

Chapter 246-226 WAC

Radiation protection – Computed tomography

WAC 246-226-001 Authority. The requirements of this chapter are adopted pursuant to the provisions of chapter 70.98 RCW and chapter 70.56 RCW.

WAC 246-226-005 Purpose and scope. This chapter establishes CT X-ray system requirements for the intentional exposure of humans of ionizing radiation for diagnostic imaging.

WAC 246-226-007 Relationship to other regulations. In addition to the requirements established in this chapter, registrants shall also comply with applicable portions of the following rules:

- (1) Applicable requirements established in chapter 246-220 WAC, Radiation protection – general provisions;
- (2) Applicable requirements established in chapter 246-221 WAC, Radiation protection standards;
- (3) Applicable requirements established in chapter 246-222 WAC, Radiation protection – worker rights;
- (4) Applicable requirements established in chapter 246-224 WAC, Radiation protection – radiation machine assembly and registration;
- (5) Applicable requirements established in chapter 246-225 WAC, Radiation protection – X-rays in the healing arts; and
- (6) Applicable fees established in chapter 246-254 WAC, Radiation protection – fees.

WAC 246-226-010 Definitions, abbreviations, and acronyms. The definitions, abbreviations, and acronyms in this section and in WAC 246-220-010 apply throughout this chapter unless the context clearly indicates otherwise.

- (1) “CT (computed tomography)” means a radiologic imaging procedure or system that uses computer processing to generate an image of tissues using thin slices sent through the patient’s body to detectors on the other side.
- (2) “CT conditions of operation” means all selectable parameters governing the operation of a CT X-ray system including nominal tomographic section thickness, filtration, and the technique factors as defined in this section.
- (3) “CTDI (computed tomography dose index)” means the integral of the dose profile along a line perpendicular to the tomographic plan divided by the product of the nominal tomographic section thickness and the number of tomograms produced in a single scan **that is:**

Where:

Z = Position along a line perpendicular to the tomographic plane;

D(z) = Dose at position z;

T = Nominal tomographic section thickness;

N = Number of tomograms produced in a single scan.

And:

The dose profile is centered around $z=0$ and that, for a multiple tomogram system, the scan increment between adjacent scans is nT .

- (4) “CTDI_{vol} (computed tomography dose index)” means a weighted average measurement based on a reference phantom dosimetry measurement, expressed in milliGray. Not applicable to helical scan acquisition.
- (5) “CT dosimetry phantom” means an object used to determine the dose delivered by a CT X-ray system.
- (6) “CT medical director” means...
- (7) “CTN (computed tomography number)” means the number used to represent the X-ray attenuation associated with each elemental area of the CT image:

Where:

- (8) “CT procedure” means an activity directed at or performed on an individual necessary to make a diagnosis using a CT X-ray system, including, but not limited to, setting, modifying, or applying parameters or protocols.
- (9) “CT X-ray system” means a gantry-style...
- (10) “Department” means the Washington state Department of Health.
- (11) “Dose profile” means the dose as a function of position along a line.
- (12) “DLP (dose length product)” means the product of the CTDI_{vol} and the scan length of a group of scans. This number can be calculated over the entire CT procedure to give an estimate of the total dose. The value is expressed in milliGray centimeters.
- (13) “Filtration” means material placed in the beam to preferentially absorb low energy photons that contribute nothing to the image, and yet otherwise would increase patient exposure.
- (14) “Health scanning mode” means...
- (15) “Kilowatts” means peak power, which is the highest rated kilovoltage of a CT-X-ray system multiplied by the maximum rated amperage multiplied by the power factor.
- (16) “Lead CT technologist” means...
- (17) “Lead interpreting CT physician” means a physician licensed under RCW 18.71.021 or RCW 18.57.031 designated by the registrant to perform the duties under WAC 246-226-070(7).
- (18) “Mobile CT X-ray system” means...
- (19) “Multiple tomogram system” means a computed tomography X-ray system that produces more than one tomogram from X-ray transmission data during a single scan.
- (20) “Noise” means the standard deviation of the fluctuations in CTN expressed as a percentage of the attenuation coefficient of water. Its estimate (S_n) is calculated using the following express:

Where:

- (21) “Nominal tomographic section thickness” means the full width at half-maximum of the sensitivity profile taken at the center of the cross-sectional volume over which X-ray transmission data are collected.
- (22) “Operator” means a health professional licensed under RCW 18.71.021, RCW 18.57.031, or chapter 18.84 RCW whose scope of practice includes CT diagnostics which includes choosing

the appropriate scan protocol, appropriately adjusting technical parameters when necessary, and administering the CT procedure.

- (23) "Parameter" means ...
- (24) "PET (positron emission tomography)" means an imaging technique that uses positron-emitting radionuclides to produce three-dimensional images of functional processes in the body.
- (25) "PET/CT" means a PET used in conjunction with a CT X-ray system.
- (26) "Protocol" means the set of parameters affecting CT dose and image quality.
- (27) "Qualified medical physicist" means a physicist who meets the requirements of WAC 246-226-070.
- (28) "Reference plane" means a plane which is displaced from and parallel to the tomographic plane.
- (29) "Registrant" means the owner or controller of the radiation machine who is responsible for the safe operation of the radiation machine.
- (30) "Scan" means the complete process of collecting X-ray transmission data for the production of a tomogram. Data can be collected simultaneously during a single scan for the production of one or more tomograms.
- (31) "Scan increment" means the amount of relative displacement of the patient with respect to the CT X-ray system between successive scans measured along the direction of such displacement.
- (32) "Sensitivity profile" means the relative response of the CT X-ray system as a function of position along a line perpendicular to the tomographic plane.
- (33) "SPECT (single photon emission computed tomography)" means...
- (34) "SPECT/CT" means single photon emission computed tomography used in conjunction with a CT X-ray system.
- (35) "Technical factor" means...
- (36) "Technical parameters" means
- (37) "Technique factor" means peak tube potential in kV and either:
 - (a) Tube current in mA and exposure time in seconds; or
 - (b) The product of tube current and exposure time resulting in mAs.
- (38) "Tomogram" means ...
- (39) "Tomographic plane" means the geometric plan which the manufacturer identified as corresponding to the output tomogram.
- (40) "Tomographic section" means the volume of an object whose X-ray attenuation properties are imaged in a tomogram.

WAC 246-226-020 Equipment requirements. The CT X-ray system must:

- (1) Meet the requirements of 21 CFR 1020.33 at the time of installation and while the CT X-ray system is registered with the department under chapter 246-224 WAC, Radiation Protection – Radiation machine assembly and registration; and
- (2) Be equipped:

- (a) With a visible signal that indicates when the X-ray exposure has been terminated;
- (b) So that the operator can terminate an X-ray exposure of greater than one-half second duration at any time during the X-ray exposure;
- (c) With an emergency button or switch that is labeled to clearly indicate its function;
- (d) So that the CT conditions of operation used during a CT procedure are:
 - i. Displayed prior to beginning a scan, and
 - ii. Visible by the operator from any location scanning can be initiated.
 - iii. Permanent markings may be used on equipment with fixed conditions of operation.
- (e) So that radiation leaked from the tube port does not exceed limits adopted in WAC 246-225-040(3) and (4) when data are not being collected for image production.
- (f) So that the accuracy of the laser or optical positioning system is within 5 millimeters on axial position (z-axis).
- (g) With an X-ray production indicator of at least one-half second at or near the gantry that is visible from any point outside the gantry opening.
- (h) So that premature termination of the X-ray exposure by the operator requires resetting of the CT conditions of operation prior to initiating another scan.

WAC 246-226-030 Facility design requirements.

- (1) For the purposes of this section, the terms below are defined as follows:
 - (a) "Fixed CT X-ray system" means a CT X-ray system that is permanently mounted and part of the building in which it is used.
 - (b) "Mobile CT X-ray system" means a CT X-ray system that is permanently mounted in a vehicle or trailer.
 - (c) "Portable CT X-ray system" means a CT X-ray system that is not permanently mounted in a building, vehicle, or trailer and is movable between rooms.
- (2) A facility must be designed and constructed:
 - (a) To provide for two-way aural communication between the patient and the operator at the control panel;
 - (b) To allow the operator to continuously observe the patient from the control panel during irradiation using windows, mirrors, closed-circuit television, or an equivalent method;
 - (c) With an alternate viewing system when the primary viewing system is electronic; and
- (2) Within twelve months of CT X-ray system installation, the registrant shall conduct a physical survey to verify shielding to ensure exposure does not exceed dose limits established in WAC 246-221. For CT X-ray system installations installed before **[insert effective date of the chapter]**, the physical survey must be conducted by **[two years after effective date of the chapter]**.
- (3) A fixed or mobile CT X-ray system:
 - (a) Operator's booth and surrounding occupied areas must be designed and constructed in accordance with the National Council on Radiation Protection and Measurements Report #147 (2004);

- (b) Protective barriers must be provided in the ceiling, floor, and walls of the CT X-ray system enclosure to ensure exposure does not exceed dose limits established in WAC 246-221; and
 - (c) Control panel must be shielded by a protective barrier that cannot be removed from a protective position between the operator and the radiation source during CT X-ray system operation.
- (4) A portable CT X-ray system must meet the requirements of this section except, to meet the requirement of (2)(c) of this section, it may be equipped with a shield adequate to protect the operator and surrounding areas to ensure exposure does not exceed dose limits established in WAC 246-221.
- (5) The registrant shall submit a revised radiation shielding plan for department review in accordance with WAC 246-225-030 after replacement of the CT X-ray system, or any change in the CT X-ray system room's construction or surrounding room's construction.

WAC 246-226-040 Operating procedures and conditions of operation.

- (1) For the purposes of this section, the estimated patient dose is equal to the DLP. DLP is calculated by multiplying the $CTDI_{vol}$ by scan length.
- (2) The registrant shall:
- (a) Establish a procedure to record and retrieve estimated patient dose from every CT procedure performed.
 - (b) Provide estimated patient dose within ten business days of a patient request.
 - (c) Send each CT procedure and protocol page that lists the technical factors and estimated patient dose electronically to the Picture Archiving and Communications System, also known as PACS.
- (3) **Effective [insert date six months after the effective date of these rules]**, the registrant shall establish CT procedures for each CT X-ray system in consultation with a qualified medical physicist and the lead interpreting CT physician, CT medical director, or lead CT technologist to ensure they are correct for the intended dose and image quality as follows:
- (a) Display pediatric CT procedures on each CT X-ray system used for pediatric CT procedures.
 - (b) Establish procedural, software, and engineering measures such as password protection that prohibit anyone from changing protocols or parameters without approval from the lead CT technologist or the lead interpreting CT physician. Documentation of protocol or parameter changes must be maintained consistent with the requirements of WAC 246-226-100.
- (4) The registrant may not allow the CT manufacturer's technical or applications representatives to make protocol changes or other software changes or upgrades that would impact radiation dose or image quality without the approval of the lead interpreting CT physician, the lead CT technologist, or the qualified medical physicist.
- (5) **Effective [insert date six months after the effective date of these rules]**, the registrant shall review all CT procedures every twelve months in consultation with a qualified medical physicist

and the lead interpreting CT physician, CT medical director, or lead CT technologist to ensure they are correct for the intended dose and image quality as follows:

- (a) Compare current protocols to the dose assessments that were made during the last annual performance evaluation required in section 090 of this chapter;
 - (b) Determine whether the protocols from each CT procedure is appropriate or whether there is an opportunity to modify the protocol and lower the $CTDI_{vol}$ without an unacceptable sacrifice to image quality;
 - (c) Establish protocols that maintain image quality at the desired noise level within dose levels established in WAC 246-226-050.
 - (d) Establish guidelines of variability that establish parameter and protocol limits.
 - i. The registrant shall limit the use of the CT X-ray system to those permitted by the established guidelines of variability.
 - ii. The operator may adjust parameters or protocols for a CT procedure as long as they remain within the approved limits established in the guidelines of variability.
 - (e) Retain written approval of the annual review for each CT X-ray system with date and signature of the registrant, qualified medical physicist, and lead interpreting CT physician, and make it available for inspection by the department;
- (6) The operator shall check the display panel before and after performing each scan to make sure the amount of radiation delivered is appropriate for the CT procedure and individual patient. This may be accomplished by reviewing dose indicator devices if available or dose indices such as the technique factors. Dose indicators or indices outside of expected values shall be documented and reviewed by the lead interpreting CT physician or qualified medical physicist.
- (7) Each registrant shall create a written policy establishing procedures for retaking CT procedures, including, but not limited to, how many scans are authorized for a patient and who can authorize additional retakes. The policy must be approved by the CT medical director or the lead interpreting CT physician
- (8) If staff routinely working with or around radiation sources hold patients during CT procedures, personnel exposure may not exceed the dose limits established in WAC 246-221. The registrant may not require staff to hold patients during CT procedures.
- (9) When a patient must be held in position for a CT procedure, mechanical supporting or retraining devices must be used unless contraindicated. If the patient must be held by an individual, the individual shall:
- (a) Wear protective gloves and a protective apron of 0.5 millimeter minimum lead equivalent;
 - (b) Be positioned so that no part of his or her body will be struck by the useful beam; and
 - (c) Be positioned so that his or her body is as far as possible from the edge of the useful beam.
- (10) Only individuals whose presence is necessary are allowed in a CT X-ray system room during exposure. Each individual, except the patient, shall be protected by at least 0.5 millimeter lead equivalent apron or a whole body protective barrier.

WAC 246-226-050 Dose limits. The CTDI_{vol} for the following CT procedure on standard phantoms may not exceed the dose limits shown below.

CT Procedure	Dose Limit: CTDI _{vol} (mGy)	Reference Levels: CTDI _{vol} (mGy)
Adult head	80	75
Adult abdomen	30	25
Pediatric head	40	35
Pediatric abdomen (40 pounds)	20	15

WAC 246-226-060 Required notification of deterministic injurious health effect.

- (1) The purpose of this section is to improve patient safety by supporting health care providers and facilities in their efforts to reduce the incidence of medical errors that contribute to deterministic injurious health effects. This rule does not relieve the department of its statutory obligation to enforce this and other radiation protection laws.
- (2) For the purposes of this section, deterministic injurious health effect, or effect, means:
 - (a) A 1500 mGy or larger dose of ionizing radiation as estimated by the CT X-ray system's software, or as calculated by a qualified medical physicist, delivered to any organ or tissue of a patient within a time period of 24 hours; or
 - (b) Any ionizing radiation exposure from a CT procedure that results in unanticipated permanent functional damage to an organ or physiological system, hair loss, or erythema.
- (3) For the purposes of this section, event means a specific CT procedure that resulted in a deterministic injurious health effect.
- (4) The registrant shall, within five business days of discovery of an event, notify the department and the referring physician of the person subject to the effect by phone. The registrant shall provide the notification when it is caused by either:
 - (a) Repeating a CT procedure on the same patient over the same area within 24 hours, unless otherwise ordered by a physician or radiologist; or
 - (b) A single CT procedure of a patient that resulted in an effect.
- (5) The notification must include the following:
 - (a) The name of the medical facility;
 - (b) The date the event was discovered;
 - (c) The type of effect observed;
 - (d) The cause of the effect; and
 - (e) Any additional contextual information the medical facility chooses to provide.
- (6) For each event, the registrant shall conduct a root cause analysis in consultation with a qualified medical physicist, the lead interpreting CT physician, CT medical director, lead CT technologist, and the operator who performed the CT procedure. The root cause analysis must:

- (a) Follow the procedures and methods of:
 - i. The joint commission;
 - ii. The department of veterans affairs national center for patient safety; or
 - iii. Another nationally recognized root cause analysis methodology the department has found acceptable for computed tomography.
 - (b) Include the following information:
 - i. The findings regarding the root cause of the event;
 - ii. The number and types of health professionals present at the time the reported event occurred; and
 - iii. A corrective action plan consistent with the findings of the root cause analysis and including:
 - iv. How each finding will be addressed and corrected;
 - v. When each correction will be completed;
 - vi. Who is responsible to make the corrections;
 - vii. What action will be taken to prevent the event from reoccurring; and
 - viii. A monitoring schedule to assess the effectiveness of the corrective action plan, including who is responsible for the monitoring schedule.
 - (c) If the registrant determines there is no need to create a corrective action plan for a particular event, include a written explanation of the reasons for not creating a corrective action plan.
- (7) The root cause analysis may not include any identifying information for any health care professional, facility employee, or patient involved.
- (8) The department shall arrange for a joint review of the root cause analysis within 45 days of receiving notification of the event.
- (9) After joint review of the root cause analysis, the registrant shall make appropriate modifications to prevent future effects and document the changes made with sixty days of the joint review.
- (10) The department may not retain the root cause analysis. All records retained by the department are subject to public disclosure under chapter 42.56 RCW, Public records act.
- (11) Notification and reporting under this rule does not remove a registrant's responsibility to report a licensed practitioner's unprofessional conduct to the department, as defined under RCW 18.130.180.

WAC 246-226-070 Staffing requirements.

- (1) Each registrant with a CT X-ray system shall employ or contract with a physician licensed under RCW 18.71.021 or RCW 18.57.031; or a radiologic technologist licensed under chapter 18.84 RCW to perform CT procedures. The registrant may employ or contract with a radiological technologist licensed under chapter 18.84 RCW with an ARRT CT certification to meet this requirements of this section.
- (2) Each registrant with a CT X-ray system shall employ or contract with a qualified medical physicist to perform the activities of the qualified medical physicist specified in this chapter.

- (3) Prior to employing or contracting with a qualified medical physicist, the registrant shall verify the qualified medical physicist meets (a), (b), or (c) of this subsection:
- (a) Holds a valid certificate in:
 - i. Diagnostic radiological physics or radiological physics from the American Board of Radiology,
 - ii. Diagnostic imaging physics from the American Board of Medical Physics, or
 - iii. Diagnostic radiology physics from the Canadian College of Physicists in Medicine.
 - (b) Has the following experience and education requirements:
 - i. Three years of documented successful experience in a clinical CT environment; and
 - ii. Hold a graduate degree from an accredited institution in medical physics, radiological physics, physics, or another relevant physical science or engineering discipline; including formal coursework in the biological sciences with at least:
 - (A) One course in biology or radiation biology; and
 - (B) One course in anatomy, physiology, or similar topics related to the practice of medical physics.
 - (c) Effective **[insert effective date of chapter]**, has conducted surveys of at least three CT X-ray systems between January 1, 2007 and January 1, 2010 and meets the continuing experience requirements of this chapter. Effective **[insert effective date of chapter]**, a qualified medical physicist shall meet the requirements of (a) or (b) of this subsection.
- (4) Prior to employing or contracting with a qualified medical physicist, the registrant shall verify that the qualified medical physicist has evaluated at least five CT X-ray systems in accordance with this chapter in the preceding two years. This requirement is waived if it has been less than two years since the qualified medical physicist met the requirements of subsection (3) of this section.
- (5) Prior to employing or contracting with a qualified medical physicist, the registrant shall verify that the qualified medical physicist has earned at least fifteen continuing medical education units pertinent to CT in the preceding three years. At least half of the continuing education units must be:
- (a) Attendance-based learning at courses accredited by the Accreditation Council for Continuing Medical Education;
 - (b) Continuing medical education activities in journals;
 - (c) Continuing medical education enduring materials;
 - (d) Presentations at conferences;
 - (e) Publications in peer-reviewed journals; or
 - (f) Test item writing.
- (6) . This requirement is waived if it has been less than three years since the qualified medical physicist met the requirements of subsection (3) of this section.
- (7) Before employing or contracting with a person who failed to maintain the continuing experience requirements of this section, the registrant shall verify the qualified medical physicist has

evaluated five CT X-ray systems in accordance with this chapter under the direct supervision of a qualified medical physicist in the preceding two years.

- (8) The registrant shall appoint a lead interpreting CT physician to:
- (a) Develop, implement, and enforce policies, procedures, and registrant requirements that address:
 - i. Radiation protection, the hazards of radiation exposure to both patients and facility personnel, and appropriate monitoring;
 - ii. Identification of pregnant or potentially pregnant patients; and
 - iii. Safety issues, including contrast use and sedation, and reduce exposure as much as reasonably possible for pediatric patients;
 - (b) Ensure that a physician is present and immediately available when contrast is administered to a patient; and
 - (c) Be responsible for:
 - i. Implementing the quality control program required in section 080 of this chapter;
 - ii. Ensuring compliance with the recommendations of the qualified medical physicist; and
 - iii. The oversight of all CT-related materials, including clinical and phantom images, quality control data, and other information required by this chapter.
- (9) The registrant shall appoint a CT medical director to ...
- (10) The registrant shall appoint a lead CT technologist to ...

WAC 246-226-080 Quality control program.

- (1) The registrant shall establish, document, and implement a quality control program in consultation with the qualified medical physicist before using a CT X-ray system. The quality control program must include, but is not limited to, the following:
- (a) Daily measurement of water CTN and standard deviation;
 - (b) Daily artifact evaluation;
 - (c) Weekly wet laser printer quality control;
 - (d) Monthly visual checklist;
 - (e) Monthly dry laser printer quality control; and
 - (f) Monthly display monitors quality control.
- (2) The registrant shall modify the quality control program and document the changes in consultation with the qualified medical physicist if the results of an evaluation included in the quality control program do not meet the requirements of this chapter.

WAC 246-226-090 Performance evaluation. The registrant shall employ or contract with a qualified medical physicist to conduct a performance evaluation to assess the quality and safety of the CT X-ray system and its operation that meets the following requirements:

- (1) A performance evaluation must be conducted:

- (a) Initially, before using a CT X-ray system;
 - (b) Annually following the initial evaluation; and
 - (c) After any change, replacement, or reconfiguration of components which, in the opinion of the qualified medical physicist, could cause a change in the radiation output or image quality.
- (2) A performance evaluation must evaluate:
- (a) Alignment light accuracy;
 - (b) Alignment of table to gantry;
 - (c) Table and gantry tilt;
 - (d) Slice localization from scanned projection radiograph;
 - (e) Table increment and travel accuracy;
 - (f) Slice thickness accuracy;
 - (g) Image quality, including the following:
 - i. High-contrast resolution;
 - ii. Low-contrast resolution;
 - iii. Image uniformity;
 - iv. Noise;
 - v. Artifact evaluation; and
 - vi. Spatial resolution.
 - (h) Gray level performance of CT acquisition display monitors;
 - (i) CTN uniformity, accuracy, and linearity;
 - (j) Dosimetry, including the following:
 - i. Dose indicator, such as $CTDI_{vol}$; and
 - ii. Patient radiation dose for preventative CT procedures;
 - (k) Safety, including the following:
 - i. Visual inspection;
 - ii. Audible and visual signals;
 - iii. Posting requirements; and
 - iv. Scattered radiation measurements.
 - (l) The ongoing quality control program, including evaluation results and corrective actions;
 - (m) Protocols;
 - (n) Radiation output by:
 - i. Using a calibrated dosimetry system that:
 - (A) Has been calibrated within the preceding 24 months; and
 - (B) Is traceable to a national standard.
 - ii. Using a CT dosimetry phantom that:
 - (A) Is a right circular cylinder of polymethyl methacrylate of density 1.19 plus or minus 0.01 grams per cubic centimeter;
 - (B) Is at least 14 centimeters in length;
 - (C) Is 32.0 centimeters in diameter for evaluating CT X-ray systems designed to image any section of the body;

- (D) Is 16.0 centimeters for systems designed to image the head, or for whole body CT X-ray systems operated in the health scanning mode; and
 - (E) Provides for the placement of a dosimeter along the axis of rotation and along a line parallel to the axis of rotation 1.0 centimeters from the outer surface and within the phantom. The qualified medical physicist may place additional dosimeters or alignment devices at other locations.
- iii. Accounting for any effects on the doses measured due to the removal of phantom material to accommodate dosimeters through appropriate corrections to the reported data or included in the statement of maximum deviation for the values obtained using the phantom;
 - iv. Performing all dose assessments with the CT dosimetry phantom placed on the patient support device without additional attenuation materials present;
 - v. Measuring the dose profile along the center axis of the CT dosimetry phantom for the minimum, maximum, and midrange values of the nominal tomographic section thickness used by the registrant. Where less than three nominal tomographic section thicknesses can be selected, the dose profile determination shall be performed for each available nominal tomographic section thickness.
 - vi. Measuring the $CTDI_{vol}$ by orienting the CT dosimetry phantom so that the measurement point 1.0 centimeter from the peripheral outer surface of the phantom and the measurement point along the axial line of the phantom is in the same angular position within the gantry as the point of maximum surface $CTDI_{vol}$ identified. The CT conditions of operation must correspond to typical values used for the average patient protocol. For the purpose of determining the $CTDI_{vol}$, the manufacturer's nominal tomographic section thickness for that particular CT X-ray system may be used.
- (o) Accuracy of the displayed dose on the CT X-ray system console and verify the displayed dose is within twenty percent of the measured doses.
 - (p) Deviation from indicated scan increment versus actual scan increment and make adjustments so that the deviation does not exceed plus or minus 1 millimeter with any mass from 0 to 100 kilograms resting on the patient support device:
 - i. To measure the deviation, the patient support device must be incremented from the typical starting position for the type of scan being performed and size of patient, to the maximum incremented distance or 30 centimeters, whichever is less, and then returned to the starting position.
 - ii. Measurement of actual versus indicated scan increment may be taken anywhere along the plane of horizontal movement.

(3) Performance evaluation report:

- (a) The qualified medical physicist shall prepare a performance evaluation report that includes the following:

- i. A summary of the performance evaluation required under this section.
 - ii. Recommendations for improvements, if any.
 - iii. Type of radiation detection instrument or system used, including the date of the last calibration.
- (b) The qualified medical physicist shall provide the performance evaluation report to the registrant within thirty days.

WAC 246-226-100 Required records and reports.

- (1) The registrant shall place written information at the CT X-ray system control panel regarding the operation and calibration of the CT X-ray system including, but not limited to, the following:
- (a) Dates of the latest calibration and where the results are located;
 - (b) Quality control program the results of at least the most recent quality control evaluation, and all additional schedules of evaluation established by the qualified medical physicist appropriate for the CT X-ray system;
 - (c) Guidelines of variability;
 - (d) The distance in millimeters between the tomographic plane and the reference plane if a reference plane is used;
 - (e) A current technique chart that specifies the CT conditions of operation and number of scans for each routine CT procedure; and
 - (f) Written documentation provided by the qualified medical physicist of a discrepancy greater than twenty percent between the measured doses and the displayed doses on the CT X-ray system console and the reason for the discrepancy.
- (2) A registrant shall maintain the following documents for the times specified and make them available for review by the department upon request:
- (a) The most recent physical survey required under section 030 of this chapter must be retained for as long as the CT X-ray system is in use.
 - (b) Records documenting the qualifications of all personnel who worked at the facility as a physician licensed under RCW 18.71.021 or RCW 18.57.031; or a radiologic technologist licensed under chapter 18.84 RCW, employed or contracted qualified medical physicist, or lead interpreting CT physician for three years. Records of personnel no longer employed by the CT facility must be retained until the next inspection following the employee's termination has been completed and the department has determined that the facility is in compliance with the staffing requirements of WAC 246-226-070;
 - (c) All root cause analyses required under WAC 246-226-070 must be retained for at least five years.

WAC 246-226-110 Exemptions.

- (1) Registrants exclusively using low power CT X-ray systems (5 kW or less) or conebeam CT X-ray systems are exempt from the requirements of this chapter.

- (2) Registrants using PET/CT or SPECT/CT X-ray systems exclusively are exempt from the requirements of this chapter, except that the registrant shall comply with WAC 246-226-090, Performance evaluation.
- (3) Registrants using CT simulators exclusively for treatment planning purposes in conjunction with a megavoltage radiation therapy unit are exempt from the requirements of this chapter, except that the registrant shall comply with WAC 246-226-090, Performance evaluation

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