the room at specified test conditions, or
 - (b) the type and thickness of materials, or lead equivalency, of each protective barrier; and
- (vii) a copy of all correspondence with this Agency regarding that x-ray system.

APPENDIX IX

NATIONAL CREDENTIALING ORGANIZATIONS RECOGNIZED FOR DELAWARE CERTIFICATION

1. American Registry of Radiologic Technologists (ARRT)
2. Dental Assisting National Board Certified Dental Assistant (CDA) Examination
3. Dental Assisting National Board Radiation Health and Safety (RHS) Examination
4. Nuclear Medicine Technologist Certification Board (NMTCB)
5. Cardiovascular Credentialing International (CCI)

Applicants may obtain information from the following office:

Delaware Division of Public Health
Office of Radiation Control
417 Federal Street
Dover, Delaware 19901

Telephone (302) 744-4546
Fax (302) 739-3839

ORC Forms, and Instructions are posted on the following web site(s):

<http://www.dhss.delaware.gov/dhss/dph/hsp/orc.html>

or

www.delaware.gov

*Enter "radiation" (lower case) in the search engine
Click on Office of Radiation Control link*

