

**Dental Shielding Workshop
December 11, 2007**

Minnesota Department of Health
Chapter 4732 "Ionizing Radiation Rules"

<http://www.health.state.mn.us/divs/eh/radiation/xray/4732oct07.pdf>

CHAPTER 4732 EFFECTIVE 11/5/07

- Part 0220 GENERAL REQUIREMENTS FOR ALL FACILITIES
 - Part 0355 GENERAL REQUIREMENTS FOR SHIELDING
 - Part 0360 SHIELDING PLAN
 - Part 0365 ADDITIONAL SHIELDING REQUIREMENTS FOR DENTAL FACILITIES
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**Part 0220 GENERAL REQUIREMENTS FOR ALL FACILITIES—Subpart 3
Shielding Requirements**

- A. Blueprint or drawing
 - B. Shielding plan
 - C. Calculations
 - If A,B,C not done, do verification survey
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Part 0220 GENERAL REQUIREMENTS
FOR ALL FACILITIES—Subpart 4
Exemption

- Dental facilities with only intraoral capabilities are exempted from the shielding requirements in subpart 3
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Part 0355 GENERAL SHIELDING
REQUIREMENTS

- Basically, refers to Part 0360 and 0365 (dental extra-oral).
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Part 0360 SHIELDING PLAN

- Subp. 1. **Applicability.** After February 3, 2008, the registrant is required to have a shielding plan completed for new construction or remodeling of its x-ray areas.
 - (Intra-oral exempted in Subp. 5)
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Part 0360 SHIELDING PLAN—CONTINUED

- Subp. 2. **Requirements.** The plan must show:
 - A. Dimensions
 - B. Machine location and direction
 - C. Door & window location
 - D. Control booth location (Dental CT)
 - E. Composition and thickness of walls
 - F. Manufacturer & model of equipment
 - G. Maximum technique factors
 - H. Type of examinations
 - I. Anticipated workload (patients or mA-min per week)
 - J. Adjacent occupancies

Part 0360 SHIELDING PLAN—CONTINUED

- Subp. 3. **Modifications.** The review of shielding plans must not preclude the requirement of additional modifications, that is, additional shielding in the future.

Part 0360 SHIELDING PLAN—CONTINUED

- Subp. 4. **Shielding review.** After February 3, 2008, the shielding plan must be submitted to the commissioner prior to any new construction or structural remodeling

Part 0360 SHIELDING PLAN—CONTINUED

- Subp. 5. **Exemptions.** Dental facilities with only intraoral capabilities; or if the replacement of a piece of radiation-producing equipment does not increase the risk of radiation beyond the dose limits.

Part 0360 SHIELDING PLAN—CONTINUED

- Subp. 6. **Records.** The shielding plan documentation must be maintained by the registrant of the facility:
 - A. Shielding plan data including all assumptions and specifications;
 - B. Construction, or as-built, documents showing location and amounts of shielding material installed;
 - C. Post-construction radiation evaluation, if any;
 - D. Information regarding remedies, if any were required;
 - E. All re-evaluations of the room; and
 - F. The shielding plan information must include the name of the individual completing the plan and the date

Part 0360 SHIELDING PLAN—CONTINUED

- Subp. 7. **Permanent placard.** A permanent placard must be mounted in the room specifying the amount and type of shielding in all walls, doors, partitions, and, if occupied, spaces above or below the floor and ceiling.
- Alternatively, a notice may be posted telling where this information is stored

**Part 0365 ADDITIONAL REQUIREMENTS
FOR DENTAL FACILITIES**

- A. When radiographic systems are installed in adjacent rooms or areas, protective barriers (walls) must be provided between the rooms to ensure that the doses are ALARA
- B. Each installation must be provided with a protective barrier for the operator or must be arranged so the operator can stand at least 6 feet from the patient and the tube head
- C. Protective barriers and exposure switches must be arranged such that the operator is able to view the patient and all entrances

INTRA-ORAL MACHINES

- No shielding plan is required
- Layout must be ALARA, with 6-foot distance for operator, and allows viewing of patient, others

EXTRA-ORAL MACHINES

- Plan must be submitted for review (see Shielding Plan Review Form). Our goal is to complete the plan within 30 days.
- Guidelines:
 - MN X-ray Notice 2007-02
 - NCRP 145 *Radiation Protection in Dentistry*
 - British Columbia Centre for Disease Control

EXTRA-ORAL MACHINES—continued

- Panoramic considerations
 - All radiation is secondary (primary stopped internally)
 - Measured exposure at 1 meter is typically 4.5 E-3 mrem per exposure

EXTRA-ORAL MACHINES—continued

- Example using Notice 2007-02:
 - Install panoramic machine next to wall shared with another tenant using triple sheet rock.

EXTRA-ORAL MACHINES—continued

- Example using NCRP 145:
 - Use factor 4.5 E-3 mrem per exposure
 - Anticipate 50 exposures per week (2500 per year)
 - Calculate annual exposure at 1 meter of 11 mrem
 - Less than public dose limit of 100 mrem/year; no additional shielding required

EXTRA-ORAL MACHINES—continued

- Example using BC Centre form:
 - Anticipate up to 50 exposures per week:
 - 1 inch gypsum wall board for Wall D (switch location in protected area)
 - 1 inch gypsum wall board for surrounding walls A, B, C
 - No shielding required for entrance

EXTRA-ORAL MACHINES—continued

- Cephalometric considerations
 - Example using BC Centre form, anticipate up to 50 exposures per week with lead-lined cassette holder:
 - 1 inch gypsum wall board for Wall D (switch location in protected area)
 - 1 inch gypsum wall board for surrounding walls A & C
 - 2 inch gypsum wall board for Wall B (full occupancy)
 - No shielding required for entrance

CT (Head & Neck)

- Submit manufacturers iso-dose curves
- May need control booth
- NCRP 147, Section 5.6
