



Radiation Control
X-ray Unit
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Chiropractic Facilities with X-ray Equipment



Calibrations

Calibrations/Performance Evaluations must be performed prior to first use of your x-ray equipment, anytime maintenance is performed, and at the required frequencies

Shielding

All registrants must maintain documentation of the radiation shielding installed in their facility. After February 5, 2008, all facilities are required to submit a shielding plan to MDH prior to construction

Registration

Registration is required by facilities, not service providers, prior to first use of x-ray equipment, annually, and with any new piece of equipment installed

Radiation Safety

Registrants must have a site specific, written or electronic, radiation safety/quality assurance program that embodies ALARA for keeping individual doses As Low As Reasonably Achievable

www.health.state.mn.us/xray

X-ray Equipment Calibrations

Calibrations/Performance Evaluations

4732.0306

4732.0835

4732.1100

Calibrations/Performance Evaluations must be performed prior to first use of your x-ray equipment and anytime maintenance is performed on the x-ray unit or system. A listing of the required tests can be found in [Minnesota Rules, Chapter 4732.1100](#). Performance evaluation of your x-ray equipment must be performed:

1. At intervals not to exceed 24 months for the following:
 - Radiographic x-ray equipment
 - Dental x-ray equipment
 - Screen contact (one or more cassettes)
 - Speed match testing with two or more cassettes and cassettes of the same speed/type
2. At intervals not to exceed 12 months for the following:
 - Fluoroscopic x-ray equipment
 - Computed Tomography x-ray equipment
3. Anytime maintenance is performed on the x-ray equipment or system

The exposure of an individual for training, instruction, demonstration, or maintenance is a prohibited action under Minnesota Rules, Chapter 4732.0306

Individuals that assemble, install, repair or replace components of your x-ray equipment, perform calibrations, or performance evaluations on your x-ray equipment must be registered as a service provider with the state of Minnesota prior to providing these services.



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Digital Imaging

Computed Radiography (CR), Direct Radiography (DR) and Photostimulable Storage Phosphor (PSP) imaging are the manner in which the x-rays are received and processed to provide for a diagnostic image.

- Many registrants converting x-ray units to a CR or PSP imaging system may only replace the film imaging cassettes with CR or PSP imaging cassettes.
- Regardless of the imaging system an x-ray tube is necessary and the patient must receive radiation in order to generate the image.
- CR and PSP imaging systems require the imaging cassette to be placed in an image reader to obtain the x-ray image.
- For digital imaging systems, the x-ray image is obtained directly from the sensor and received on the computer monitor without the need for an image reader.

Dose reduction is not an “automatic” when converting to digital imaging. Doses may be higher during the transitional stages from film to digital imaging.

Minnesota Rules, Chapter 4732.0835 states that you must follow the manufacturer quality control recommendations when you have a computed radiography (CR), direct radiography (DR) or photostimulable storage phosphor (PSP) system.

1. Calibrations of the digital x-ray system must be performed if this digital system includes new or replacement x-ray equipment
2. Performance evaluations of your x-ray equipment must be performed at the appropriate interval listed in Calibrations/Performance Evaluations or anytime maintenance is performed on the x-ray unit or system.
3. Review your digital technical manuals very carefully. Maintenance and quality control testing of the image receptors must be performed according to manufacturer’s specifications and be maintained onsite.

Shielding Requirements

You are responsible for protecting your staff, your patients and the public from unnecessary radiation. MDH has requirements for the design of an x-ray room/area to ensure that you have met the minimum protection requirements.

[Minnesota Rules, Chapter 4732.0220](#), subpart 3 requires all registrants maintain documentation of the radiation shielding installed in their facility. The documentation must include:

1. A blue print or architectural drawing indicating installed shielding.
2. A shielding plan that was completed by a service provider or an appropriate radiological physicist.
 - The actual structural composition and thickness or lead equivalent of all walls, doors, partitions, and, if occupied spaces above or below, the floor and ceiling of the rooms concerned
 - Shielding plans must be completed by a service provider registered in Minnesota or by a radiological physicist

Shielding plans completed by any other individual will not be accepted by MDH and do not comply with the shielding plan submission requirements.

3. Calculations to ensure occupational staff and the public do not receive a dose in excess of the dose limits found in:
 - Occupational, [Minnesota Rules, Chapter 4732.0410](#)
 - Embryo or Fetus, [Minnesota Rules, Chapter 4732.0415](#)
 - Exposure to minors, [Minnesota Rules, Chapter 4732.0420](#)
 - Members of the public, [Minnesota Rules, Chapter 4732.0430](#)

OR

4. If shielding compliance can't be verified by all the above, a detailed radiation survey covering the radiation levels at the operator position and at pertinent points outside the room during normal operation must be completed.

If your x-ray room/area was constructed prior to February 5, 2008, you were not required to submit a shielding plan to MDH. However, you were required to perform a radiation survey or radiation shielding evaluation of your room/area to ensure that staff and the public are protected from unnecessary radiation and the dose received are not in excess of the limits identified in this guide.



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MDH does not develop or approve radiation shielding plans, but does verify the following at the time of inspection:

1. A post construction radiation evaluation has been completed to ensure the room/area has been constructed according to the submitted shielding plan and MDH shielding requirements to include: Room area design, operator's booth design requirements, viewing conditions, and shielding calculations
2. Corrective actions are taken when a post construction radiation evaluation or subsequent analysis of operating conditions indicate:
 - The possibility of individuals receiving a dose in excess of the dose limits prescribed in [Minnesota Rules, Chapters 4732.0410 - 4732.0430](#)
 - Non-compliance with the design of the room/area
3. Permanent Placards are in place

[Minnesota Rules, Chapter 4732.0360](#) establishes requirements for shielding plans to be completed and submitted to MDH after February 5, 2008 for the following:

1. New construction of an x-ray room/area
 - This includes rooms/areas that were not originally designed for x-ray use and are now used routinely or permanently
2. Structural remodel of an existing x-ray room/area
 - Removal or remodeling of existing exterior walls, ceiling, floor, or control booth of a room or area
3. Shielding plan forms and additional information may be found on the MDH X-ray website in the Topic Index, under Shielding

When a shielding plan has been completed and submitted, a permanent placard must be mounted in the room/area identifying the amount and type of shielding in the room/area

A placard must be mounted in the x-ray equipment room/area specifying the amount and type of shielding in all walls, doors, partitions, and, if occupied, spaces above or below the floor and ceiling.

- If mounting the shielding information is not practical, you may post a notice in the room/area that describes the document and states where it may be examined
- The placard is to remain in the room/area until the room/area is destroyed or remodeled at which time a new shielding plan must be completed and submitted if the room/area is to be used for x-ray purposes
- The placard must be mounted in a manner that the placard cannot easily be removed, defaced or destroyed
- In the event the placard is removed, defaced or destroyed, you must replace the placard

Example placard when shielding information is placed directly on the placard:

Radiation Shielding for Room 101
Control Room Wall contains 1/16 inch lead
North Wall contains 1/16 inch lead
East Wall contains 1/32 inch lead
South Wall contains 1/32 inch lead
West Wall contains 1/32 inch lead
Ceiling contains 4 inches concrete on metal deck
Floor is concrete on slab (unoccupied)

Minnesota Department of Health Radiation Control, X-ray Unit

X-ray Program Responsibilities

Equipment Notifications & Registration

Facilities must register their x-ray equipment prior to first use. Facilities are responsible for x-ray registration, not Service Providers. Registration is required annually, and with any new piece of equipment acquired throughout the year. If there are any changes to an existing registration or x-ray program, registrants must notify MDH within 30 days of the change. Service Providers must notify MDH within 15 days of sale, lease or transfer of x-ray equipment. Equipment notifications can be sent via email to health.xray@state.mn.us.

Service Providers

Service Providers are registered with MDH, renewed annually. Facilities are responsible for verifying a Service Provider registration prior to equipment installation, performance evaluation, and/or calibrations. Service Providers must notify MDH and the registrant of the sale, lease, transfer or install of x-ray equipment. A list of registered Service Provider companies is available on our website.

X-ray Operators

Grandfathered-in X-ray Operators: Individuals qualified as x-ray operators on or prior to January 1, 2008 are grandfathered into the program and do not have to take the Limited Scope X-ray Operators exam. X-ray Operators may perform radiographic procedures including fluoroscopy, CT and bone densitometry, but they may not perform mammography. A certificate and/or letter was issued to each operator, and proof of eligibility will be verified at an MDH inspection.

Limited Scope X-ray Operators: Applicants taking the Limited Scope X-ray Operators exam must pass the Core Exam and at least one of the following anatomical modules: chest, extremities (hip), skull/sinus, spine (abdomen and pelvis) or podiatry. Limited Scope X-ray Operators may only perform procedures pertaining to the modules they passed.

Bone Density Equipment Operators: Applicants who pass the Bone Density Equipment Operators exam are qualified to operate bone densitometry x-ray equipment only.

Limited Scope X-ray Operators and Bone Density Equipment Operators may not operate fluoroscopy, computed tomography, mammography or perform x-ray procedures where contrast media is used. Documentation is provided by MDH to the applicant of exams passed and is the only document that verifies x-ray equipment operation qualifications. Employers must maintain a copy of each operators qualification documentation in their records.



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Quality Assurance (QA) Program

Registrants must have a site specific, written or electronic, quality assurance program that embodies ALARA for keeping individual doses As Low As Reasonably Achievable. This may include, but is not limited to:

Annual Radiation Program Audits	Performed internally by RSO every 12 months.
Calibrations	Installations and equipment performance tests performed at the required frequency and prior to first patient use.
Deficiencies	Must be documented and corrected.
Dosimetry	Compliance with rule requirements, if applicable.
Personal protective equipment	Testing and use, if applicable.
Quality Assurance (QA) & Operating and Emergency Procedures	May include the following: declared pregnancy, holding, emergency, operating procedures, repeat/retake, radiation program audit, and other site specific radiation safety policies and procedures.
Quality Control tests (QC)	Medical and Chiropractic facilities: Cassette screen contact and speed match, darkroom fog, developer temperature, sensitometry and densitometry processor evaluation. Manufacturer recommended for all facilities with digital imaging.
Radiation Safety Officer (RSO)	Must be designated with a signed delegation agreement in place.
Record maintenance	Must be maintained onsite for review.
Retake or Reject Analysis	Must be conducted quarterly and written procedures maintained onsite. Excluding dental facilities.
Shielding Plan	Must be submitted to MDH prior to first patient use and maintained onsite. Excluding Bone Densitometry, Mammography, and Dental Intraoral.
Training	Must be conducted initially and with any changes to QA program. Site specific and maintained onsite.
X-ray Operator qualifications	Must be maintained onsite for human-use only equipment.