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**TITLE 252. DEPARTMENT OF ENVIRONMENTAL QUALITY
CHAPTER 410. RADIATION MANAGEMENT**

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SUBCHAPTER 1. GENERAL PROVISIONS

Section

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252:410-1-1. Purpose and applicability

(a) **Purpose.** The purpose of this Chapter is to ensure radiation management activities conducted within the jurisdiction of the DEQ are protective of health, safety, property and the environment.

(b) **Applicability.** Except as otherwise specifically provided, this Chapter applies to all persons who receive, possess, use, transfer, own, handle, dispose, store, house or acquire any source of radiation; provided, however, that nothing in this Chapter shall apply to any person to the extent such person's activity is subject to regulation under a specific license issued by the U.S. Nuclear Regulatory Commission or as a diagnostic x-ray facility by the Oklahoma State Department of Health.

(c) **State Agreement.** Any regulation by the State of Oklahoma of source material, byproduct material and special nuclear material in quantities not sufficient to form a critical mass is subject to agreement between the State and the U.S. Nuclear Regulatory Commission and to 10 CFR Part 150 of the Commission's Regulations.

(d) **Effective date.** This Chapter as amended shall become effective on June 1, 2000, except Subchapters 5 and 10 shall become effective on September 29, 2000.

(e) **Subchapters.** References to Subchapters are Subchapters in this Chapter.

(f) **Appendices.** References to appendices are appendices to this Chapter unless otherwise stated.

252:410-1-2. Definitions

The following words or terms, when used in this Chapter, shall have the following meaning, unless the context clearly indicates otherwise. In cases of conflict between the definitions of this section and those incorporated by reference from 10 CFR, 10 CFR definitions incorporated by reference into Subchapter 10 shall prevail for purposes of the Radioactive Materials Program; definitions incorporated by reference into Subchapter 21 shall prevail for NESHAP purposes; and definitions incorporated by reference into Subchapter 20, shall apply to all persons subject to this Chapter.

"Accelerator-produced material" means any material made radioactive by a particle accelerator.

"Access panel" means any barrier or panel on a cabinet which is designed to be removed or opened for maintenance or service purposes, requires tools to open and allows access to the interior.

"Agreement State" means any State with which the U.S. Nuclear Regulatory Commission or the U.S. Atomic Energy Commission has entered into an effective agreement under subsection 274(b) of the Atomic Energy Act of 1954, as amended (73 Stat. 689; 42 USC §2021 *et seq.*).

"Analytical x-ray system" means a group of components utilizing x or gamma rays to determine the elemental composition or to examine the microstructure of materials.

"Anniversary date" means the issuance day and month of a permit or license.

"Application" means a written request for a new, amended or renewed authorization.

"Assembler" means any person engaged in the business of assembling, replacing, or installing one or more components into an x-ray system or subsystem. The term includes the owner of an x-ray system or his or her employee or agent who assembles components into an x-ray system that is subsequently used to provide professional or commercial services.

"Authorization" means any DEQ radiation management plan approval, certificate, individual certification, permit, license, or reciprocity recognition required by this Chapter.

"Beam-limiting device" means a device which provides a means to restrict the dimensions of the x-ray field.

"Byproduct material" means:

(A) Any radioactive material (except special nuclear material) yielded in, or made radioactive by, exposure to the radiation incident to the process of producing or using special nuclear material;

(B) The tailings or wastes produced by the extraction or concentration of uranium or thorium from ore processed primarily for its source material content, including discrete surface wastes resulting from uranium solution extraction processes. Underground ore bodies depleted by these solution extraction operations do not constitute "byproduct material" within this definition;

(C) Any discrete source of radium-226 that is produced, extracted, or converted after extraction, before, on, or after August 8, 2005, for use for a commercial, medical, or research activity; or

(D) Any material that:

(i) Has been made radioactive by use of a particle accelerator; and

(ii) Is produced, extracted, or converted after extraction, before, on, or after August 8, 2005, for use for a commercial, medical, or research activity; and

(E) Any discrete source of naturally occurring radioactive material, other than source material, that:

(i) The U.S. Nuclear Regulatory Commission, in consultation with the Administrator of the Environmental Protection Agency, the Secretary of Energy, the Secretary of Homeland Security, and the head of any other appropriate Federal agency, determines would pose a threat similar to the threat posed by a discrete source of radium-226 to the public health and safety or the common defense and security; and

(ii) Before, on, or after August 8, 2005, is extracted or converted after extraction for use in a commercial, medical, or research activity.

"Calibration" means the determination of:

(A) the response or reading of an instrument relative to a series of known radiation values over the range of the instrument, or

(B) the strength of a source of radiation relative to a standard.

"Central axis of the beam" means a line passing through the virtual source and the center of the plane figure formed by the edge of the first beam limiting device.

"CFR" means the Code of Federal Regulations.

"Chapter" means, unless specified otherwise, OAC 252:410, Radiation Management.

"Collimator" means a device or mechanism by which the x-ray beam is restricted in size.

"Contact therapy" means an x-ray system used for therapy with the x-ray tube port placed in

contact with or within 5 centimeters of the surface being treated.

"Control panel" means that part of the radiation machine control upon which are mounted the switches, knobs, push buttons, and other hardware necessary for manually setting the technique factors.

"Corresponding authorization" means a permit, license or certification issued to a person by an out-of-state entity that authorizes the same or similar radiation management activities as those authorized by DEQ for this state.

"DEQ" means the Oklahoma Department of Environmental Quality.

"Dose monitoring system" means a system of devices for the detection, measurement, and display of quantities of radiation.

"Dose monitor unit" means a unit response from the dose monitoring system from which the absorbed dose can be calculated.

"Exposure rate" means the exposure per unit of time, such as Roentgen per minute and milliRoentgen per hour.

"Facility" or "Site" means the location at which one or more radiation producing units are located and/or installed. Facilities or sites with several such units located and/or installed in different buildings and/or vehicles, but at the same street address and under the same administrative control will be considered to be one facility.

"Field emission equipment" means equipment which uses an x-ray tube in which electron emission from the cathode is due solely to the action of an electric field.

"Field size" means the dimensions along the major axes of an area in a plane perpendicular to the central axis of the useful beam of incident radiation at a normal treatment distance and defined by the intersection of the major axes and the 50 percent isodose line. Material shall be placed in the beam such that dose maximum is produced at the normal treatment distance when field size is being determined.

"Filter" means material placed in the useful beam to absorb preferentially selected radiations.

"Focal spot" means the area projected on the anode of the x-ray tube by the electrons accelerated from the cathode and from which the useful beam originates.

"Gantry" means that part of the system supporting and allowing possible movement of the radiation head.

"Half-value layer", also known as "HVL", means the thickness of specified material which attenuate the beam of radiation to an extent such that the exposure rate is reduced to one-half of its original value. In this definition, the contribution of all scattered radiation, other than any which might be present initially in the beam concerned, is deemed to be excluded.

"Healing arts" means those professional disciplines authorized by the laws of this state to use x-rays or radioactive material in the diagnosis or treatment of human or animal disease.

"Industrial radiographer" means an individual who performs or personally supervises industrial radiographic operations and who is responsible to their employer or contractor permittee or licensee for assuring compliance with the requirements of this Chapter and the conditions of the permit or license.

"Industrial radiography" means a non-destructive testing method that uses ionizing radiation such as gamma rays or x-rays to make radiographic images for the purpose of detecting flaws in objects.

"Industrial x-ray system" means an x-ray system used in manufacturing or for industrial quality control.

"Inspection" means an official examination or observation including but not limited to, records, tests, surveys, and monitoring to determine compliance with rules, orders, requirements,

and conditions of the DEQ.

"Interlock" means a device arranged or connected such that the occurrence of an event or condition is required before a second event or condition can occur or continue to occur or, where applicable, means a device for precluding access to an area of high radiation by automatically reducing the exposure rate.

"Interruption of radiation" means stopping irradiation with the possibility of continuing irradiation without resetting of operating conditions at the control panel.

"Irradiation" means the exposure of matter to ionizing radiation.

"Isocenter" means the intersection of the collimator axis of rotation and the gantry axis of rotation.

"kV" means kilovolts.

"kVp" means the maximum value of the potential difference across the x-ray tube during an exposure and shall be deemed to be equivalent to kilovolts peak.

"Lead equivalent" means the thickness of lead affording the same attenuation, under specified conditions, as the material in question.

"Leakage radiation" means radiation emanating from the therapeutic source assembly except for:

(A) the useful beam; and

(B) radiation produced when the exposure switch or timer is not activated.

"Leakage technique factors" means the technique factors which are used in measuring leakage radiation associated with the diagnostic or therapeutic assembly. They are defined as follows:

(A) for diagnostic tube housing assemblies intended for capacitor energy storage equipment, the maximum-rated peak tube potential (kVp) and the maximum-rated number of exposures in an hour for operation at the maximum-rated peak tube potential with the quantity of charge per exposure being 10 millicoulombs, i.e., 10 milliampere-seconds, or the minimum obtainable from the unit, whichever is larger.

(B) for diagnostic tube housing assemblies intended for field emission equipment rated for pulsed operation, the maximum-rated peak tube potential and the maximum-rated number of x-ray pulses in an hour for operation at the maximum-rated peak tube potential.

(C) for all other diagnostic or therapeutic tube housing assemblies, the maximum-rated peak tube potential and the maximum-rated continuous tube current for the maximum-rated peak tube potential.

"Local components" mean part of a radiation machine and include areas that are struck by radiation such as housings, port and shutter assemblies, collimators, sample holders, cameras, goniometers, detectors, and shielding, but do not include power supplies, transformers, amplifiers, readout devices, and control panels.

"mA" means milliamperes.

"MeV" means million electron volts.

"Moving beam therapy" means radiation therapy with relative displacement of the useful beam and/or the patient during irradiation. It includes arc therapy, skip therapy, conformational therapy, and rotational therapy.

"Nominal treatment distance" means:

(A) for electron irradiation, the distance from the scattering foil or exit window of the electron beam to the surface along the central axis of the useful beam, or from the virtual source to the surface along the central axis of the useful beam as specified by the manufacturer.

(B) for x-ray irradiation, the virtual source or target to isocenter distance along the central axis of the useful beam. For nonisocentric equipment, this distance shall be that specified by the manufacturer.

"Normal operating procedures" mean step-by-step instructions necessary to accomplish the task. These procedures shall include sample insertion and manipulation, equipment alignment, routine maintenance by the permittee, and data recording procedures, which are related to radiation safety.

"NRC" means the U.S. Nuclear Regulatory Commission.

"Open-beam system" means an x-ray system in which an individual could accidentally place some part of his body in the primary beam path during normal operation.

"Part" means the numbered Part of the Subchapter in which the reference appears unless specified otherwise.

"Particle accelerator" means any machine capable of accelerating electrons, protons, deuterons, or other charged particles in a vacuum and of discharging the resultant particulate or other radiation into a medium at energies usually in excess of 1 MeV.

"Patient" means an individual subjected to a healing arts examination, diagnosis or treatment.

"Peak tube potential" (See kVp).

"Permanent x-ray radiographic installation" means an enclosed shielded room, cell or vault in which radiography is performed.

"Permittee" means any person who holds a permit issued by the DEQ in accordance with this Chapter.

"Personnel monitoring equipment" means devices such as film badges, pocket dosimeters, and thermoluminescent dosimeters designed to be worn or carried by an individual for the purpose of estimating the dose received by the individual.

"Phantom" means a volume of material behaving in a manner similar to tissue with respect to the attenuation and scattering of radiation.

"Practical range of the electrons" corresponds to classical electron range where the only contribution to dose is from bremsstrahlung x-rays.

"Primary authorization" means the radiation management license, permit or certification issued by an out-of-state entity which DEQ has recognized under reciprocity.

"Primary beam" means ionizing radiation emitted from the target and passing through the window of the x-ray tube housing.

"Primary dose monitoring system" means a system which will monitor the useful beam during irradiation and which will terminate irradiation when a pre-selected number of dose monitor units have been acquired.

"Protective barrier" means a barrier of radiation absorbing material(s) used to reduce radiation exposure. The types of protective barriers are as follows:

(A) **"Primary protective barrier"** means the material, excluding filters, placed in the useful beam, for protection purposes, to reduce the radiation exposure.

(B) **"Secondary protective barrier"** means a barrier sufficient to attenuate the stray radiation (the sum of leakage and scattered radiation) to the required degree.

"Qualified expert" means a person certified in an appropriate field by the American Board of Radiology in Physics, the American Board of Health Physics, the American Board of Medical Physics, the American Board of Nuclear Medicine Science, or persons otherwise deemed to have equivalent qualifications.

"Radiation detector" means a device which in the presence of radiation provides a signal or other indication suitable for use in measuring one or more quantities of incident radiation.

"Radiation head" means the structure from which the useful beam emerges.

"Radiation machine" means any device capable of producing radiation except those which produce radiation only from radioactive material.

"Radiation safety officer" means an individual who has the responsibility to apply and enforce the overall radiation safety program at a facility or site.

"Radioactive material" means any solid, liquid, or gas which emits radiation spontaneously.

"Radioactive Materials Program" means the DEQ radiation management program for licensing of certain categories of radioactive materials based on the Oklahoma Environmental Quality Code including the Oklahoma Radiation Management Act; the Atomic Energy Act of 1954, 42 U.S.C. 2011 *et seq.* as amended; Title II of the Energy Reorganization Act of 1974, 42 U.S.C. 5801 *et seq.*; the State Agreement; this Chapter (OAC 252:410) including the rules incorporated from Title 10 of the Code of Federal Regulations; and orders or licenses issued thereunder.

"Radioactivity" means the transformation of unstable atomic nuclei by the emission of radiation.

"Radiological physicist" means a person certified by the American Board of Radiology as either a radiological physicist or a radiation therapy physicist or by the American Board of Medical Physics certified in therapy physics, or persons with equivalent qualifications.

"Rating" means the operating limits as specified by the component manufacturer.

"Reciprocity recognition" means DEQ has recognized a person's radiation management authorization issued by an out-of-state entity as a primary authorization and, on the strength of that underlying authorization and the person's compliance record in that and other recognizing states, has authorized that person to perform certain corresponding radiation management activities in Oklahoma without a DEQ-issued permit, license or certification.

"Recognized person" means a person approved by DEQ for reciprocity recognition.

"Restricted area" (controlled area) means any area, access to which is controlled by the permittee, for the purpose of protecting individuals from exposure to radiation and radioactive material. A restricted area shall not include any areas used for residential quarters, although a room or rooms in a residential building may be set apart as a restricted area.

"Roentgen" means the special unit of exposure. One Roentgen (R) equals 2.58×10^{-4} coulombs/kilogram of air.

"Scattered radiation" means radiation that, during passage through matter, has been deviated in direction. The term includes direct scattered and primary scattered radiation which has been deviated in direction only by materials irradiated by the useful beam.

"Sealed source" means any radioactive material that is encapsulated to prevent leakage or escape of the radioactive material.

"Secondary dose monitoring system" means a system which will terminate irradiation in the event of failure of the primary system.

"Shutter" means a device attached to the tube housing assembly which can totally intercept the useful beam and which has a lead equivalency not less than that of the tube housing assembly.

"Source material" means uranium or thorium, or any combination thereof, in any physical or chemical form, or ores which contain by weight one-twentieth of one percent or more of uranium, thorium, or any combination thereof. Source material does not include special nuclear material.

"Special nuclear material" means plutonium, uranium 233, uranium enriched in the isotope 233 or in the isotope 235, and any other material which the NRC determines to be special nuclear material, or any material artificially enriched by any of the foregoing, but does not include source material.

"Spot-check" means a procedure which is performed to assure that a previous calibration continues to be valid.

"State agreement" means the agreement between the NRC and the State of Oklahoma with effective date of September 29, 2000, transferring to DEQ the NRC's regulatory authority in the State of Oklahoma for certain categories of radioactive material including: byproduct material, source material used to take advantage of its density and high-mass property where the use of the specifically licensed source material is subordinate to the primary specifically licensed use of byproduct material, and special nuclear material in quantities not sufficient to form a critical mass.

"Stationary beam therapy" means radiation therapy without relative displacement of the useful beam and the patient during irradiation.

"Subchapter" means a Subchapter of this Chapter unless stated otherwise.

"Target" means that part of a radiation head which by design intercepts a beam of accelerated particles with subsequent emission of other radiation.

"Technique factors" means the conditions of operation. They are specified as follows:

(A) for capacitor energy storage equipment, peak tube potential (kVp) in kV and quantity of charge in milliampere second (mAs);

(B) for field emission equipment rated for pulsed operation, peak tube potential in kV and number of x-ray pulses;

(C) for CT equipment designed for pulsed operations, peak tube potential in kV, scan time in seconds, and either tube current in mA, x-ray pulse width in seconds, and the number of x-ray pulses per scan or the product of tube current, x-ray pulse width, and the number of x-ray pulses in mAs;

(D) for CT equipment not designed for pulsed operation, peak tube potential in kV, and either tube current in mA and scan time in seconds or the product of tube current and exposure time in mAs and the scan time when the scan time and exposure time are equivalent; and

(E) for all other equipment, peak tube potential in kV and either tube current in mA and exposure time in seconds or the product of tube current and exposure time in mAs.

"Temporary job site" means a location where radioactive materials or radiation machines are used, other than the specific use location(s) listed on a permit or license.

"Termination of irradiation" means the stopping of irradiation in a fashion which will not permit continuance of irradiation without the resetting of operating conditions at the control panel.

"Test" means the process of verifying compliance with an applicable regulation.

"Traceable to a national standard" means that a quantity or a measurement has been compared to a national standard directly or indirectly through one or more intermediate steps and that all comparisons have been documented.

"Tube housing assembly" means the tube housing with the tube installed. It includes any high-voltage and/or filament transformers and other appropriate elements contained within the tube housing.

"Useful beam" means the radiation emanating from the tube housing port or the radiation

head and passing through the aperture of the beam limiting device when the exposure controls are in a mode to cause the system to produce radiation.

"Virtual source" means a point from which radiation appears to originate.

"Wedge filter" means an added filter effecting continuous progressive attenuation on all or part of the useful beam.

"X-ray field" means that area of the intersection of the useful beam and any one of the set of planes parallel to and including the plane of the image receptor, whose perimeter is the locus of points at which the exposure rate is one-fourth of the maximum in the intersection.

"X-ray high-voltage generator" means a device which transforms electrical energy from the potential supplied by the x-ray control to the tube operating potential. The device may also include means for transforming alternating current to direct current, filament transformers for the x-ray tube(s), high-voltage switches, electrical protective devices, and other appropriate elements.

"X-ray system" means an assemblage of components for the controlled production of x-rays. It includes minimally an x-ray high-voltage generator, an x-ray control, a tube housing assembly, a beam-limiting device, and the necessary supporting structures. Additional components which function with the system are considered integral parts of the system.

"X-ray tube" means any electron tube which is designed to be used primarily for the production of x-rays.

"10 CFR" means Title 10 of the Code of Federal Regulations.

252:410-1-3. Exemptions from the regulatory requirements

DEQ may, upon application therefor or upon its own initiative, grant such exemptions or exceptions from the requirements of this Chapter as it determines are authorized by law and will not result in undue hazard to public health and safety or property.

252:410-1-4. General regulatory requirements

(a) **Safety requirements.** All persons required to comply with this Chapter shall:

(1) **Operations.** Conduct all radiation management activities in such a manner as to minimize danger to health, safety, property and the environment. All radiation producing machines and other sources of radiation must be used according to the manufacturer's specifications and any other guidelines or standards that apply to the specific purpose of use.

(2) **Radiation protection standards.** Conduct all radiation management activities in compliance with the radiation protection standards of 252:410-20.

(3) **Duty to mitigate.** Take all reasonable steps to minimize or correct any adverse impact on health, safety, property and the environment which results from radiation associated with the use, operation, storage, or disposal of radioactive material or radiation machines.

(4) **Notification of events.** Notify the DEQ when:

(A) a radiation protection standard has been exceeded and notice is required by 10 CFR 20.2202, 20.2203 and 20.2204, incorporated by reference in Subchapter 20;

(B) any medical event occurs and notice is required by 252:410-11-4 and/or 10 CFR 35.3045, incorporated by reference in Subchapter 10;

(C) any source of radiation is lost or stolen and notice is required by 10 CFR 20.2201, incorporated by reference in Subchapter 20;

(D) a radiation machine is lost or stolen and notice is required by OAC 252:410-20-7(a);

(E) an incident has occurred and reporting is required by OAC 252:410-20-7(b);

(F) any incident occurs involving a radiation machine that is reportable under OAC 252:410-15-10; or

(G) notice is required under the Radioactive Materials Program by 10 CFR 30.50, 34.101, 35.3045, 36.83, 39.77, 40.60, 70.50 and 71.95, incorporated by reference in Subchapter 10.

(b) **Records and reporting.** All records and reports required by this Chapter must be clear and legible. Personnel monitoring records must be maintained until the holder is no longer subject to radiation management requirements. All other records must be maintained for a minimum of three (3) years unless a longer period of time is specified in this Chapter. Electronic media capable of producing accurate and complete records throughout the required retention period may be used; however, DEQ may require printed documents for its reviews. Any person subject to this Chapter must:

(1) **Duty to provide information.** Furnish to DEQ, within the time specified, any information which DEQ may request to determine the extent of compliance with this Chapter and whether cause exists for renewing, amending, suspending, or revoking a radiation management authorization.

(2) **Errors and omissions.** Promptly submit correct facts or information to DEQ when the person becomes aware that a material fact was submitted erroneously or omitted from a radiation management application or in any report or notice required by this Chapter or an authorization.

(c) **Signs, labels and words of warning.** All signs, labels and other warning devices required by this Chapter must be in plain sight with words or symbols that are easy to read and understand.

(d) **Inspections and tests.** Any person subject to this Chapter:

(1) shall give DEQ at all reasonable times opportunity to inspect sources of radiation, the premises and facilities where the sources of radiation are used or stored and records required to be maintained by this Chapter. All reasonable times shall include normal hours of operation as well as any time when radiation management activities are being performed outside of normal hours of operation

(2) may be required by DEQ to test or allow DEQ to test facilities and equipment related to the use and storage of radiation machines and radioactive materials to verify the adequacy of protections from radiation.

(e) **Severability.** Should any of the rules of this Chapter be declared unconstitutional or invalid for any reason, the remainder of the rules shall not be affected thereby.

252:410-1-5. Compliance required

(a) **Failure to comply.** Any person to whom this Chapter applies must comply with the requirements of this Chapter and the Radiation Management Act, 27A O.S. § 2-9-101 *et seq.* Failure to register or become certified, permitted, licensed, or recognized under this Chapter does not negate compliance with requirements that apply to registrants, certificate holders, permittees, licensees and recognized persons. Failure to comply may result in denial of applications or registrations, administrative penalties, suspension and/or revocation of authorizations and civil and/or criminal prosecution. Failure to comply includes:

(1) knowingly making any false statement or representation in or omitting material information from any required application, certification, registration, notice, analysis. or report;

(2) altering any test sample or report;

(3) rendering inaccurate any required monitoring device or control; and

(4) exposing others to radiation through reckless disregard of required safety standards.

(b) **Administrative Enforcement.** Any violation of the requirements in Chapter 410 is subject

to enforcement in accordance with the provisions of 27A O.S. § 2-3-501 *et seq.*, and OAC 252:4, Department of Environmental Quality Rules of Practice and Procedure.

252:410-1-6. Radiation protection program

Permittees and licensees shall:

(1) **Radiation safety program.** Develop, document and implement a written radiation protection program for their radiation activities that is sufficient to ensure compliance with the requirements of this Chapter that apply to such activities and the materials, equipment and machines used therein; and

(2) **Radiation safety officer.** Designate a radiation safety officer and ensure the designated individual is trained in radiation protection as it applies to their radiation management activities and, if different from themselves, is available to them for advice and assistance on radiation safety matters.

252:410-1-7. Incorporation of federal regulations by reference

(a) **10 CFR.** References in this Chapter to Title 10 of the Code of Federal Regulations (10 CFR) mean the January 1, 2016 publication of 10 CFR.

(b) **40 CFR.** References in this Chapter to Title 40 of the Code of Federal Regulations (40 CFR) mean the July 1, 1998 publication of 40 CFR and 64 Fed. Reg. 5574 (February 3, 1999).

(c) **Citations incorporated.** When a provision of the Code of Federal Regulations is incorporated by reference, all citations contained therein are also incorporated by reference.

SUBCHAPTER 3. RADIATION MACHINES - COMMON REQUIREMENTS

PART 1. GENERAL PROVISIONS

Section

- 252:410-3-1. General provisions
- 252:410-3-2. Permit required; exemptions
- 252:410-3-3. Permit application and registration
- 252:410-3-4. Report of changes
- 252:410-3-5. Approval not implied
- 252:410-3-6. Assembler and/or transferor obligation and fees
- 252:410-3-7. Out-of-state radiation machines

PART 3. RADIATION SAFETY MANAGEMENT

- 252:410-3-31. Use and safety
- 252:410-3-32. Duties of radiation machine permittees
- 252:410-3-33. Recordkeeping

PART 1. GENERAL PROVISIONS

252:410-3-1. General provisions

(a) **Purpose.** This Subchapter establishes permitting, registration, notice and general radiation safety requirements common to all types of radiation machines for which specific requirements are set forth in Subchapters 11, 13, 15 and 17.

(b) **Applicability and related requirements.** Any person subject to the authorization requirements of Subchapters 11, 13, 15 and/or 17 must comply with this Subchapter. Other requirements to which such persons are subject include:

- (1) Subchapter 1, General Provisions;
- (2) Subchapter 7, Radiation Management Authorizations; Procedures and Requirements; and
- (3) Subchapter 20, Standards for Protection Against Radiation.

(c) **Definitions.** For purposes of this Subchapter:

- (1) **"Radiation machines"**, as defined in 252:410-1-2, means x-ray systems and particle accelerators, specifically:
 - (A) x-ray systems and particle accelerators used for therapeutic purposes regulated by Subchapter 11;
 - (B) analytical and industrial x-ray systems regulated by Subchapter 13;
 - (C) industrial radiography machines regulated by Subchapter 15; and
 - (D) particle accelerators used for purposes other than therapy regulated by Subchapter 17.
- (2) **"Use"** means to operate a radiation machine or cause it to be operated.

252:410-3-2. Permit required; Exemptions

(a) **Permit required.** Permits are required in accordance with Subchapters 11, 13, 15 and 17.

(b) **Exemptions.** The following are exempt from the registration and notice requirements of this Subchapter:

- (1) **Certain electronic equipment.** Electronic equipment that produces radiation incidental to its operation for other purposes provided the equipment's dose equivalent rate averaged over an area of 10 square centimeters does not exceed 0.5 millirem per hour at 5 centimeters from any accessible surface of the equipment. The production, testing, or factory servicing of the equipment is not exempt;
- (2) **Radiation machines in transit and storage.** Radiation machines while in transit or storage incident thereto;
- (3) **Neutron generators.** Neutron generators used in well-logging applications which are covered under a specific NRC or State Agreement license; and
- (4) **Inoperable or stored machines.** Radiation machines which are inoperable or in long-term storage and will not be used during the permitted term.

252:410-3-3. Permit application and registration

(a) **Permit application.** Applicants for radiation machine operating permits must file an application according to the requirements of Subchapter 7.

(1) **Permit application content.** Applications for new or renewal operating permits must include:

- (A) the name, address and contact numbers of applicant; signed certifications required by Subchapter 7; facility address, the designated radiation safety officer's name, telephone/fax number and qualifications,
- (B) identification of the type of radiation machine permit sought;
- (C) a brief summary of proposed uses of the machines;
- (D) a description of the design of any radiation safety vault and/or shielded area including drawings and shielding calculations;
- (E) exhibits relevant and necessary to support the application including a written

radiation safety program and any initial survey report(s);

(F) any other summary information or data necessary to show compliance with Subchapters 11, 13, 15 and/or 17; and

(G) a completed registration form.

(2) **Issuance.** In addition to the criteria referenced in Subchapter 7, DEQ approval of a radiation machine permit application will be based on whether:

(A) the applicant is qualified by reason of training and experience to use the machine in such a manner as to minimize danger to health, safety, property and the environment; and

(B) the applicant's proposed or existing equipment, facilities and radiation protection plan including operating and emergency procedures meet the requirements of this Chapter.

(3) **Permit term.** Permits shall be issued for a fixed term, not to exceed ten (10) years from the date of issuance.

(b) **Registration.** All non-exempt radiation machines must be registered.

(1) **Registering initially.** Initial registration is required of applicants for new radiation machine operating permits or reciprocity recognitions.

(2) **Content.** The registrant must list his machines and provide information on the machines, the facility address, person responsible for machine safety, telephone/fax numbers, the location (if known) of any temporary in-state work site(s), and other data requested on DEQ's registration form.

(3) **Updating registration.** Permittees must update their registration at least 30 days after acquiring a new machine or after disposing or transferring a registered machine to another person. Updates require the submittal of a corrected registration form to DEQ.

(4) **Registering machines brought into state.** Machines brought into Oklahoma must be registered in accordance with this Subchapter.

(c) **Application and annual permit fees.** Persons must pay fees based on the number of non-exempt machines within their possession or control according to the fee schedules of Appendix A. Subject to the maximum fees set by Appendix A, fees due from persons who manufacture, assemble or repair radiation machines in the state will be determined by the maximum number of tubes to be tested by the applicant at any one time during the permit term. Annual fees are due each year on the last day of the month in which the permit was issued.

252:410-3-4. Report of changes

A permittee or applicant must notify DEQ in writing before making any significant change which would render the information contained in his permit application, registration and/or permit inaccurate.

252:410-3-5. Approval not implied

No person shall state or imply that any activity conducted with a registered radiation machine has been approved by DEQ.

252:410-3-6. Assembler and/or transferor obligation and fees

(a) **Transfer notice.** Except for machines in transit or storage incident thereto, any person who sells, leases, transfers, lends, assembles or installs any radiation machine in this state for purposes other than repair and maintenance shall submit to DEQ within 15 days after the transfer:

(1) the name and address of the transferee;

- (2) the manufacturer, model and serial number of each transferred machine; and
 - (3) the transfer date.
- (b) **Permitting and fees.** The permitting and fee requirements of this Chapter apply to persons in the state who manufacture, assemble or repair radiation machines.
- (c) **Requirements.** No person shall make, sell, lease, transfer, lend, assemble or install radiation machines or supplies used in connection with such machines, unless when properly placed in operation, the machines and/or supplies will meet the requirements of this Chapter.

252:410-3-7. Out-of-state radiation machines

- (a) **Permitting, registration and notice.** Before bringing a non-exempt radiation machine into the state to use at a temporary job site, a person must:
- (1) Hold a DEQ radiation machine operating permit or reciprocity recognition and have registered the machine with DEQ; and
 - (2) Give written notice to DEQ at least three (3) working days before the proposed date of use. Notifications of less than 3 days may be approved by DEQ if the applicant demonstrates justifying circumstances. The notice shall provide:
 - (A) numbers and types of machines;
 - (B) nature, start date and duration of use;
 - (C) exact location(s) of use;
 - (D) contact names, Oklahoma addresses and telephone numbers for persons responsible for the machine while it is in the state, and for permittees with no permanent address in the state, the designated service agent; and
 - (E) such other information as the DEQ may reasonably request.
- (b) **Compliance required.** While in the state, a recognized person must comply with all applicable rules of the DEQ.

PART 3. RADIATION SAFETY MANAGEMENT

252:410-3-31. Use and safety

No person shall:

- (1) **Proper use.** Use a radiation machine or system in any way that poses a significant threat or harm to health, safety, property or the environment;
- (2) **Supervision required.** Leave a radiation machine or system unattended unless it is secured against unauthorized use; or
- (3) **Exposure restrictions.** Expose an individual to radiation through the use of a radiation machine for purposes of demonstration or training.

252:410-3-32. Duties of radiation machine permittees

- (a) **Plans and procedures.** Permittees must establish a written radiation protection plan and provide copies of operating and emergency procedures to their radiation machine operators and technicians. Any deviation from the written procedures must be approved in writing by the radiation safety officer.
- (b) **Direct responsibility.** Permittees must direct the operation, repair and maintenance of their machines.
- (c) **Operator training.** Permittees must provide:
- (1) Initial training for each operator that includes:
 - (A) radiation hazards associated with the use of the equipment;

- (B) the warning, safety devices and interlocks incorporated into the equipment, or the reasons they have not been installed on certain pieces of equipment and the extra precautions required in such cases; and
- (C) recognizing symptoms of an acute localized radiation exposure and knowing how to report an actual or suspected over exposure; and
- (D) proper operating procedures for the equipment.

(2) Annual refresher training.

(d) **Operator competence.** Permittees shall allow only those individuals to operate a machine who have completed training as required by Subsection (c) of this Section and demonstrated competence in operating the machine and understand the operating and emergency procedures and instructions for the machine.

(e) **Ongoing compliance.** Permittees must continually ensure that all machines meet the specific design and safety requirements of this Chapter.

(f) **Corrective action.** At the time he knows or has reason to know of its existence, a permittee must correct any deficiency in a machine or procedure which increases the risk of harm to health, safety, property or the environment.

252:410-3-33. Recordkeeping

(a) **Subchapters 11 through 17.** Unless exempted, persons subject to Subchapters 11, 13, 15 and/or 17 must maintain the following records:

- (1) DEQ permit and registration documentation;
- (2) a written radiation management program;
- (3) written operating and emergency procedures which include restrictions required for the safe operation of each machine;
- (4) *required records of surveys and survey reports;
- (5) *survey instrument calibration records;
- (6) computer verifications, repair, maintenance, corrective actions and modifications;
- (7) machine manufacturer specifications and instructions,
- (8) personnel monitoring records;
- (9) a copy of all correspondence to and from DEQ regarding each machine; and
- (10) training records giving dates, locations, topics and hours of both initial and refresher training, instructor names, sign-in sheets, a copy of each examination given, and examination scores.

(b) **Additional requirements for Subchapter 11.** Persons subject to Subchapter 11 must maintain the following additional records:

- (1) a record of each medical event which identifies the date, operator, practitioner, radiological physicist and describes the incident and any corrective actions,
- (2) records of leakage radiation measurements in accordance with 252:410-11-51;
- (3) *calibrations of machines and dosimetry systems in accordance with 252:410-11-73, 74 and 75;
- (4) *spot-check measurements, qualified expert reviews and corrective actions taken to remedy identified deficiencies in accordance with 252:410-11-76;
- (5) *records of maintenance and modifications; and
- (6) A current copy of the following documents must be maintained at or in the area of the control panel:
 - (A) operating and emergency procedures;
 - (B) quality assurance and quality control plan;

- (C) manufacturer specifications and instructions;
 - (D) record of the maximum value of the absorbed dose rate specified by the manufacturers for machine parameters;
 - (E) latest machine/system calibration; and
 - (F) records of the most recent spot-check measurements and qualified expert reviews.
- (c) **Additional requirements for Subchapter 15.** Persons subject to Subchapter 15 must maintain the following additional *records:
- (1) *records of daily system inspections and maintenance;
 - (2) utilization records;
 - (3) records of alarm system and entrance control checks;
 - (4) records of personnel monitoring;
 - (5) at each temporary job site, a copy of the operating and emergency procedures, applicable rules, latest survey records, records of equipment problems identified in daily checks at the temporary job site, and, when operating under reciprocity, a copy of the primary authorization or permit authorizing the use of the licensed machines, and for each survey instrument at each temporary job site, verification of current calibration.
- (d) **Additional requirements for Subchapter 17.** Persons subject to Subchapter 17 must maintain the current electrical circuit diagrams of the particle accelerator and its safety interlock systems.
- (e) **Date and signature.** Records marked with asterisks (*) must also contain the date and signature of the individual performing the service.
- (f) **Location.** All records must be kept in the principal office of the permittee and made available for DEQ review.
- (g) **Duration.** Records shall be kept for the duration specified in Subchapter 1.

SUBCHAPTER 5. CERTIFICATION OF INDUSTRIAL RADIOGRAPHERS

Section

- 252:410-5-1. Certification in general
- 252:410-5-2. Applying for certification
- 252:410-5-3. DEQ certification examination
- 252:410-5-4. Certification duration and documentation
- 252:410-5-5. Out-of-state certification; Reciprocity recognition
- 252:410-5-6. Radiation Safety Course Curriculum: Radioactive Materials
- 252:410-5-7. Radiation Safety Course Curriculum: Industrial X-Ray Radiography

252:410-5-1. Certification in general

- (a) **Effective date.** This Subchapter shall become effective on the date specified in the Agreement between the NRC and the State of Oklahoma providing for the discontinuance of the regulatory authority of the NRC and assumption of the program by DEQ.
- (b) **Types.** Types of industrial radiography certification available from DEQ are:
- (1) Radioactive materials (RAM) Certification;
 - (2) Industrial X-ray Certification; and
 - (3) Joint certification in both RAM and X-ray.
- (c) **RAM certification required.** Beginning June 27, 1999, industrial radiographers must hold either RAM or joint certification before they can perform RAM radiography in accordance with 10 CFR Part 34.

(d) **X-ray certification voluntary.** X-ray certification is not required but is offered to industrial radiographers who work with industrial x-ray radiography equipment in accordance with Subchapter 15.

252:410-5-2. Applying for certification

(a) **Application procedures.** Applicants shall comply with Subchapter 7. Applicants must specify the type and date of the examination requested on the application.

(b) **New certification.** For an industrial radiography applicant to be approved for new certification, he must qualify under the criteria referenced in 252:410-7-4, have passed an approved industrial radiographer certification examination, and provided proof that he has:

(1) passed a radiation safety course approved by the NRC or Agreement State which included at least 40 hours of training in the type of certification sought. Curriculum requirements are outlined in 252:410-5-6 and 5-7 for RAM and X-ray certification respectively. The radiation safety training curriculum for applicants seeking joint certification must cover the subjects listed in both 252:410-5-6 and 5-7;

(2) satisfied the requirements of 10 CFR 34.43 (b) and (c); and

(3) obtained on-the-job training by working as an assistant radiographer supervised by one or more radiographers. On-the-job training does not include time spent in safety meetings, classroom training or using cabinet x-ray units. Minimum on-the-job hourly requirements are:

(A) for RAM certification, 200 hours active participation in radioactive materials industrial radiography operations;

(B) for x-ray certification, 120 hours active participation in x-ray industrial radiography operations; or

(C) for joint certification, (A) and (B) of this Paragraph.

(c) **Experience substituted.** Any applicant who, prior to the effective date of this Subchapter, worked 2 months as a radiographer or assistant radiographer for one or more companies licensed by the NRC or an Agreement State may substitute the two months of experience for the hour requirements of Paragraph (3)(A) of this Subsection.

(d) **Certification renewal.** Certification may be renewed by applying for, taking and passing a certification examination and meeting the renewal criteria of 252:410-7-6.

252:410-5-3. DEQ certification examination

DEQ will establish and give notice of the date, time, location and application deadline for each industrial radiography examination. An examination will be scheduled at least once a year in both Oklahoma City and Tulsa.

(1) **Confidentiality; criteria and procedures.** Examinations and answer keys are confidential. Each examination will have a maximum score of 100 percent. A score of 70 percent or higher is required for passing. To be seated for the examination, an individual must present a driver's license or other photo I.D. unless approved otherwise by DEQ. The closed-book examination will be administered by DEQ proctors. Calculators may be used except for exposure calculators or those capable of containing programmed data or formulas.

(2) **Certification fees.** The application fee for each examination is \$140.00.

(3) **Retakes.** Any applicant retaking the examination must reapply, pay the application fee and take a different examination version.

(4) **Replacement cards.** Replacement cards are available from DEQ for a \$20.00 nonrefundable fee and a written request explaining why a new card is needed. A certified

individual may use the DEQ receipt confirming payment and the replacement request as proof of certification until the replacement card is issued.

(5) **Prohibition.** Any individual observed by a proctor to be cheating shall be deemed to have failed the examination and shall be prohibited from applying for a retake for 12 months.

252:410-5-4. Certification duration and documentation

(a) **Term.** Industrial radiography certification is issued for a five-year term and is renewable.

(b) **Proof of certification.** To document certification, DEQ will issue a wallet-size I.D. card to each certified individual which displays his photograph taken at the time the examination was administered. An individual whose certification is revoked or suspended must surrender his I.D. card to DEQ.

252:410-5-5. Out-of-state certification; Reciprocity recognition

An industrial radiographer certified by an out-of-state entity can become authorized under reciprocity to perform industrial radiography in Oklahoma without becoming DEQ-certified if the individual or his licensee-employer registers the individual's name, address, card number, expiration date, and name and address of the certifying entity with DEQ before the individual performs radiography work in Oklahoma. An applicant for reciprocity recognition must comply with the rules in Part 3 of Subchapter 7, except that the recognition of an industrial radiographer certification will not be limited to 180 days in a year but will remain valid until the primary authorization has expired or has been suspended or revoked by the issuing entity.

252:410-5-6. Radiation Safety Course Curriculum: Radioactive Materials

The 40 hours of radiation safety training required to qualify for certification to perform industrial radiography with radioactive materials shall include the following subjects:

(1) **Fundamentals of Radiation Safety.** Instruction in this subject should cover characteristics of gamma radiation, units of radiation dose and quantity of radioactivity, hazards of exposure to radiation, levels of radiation from licensed material, and methods of controlling radiation dose such as working time, working distance and shielding.

(2) **Radiation Detection Instrumentation.** Instruction in this subject should cover use of radiation survey instruments including their operation, calibration and limitations; survey techniques; use of personnel monitoring equipment including film badges, thermoluminescent dosimeters (TLD's), light actuated dosimeters, pocket dosimeters and alarm ratemeters.

(3) **Radiographic equipment to be used.** Instruction in this subject should cover operation and control of radiographic exposure equipment and sealed sources including pictures or models of source assemblies (pigtailed), remote handling equipment and storage containers, as well as storage, control and disposal of licensed material.

(4) **Inspection and maintenance.** Instruction in this subject should cover equipment inspection and maintenance activities regularly performed by radiographers. This would include inspection of radiographic exposure devices, source tubes, control cables and drive mechanisms.

(5) **Regulatory Requirements.** Instruction in this subject should cover all pertinent federal and state regulations.

(6) **Case histories.** Instruction in this subject should cover histories of radiography accidents.

(7) **Written competency testing.** Comprehension and understanding of the subjects

covered in the 40 hours of radiation safety training should be evaluated with a written examination.

252:410-5-7. Radiation Safety Course Curriculum: Industrial X-Ray Radiography

The 40 hours of radiation safety training required to qualify for certification to perform industrial radiography with x-ray machines shall include the following subjects:

- (1) **Fundamentals of Radiation Safety.** Instruction in this subject should cover characteristics of x-radiation, units of radiation dose, production of x-radiation, effects of kilovoltage and milliamperage, output of radiation machines and methods of controlling radiation dose including such as working time, working distance and shielding.
- (2) **Radiation Detection Instrumentation.** Instruction in this subject should cover use of radiation survey instruments including their operation, calibration and limitations; survey techniques; use of personnel monitoring equipment including film badges, thermoluminescent dosimeters (TLD's), light actuated dosimeters, pocket dosimeters and alarm ratemeters.
- (3) **Radiographic equipment to be used.** Instruction in this subject should cover operation and control, inspection and maintenance of x-ray exposure equipment and remote handling equipment
- (4) **Regulatory Requirements.** Instruction in this subject should cover all pertinent federal and state regulations.
- (5) **Case histories.** Instruction in this subject should cover histories of radiography accidents involving x-ray machines.
- (6) **Written competency testing.** Comprehension and understanding of the subjects covered in the 40 hours of radiation safety training should be evaluated with a written examination.

**SUBCHAPTER 7. RADIATION MANAGEMENT AUTHORIZATIONS;
PROCEDURES AND REQUIREMENTS**

PART 1. GENERAL PROVISIONS COMMON TO ALL AUTHORIZATIONS

Section

- 252:410-7-1. Radiation management authorizations in general
- 252:410-7-2. Uniform application requirements
- 252:410-7-3. General application requirements
- 252:410-7-4. Authorization determinations
- 252:410-7-5. Authorization transfers
- 252:410-7-6. Renewal of authorizations

PART 3. RECIPROCITY RECOGNITION

- 252:410-7-31. DEQ reciprocity recognition
- 252:410-7-32. Reciprocity recognition application requirements
- 252:410-7-33. Reciprocity recognition approval and duration
- 252:410-7-34. Duties of recognized persons
- 252:410-7-35. Conversion of reciprocity recognition

PART 1. GENERAL PROVISIONS COMMON TO ALL AUTHORIZATIONS

252:410-7-1. Radiation management authorizations in general

- (a) **Purpose.** This Subchapter sets forth the basic procedural requirements that apply to all radiation management authorizations.
- (b) **Applicability.** This Subchapter applies to all persons required by this Chapter to hold DEQ authorizations.
- (c) **Effect.** An authorization does not convey any property rights of any sort or any exclusive privilege; does not sanction any invasion of other private rights or any infringement of federal, state, or local law or rules; and does not legalize any radiation management activity outside its scope.
- (d) **Types.** Authorizations include:
- (1) industrial radiographer certification (Subchapter 5);
 - (2) LBP-XRF permit and registration (Subchapter 19);
 - (3) radiation machine operating permits and registration for:
 - (A) x-ray systems and particle accelerators used for therapeutic purposes (Subchapters 3 and 11);
 - (B) analytical and industrial x-ray systems (Subchapters 3 and 13);
 - (C) industrial x-ray radiography systems (Subchapters 3, 13 and 15); and
 - (D) particle accelerators used for purposes other than therapy (Subchapters 3 and 17);
 - (4) Radioactive Materials licenses (Subchapter 10);
 - (5) approval of Radioactive Materials license termination and/or decommissioning plans (Subchapter 10) and decontamination plans (Subchapter 20); and
 - (6) reciprocity recognition and registration (Part 3 of this Subchapter).

252:410-7-2. Uniform application requirements

- (a) **Applicable law.** All radiation management applicants are subject to the authorization requirements of this Chapter and the tiered application procedural requirements of the Oklahoma Uniform Environmental Permitting Act, 27A O.S. § 2-14-101 *et seq.*, and Subchapter 7 of OAC 252:4 Rules of Practice and Procedure. Applicants for new, amended or renewed specific licenses under the Radioactive Materials program are also subject to 10 CFR licensing procedures and requirements as incorporated by reference in Subchapter 10.
- (b) **Application classifications.** The uniform process to which the applicant is subject is determined by the tier in which the application is classified in accordance with 252:4-7-55, 56, or 57.

252:410-7-3. General application requirements

- (a) **Procedures and fees.**
- (1) **Forms.** Applicants shall use DEQ application forms or formats.
 - (2) **Filing.** All applications must be filed with DEQ Radiation Management, be legible and provide at a minimum all applicable information requested by the form or format.
 - (3) **Fees.** All application fees are due at the time of filing.
 - (4) **Late fees.**
 - (A) Any fee with a due date will be processed without penalty if the applicable fee is paid within thirty (30) days of the original due date.
 - (B) If the applicable fee is paid thirty-one (31) or more days after the original due date, a penalty fee of five percent (5%) of the original fee per month late will be charged. Such

fee will not exceed the amount of the renewal fee.

(C) If the original fee was Ten Thousand dollars (\$10,000) or more, the penalty fee will be one and one-half percent (1.5%) of the outstanding balance per month.

(5) **Annual fee adjustment.** To assist in meeting rising costs to the DEQ of the environmental services and regulatory programs associated with licensing radioactive materials usage, the fees set out in OAC 252:410 including but not limited to application fees, annual fees, certification fees, registration fees and full cost fees shall be automatically adjusted on July 1st every year to correspond to the percentage, if any, by which the Consumer Price Index (CPI) for the most recent calendar year exceeds the CPI for the previous calendar year. The DEQ may round the adjusted fees up to the nearest dollar. The DEQ may waive collection of an automatic increase in a given year if it determines other revenues, including appropriated state general revenue funds, have increased sufficiently to make the funds generated by the automatic adjustment unnecessary in that year. A waiver does not affect future automatic adjustments.

(A) Any automatic fee adjustment under this subsection may be averted or eliminated, or the adjustment percentage may be modified, by rule promulgated pursuant to the Oklahoma Administrative Procedures Act. The rulemaking process may be initiated in any manner provided by law, including a petition for rulemaking pursuant to 75 O.S. § 305 and OAC 252:4-5-3 by any person affected by the automatic fee adjustment.

(B) If the United States Department of Labor ceases to publish the CPI or revises the methodology or base years, no further automatic fee adjustments shall occur until a new automatic fee adjustment rule is promulgated pursuant to the Oklahoma Administrative Procedures Act.

(C) For purposes of this subsection, "Consumer Price Index" or "CPI" means the Consumer Price Index - All Urban Consumers (U.S. All Items, Current Series, 1982-1984=100, CUUR0000SA0) published by the United States Department of Labor. The CPI for a calendar year is the figure denoted by the Department of Labor as the "Annual" index figure for that calendar year.

(D) The additional fees described in OAC 252:410-10-118(3) shall be excluded from the annual fee adjustments described in this subsection.

(b) **Content.** Applicants shall comply with the Subchapter(s) applicable to the type of authorization for specific content requirements.

(c) **Certifications.**

(1) **Certification of application.** Each application must include a statement signed by the applicant certifying that "The application was prepared under the applicant's direction or supervision and the information it contains is, to the best of his knowledge and belief, true, accurate and complete."

(2) **Certification of qualifications of personnel.** Except for applications for industrial radiographer certification, each application must include a statement signed by the applicant certifying that:

(A) "Each individual performing or supervising the applicant's radiation management activities under this authorization will be adequately trained in radiation safety and will comply with all applicable requirements of the Oklahoma Radiation Management Rules, OAC 252:410", and

(B) "The individual designated in the application as the radiation safety officer is qualified by training and experience to be responsible for the applicant's radiation management activities and has the authority to terminate any of the applicant's radiation

operations if such action is deemed necessary to minimize harm to health, safety, property and/or the environment."

(d) **Classification of amendments of plans, permits and licenses.** Applications for amendments to existing radiation management authorizations for which DEQ approval is required shall be classified as minor or major by the DEQ according to the following criteria. When an applicant requests multiple types of amendments, the highest tier classification of 252:4-7-55, 56 or 57 shall apply.

(1) **Minor amendment.** Minor amendment of a plan, permit or license means any change that is determined by DEQ to afford similar or decreased risk to or no added impact on health, safety and/or the environment. Examples include amendments that are not specified as major amendments and:

- (A) Are informational and clerical in nature;
- (B) Decrease authorized quantities, concentration levels, and/or forms of radioactive materials;
- (C) Substitute an authorized procedure, method or activity with one that has a more beneficial impact on health or safety or the environment;
- (D) Increase on-site monitoring or recordkeeping, reporting or training activities; or
- (E) Provide for alternate or additional personnel monitoring within acceptable requirements of 10 CFR 20.

(2) **Major amendment.** Major amendments of a plan, permit or license means any change which DEQ determines in writing has the potential of an increased adverse impact on health, safety and/or the environment, or which involves methods or procedures for which no specific limits and standards are specified in Chapter 410. Examples include amendments that:

- (A) Increase quantities or concentration levels beyond the limits set by the authorization;
- (B) Add one or more forms or isotopes of radioactive material to those previously authorized;
- (C) Add one or more sources of radiation for therapeutic use;
- (D) Authorize a disposal procedure under the procedures of 10 CFR 20.2002;
- (E) Substitute alternative method(s) for monitoring on-site releases of radioactive material at a site or facility or a method which changes off-site monitoring.

252:410-7-4. Authorization determinations

(a) **Application review.** Each application is subject to DEQ review provisions of OAC 252:4, Rules of Practice and Procedure, Subchapter 7.

(b) **Criteria for issuance or acceptance.** DEQ may deny any application in writing for cause as established by this Chapter and/or the issuance/denial criteria of 252:4-7-1.

(c) **Amendment/modification.** DEQ may, for cause or upon the applicant's request, add conditions to any authorization or amend or modify any existing authorization.

(d) **Consent to conditions.** Beginning radiation management activities under an authorization constitutes consent by the holder to all conditions to which the authorization is subject.

(e) **Severability.** The provisions of any authorization are severable. If a provision thereof is invalidated by a court of law, the remaining provisions shall remain valid.

252:410-7-5. Authorization transfers

(a) **"Transfer" defined.** For purposes of this section, "transfer" means to convey from one person to another a majority ownership interest in an entity holding a DEQ authorization by any means other than gift or devise and includes the transfer of deed, transfer of more than 50 percent

of the entity's assets or stock, and/or creation of a legal entity as a new holder of the authorization.

(b) **Transferability.** Industrial radiographer certifications and reciprocity recognitions are not transferable. LBP-XRF permits, radiation machine operating permits and Radioactive Materials specific licenses are transferable. Transfers will be approved by DEQ only when:

- (1) A DEQ inspection has shown the transferor and transferee to be in compliance with this Chapter;
- (2) The transferee has agreed in writing to comply with this Chapter and the Act, all permit or license conditions, approved plans, and the terms of any orders issued pursuant thereto;
- (3) All monies owed to DEQ by transferor or transferee have been paid;
- (4) For permits or licenses requiring financial assurances, DEQ has reviewed and adjusted as needed the amount of financial assurance required and has received the requisite amount of new financial assurances from or on behalf of the transferee; and
- (5) For Radioactive Materials specific licenses, the licensees have also complied with all applicable requirements of 10 CFR.

(c) **Operation by transferee.** A transferee cannot commence radiation management activities under a DEQ authorization until the authorization has been fully transferred and approved by DEQ.

252:410-7-6. Renewal of authorizations

(a) **Types.** Radioactive Materials specific licenses and all permits, reciprocity recognitions and industrial radiographer certifications may be renewed according to the procedures and requirements of 252:410-7-3 and this Section.

(b) **Procedures.**

- (1) Radioactive Materials specific licensees must also comply with 10 CFR requirements applicable to the type of license.
- (2) Permittees and recognized persons must file complete applications for renewal, using appropriate guidance, and also identify the information which has changed since their last application.
- (3) Industrial radiographers seeking renewal of their certifications must apply for, take and pass a new certification examination.

(c) **Fees.** No renewal application will be acted upon until payment of the applicable fee is made.

(d) **Filing.** Authorizations not renewed by their expiration date expire unless the applicant has properly filed a renewal application with DEQ on or before the existing authorization's expiration date. A renewal application filed at least 30 days prior to the authorization's expiration date shall be deemed to have been timely filed. All persons are responsible for timely renewal of DEQ authorizations regardless of whether they receive an invoice from DEQ.

(e) **Failure to file on or before expiration date.**

- (1) **Authorization expires.** Upon the expiration of an authorization, the holder is no longer authorized to conduct radiation management activities in the State.
- (2) **New application required.** Persons wanting to become re-authorized after an authorization has expired, must file an application and pay fees as a new applicant plus pay a penalty fee for non-renewal.

(f) **Renewal criteria.** In addition to the criteria referenced in 252:410-7-4, DEQ's approval of any renewal shall be based on the applicant's compliance record and cooperative participation in compliance inspections and investigations.

PART 3. RECIPROCITY RECOGNITION

252:410-7-31. DEQ reciprocity recognition

Out-of-state authorizations eligible for DEQ recognition are:

- (1) LBP-XRF permits (Subchapter 19);
- (2) Industrial radiographer certifications (Subchapter 5);
- (3) NRC and Radioactive Materials licenses (Subchapter 10); and
- (4) Radiation machine operating permits (Subchapters 3, 11, 13, 15 and 17).

252:410-7-32. Reciprocity recognition application requirements

(a) **Application required.** To qualify for new or renewed DEQ recognition, a person must apply to DEQ for recognition and satisfy the requirements of Part 1 of this Subchapter.

(b) **Application fees.** Applicants for reciprocity recognition in Radioactive Materials program areas are subject to the reciprocity fee schedule of 252:410-10-118. All other applicants for reciprocity recognition are subject to the same fee schedules as are in-state permit applicants.

252:410-7-33. Reciprocity recognition approval and duration

(a) **Approval.** Applications for reciprocity recognition shall be deemed approved and issued by DEQ unless DEQ sends written notice of denial or a request for additional information to the applicant within 30 days after the date the application was received by DEQ. DEQ may deny a recognition, approve recognition with restrictions or amend a recognition for cause, including written notice from another licensing entity that the entity has taken enforcement action against the applicant for failure to comply with the terms of the corresponding authorization issued by the entity.

(b) **Duration.**

(1) DEQ recognitions are valid for one (1) year from the date of approval. Recognitions authorize up to 180 days of radiation activities in the state during that year.

(2) The recognition will remain effective for such period of time as the registrant remains in compliance with the terms of the recognition and this Chapter, and the underlying primary authorization remains valid and has neither expired nor been suspended or revoked by the issuing entity.

(c) **Revocation; suspension.** DEQ may revoke or suspend a reciprocity recognition for failure to comply as described in 252:410-1-5. Notice of the revocation may be given by DEQ to out-of-state authorizing entities.

(d) **Action by reciprocating entities.** Written notice received by DEQ regarding enforcement actions that are taken by another entity against a DEQ authorized person for violations of corresponding radiation management authorizations is subject to the Oklahoma Open Records Act, 51 O.S. § 24A.1 *et seq.*

252:410-7-34. Duties of recognized persons

Persons operating in Oklahoma under a reciprocity recognition are subject to the same requirements of this Chapter that apply to persons holding specific DEQ authorizations and must:

- (1) **Compliance.** Be familiar with and comply with all the requirements of this Chapter, including radiation safety, notice and registration, that apply to the radiation management activities for which recognition has been approved;

- (2) **Scope.** Ensure the work performed in Oklahoma does not exceed the scope of work prescribed by the primary authorization or the conditions of the recognition;
- (3) **Notice of out-of-state enforcement action.** Give DEQ written notice of the initiation of any enforcement action against the person or primary authorization; and
- (4) **Advance notice.** Give at least three (3) days advance written notice to DEQ before commencing work in Oklahoma, including a description of the activities, exact work location(s); name of contact person in Oklahoma; phone number where worker(s) may be reached while in Oklahoma; and a schedule of dates. Notifications of less than three (3) days may be approved by DEQ if the applicant demonstrates justifying circumstances.

252:410-7-35. Conversion of reciprocity recognition

A holder of a DEQ recognition may apply to convert the recognition to a DEQ-issued permit, license or certification at any time. On request, DEQ shall apply the fee paid by the applicant for the recognition to the fee due on the application for conversion and cause the effective date of the DEQ permit or license to be the date the application for reciprocity recognition was received by DEQ.

SUBCHAPTER 10. RADIOACTIVE MATERIALS PROGRAM

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PART 150. EXEMPTIONS AND CONTINUED REGULATORY AUTHORITY IN AGREEMENT STATES AND IN OFFSHORE WATERS UNDER SECTION 274 OF THE FEDERAL ATOMIC ENERGY ACT

- 252:410-10-150. 10 CFR 150 incorporations by reference

PART 1. GENERAL PROVISIONS

252:410-10-1. Radioactive Materials Program

(a) Scope.

(1) The rules in this Subchapter establish license requirements for the following categories of radioactive materials: byproduct material, source material and special nuclear material.

(2) License requirements incorporated by reference from 10 CFR are applicable requirements for all categories of radioactive materials within the scope of this Subchapter.

(b) Exclusions. Responsibility for the following regulatory requirements remains with the NRC:

(1) **In 10 CFR 20.** Exemptions to labeling requirements, § 20.1905(g); Reports of exposures, radiation levels, and concentrations of radioactive material exceeding the constraints or limits at nuclear power plants, § 20.2203(c); Reports of individual monitoring, § 20.2206(a)(1), (a)(3), (a)(4) and (a)(5);

(2) **In 10 CFR 30.** Activities requiring license, § 30.3(b); Definitions, 30.4 "Commencement of construction" paragraph (2). "Construction" paragraph (9)(ii) and "Quantities of concern", Application for specific licenses, § 30.32(k); Terms and conditions of licenses, § 30.34 (d), (e)(1), (e)(3) and (1); Transfer of byproduct material, § 30.41 (b)(6); Tritium reports, § 30.55;

(3) **In 10 CFR 32.** Purpose and scope, § 32.1(c)(1); Subpart A, Exempt concentrations and items, §§ 32.11, 32.12, 32.14, 32.15, 32.16, 32.18 through 32.23, and 32.25 through 32.29;

Subpart D, Specifically licensed items, § 32.210;

(4) **In 10 CFR 35.** License required, § 35.11(c)(1); License amendments, § 35.13(a)(1);

(5) **In 10 CFR 36.** Definitions, 36.2 "Commencement of construction" paragraph 2 and "Construction" paragraph 9(ii);

(6) **In 10 CFR 37.** General security program requirements, 37.43(d)(9);

(7) **In 10 CFR 40.** General Provisions, §§ 40.2a and 40.3; Definitions, 40.4 "Commencement of construction" paragraph (2) and "Construction" paragraph (9)(ii); Exemptions, §§ 40.11, 40.12 and 40.13 (a), (b), (c)(1) through (5), (c)(7) through (9), 40.14; General Licenses, §§ 40.20 through 40.24; 40.26 through 40.28; License Applications, §§ 40.31 (f) through (l), §§ 40.32 (d) through (g), §§ 40.33 through 40.35, § 40.37, and § 40.38; Licenses, §§ 40.41 (d), (e)(1) and (3), (f) and (g), § 40.42 and § 40.46; Transfer of Source Material, § 40.51 (b)(6); Records, Reports, and Inspections, § 40.60 (c)(3), §§ 40.64 through 40.67; Appendix A;

(8) **In 10 CFR 61.** Other information, § 61.16; Standards for issuance of a license, § 61.23 (i) and (j) regarding physical security information and criticality safety procedures for special nuclear material possessed prior to disposal;

(9) **In 10 CFR 70.** Regulation of special nuclear material for spent fuel, high level radioactive waste and uranium enrichment facilities, §§ 70.1(c),(d) and (e); Definitions, 70.4 "Commencement of construction" paragraph (2) and "Construction" paragraph (9)(ii); Department of Defense, § 70.13; Foreign military aircraft, § 70.14; General license to possess special nuclear material for transport, § 70.20a; General license for carriers of transient shipments of formula quantities of strategic special nuclear material of moderate strategic significance, special nuclear material of low strategic significance, and irradiated reactor fuel regulated under 10 CFR 73, § 70.20b; Subpart D - License Applications, § 70.21(a)(1), (c), (f), (g) and (h); § 70.22 (b), (c) and (f) through (n), § 70.23 (a)(6) through (12) and (b), § 70.23a, and § 70.24; Subpart E - Licenses, § 70.31 (c), (d), and (e), § 70.32 (a)(1), (a)(4) through (7), (b)(1), (b)(3), (b)(4), (c) through (k), and § 70.37; § 70.40; Subpart F - Acquisition, Use and Transfer of Special Nuclear Material, Creditor's Rights, §70.42(b)(6), and § 70.44; Subpart G - Special Nuclear Material Control, Records, Reports and Inspections, § 70.51(c),(d) and (e), § 70.52 through § 70.54, § 70.55(c), § 70.56, and §70.59; Subpart H - Additional Requirements for Certain Licensees Authorized to Possess a Critical Mass of Special Nuclear Material, § 70.60 through 70.76; Subpart I - Modification and Revocation of Licenses, § 70.81 and § 70.82; Subpart J - Enforcement, §§ 70.91, 70.92 and Appendix A to Part 70;

(10) **In 10 CFR 71.** Subpart A - General Provisions, § 71.10; Subpart B - Exemptions, § 71.14(b); Subpart C - General licenses, § 71.19; Subpart D - Application for Package Approval, §§ 71.31 through 71.39; Subpart E - Package Approval Standards, §§ 71.41 through 71.45 and §§ 71.51 through 71.65; Subpart F - Package, Special Form, and LSA-III Tests, §§ 71.70 through 71.77; Subpart G - Operating Controls and Procedures, § 71.85(a), (b) and (c) and § 71.91(b); Subpart H - Quality Assurance, § 71.101(c)(2), (d), and (e) and §§ 71.107 through 71.125;

(11) **In 10 CFR 150.** Persons in offshore waters not exempt, § 150.7; Persons in agreement states exempt, § 150.10; Commission regulatory authority for physical protection in agreement states, § 150.14; Persons not exempt, § 150.15(a)(9); Continued Commission authority pertaining to byproduct material, § 150.15a(b)(6); Persons in agreement states not exempt, Continued Commission authority pertaining to byproduct material in agreement states, § 150.17; Compliance with requirements of US/IAEA safeguards agreement for

source material under state agreement license; Submission to Commission of reports for tritium in agreement states, § 150.19; Transportation by aircraft of special nuclear material by agreement state licensee, § 150.21; Violations, § 150.30; Requirements for Agreement State regulation of byproduct material, § 150.31; Funds for reclamation or maintenance of byproduct material, §150.32; and Criminal penalties, § 150.33.

(c) **Effective date.** The requirements of this Subchapter became effective September 29, 2000, the date upon which jurisdiction over all unrevoked and unexpired NRC licenses and plan approvals was transferred to DEQ.

252:410-10-2. Using provisions incorporated by reference as state rules

(a) **Extent of incorporations by reference.** Each regulation from 10 CFR is incorporated in its entirety unless specified otherwise.

(b) **Interfacing terms.** For purposes of the Radioactive Materials Program, these 10 CFR terms shall be interpreted as follows unless specified otherwise in specific incorporating sections:

(1) **"Commission"** or the **"Nuclear Regulatory Commission"** or **"NRC"** means DEQ.

(2) **"Commissioner"**, **"Regional Administrator"**, **"Administrator"**, **"Director"** or **"Executive Director"** means DEQ's Executive Director.

(3) **"License"** means a valid NRC or Radioactive Materials Program license issued under or subject to DEQ jurisdiction.

(4) **"Licensee"** means the holder of a NRC or Radioactive Materials Program license.

(5) **"NRC Operation Center"** means DEQ's hotline, 1-800/522-0206.

(6) **"Order"** means an administrative order issued by DEQ.

(7) **"10 CFR 170.31"** or **"Schedule of Material Fees"** means those fees listed in 252:410-10-101 through 121.

(c) **Alternate forms.** In lieu of a referenced NRC form, persons reporting to DEQ may use their own computer-generated form or a Radioactive Materials Program form available from DEQ.

(d) **Inconsistencies.** Whenever a requirement which has been incorporated by reference is inconsistent with another rule of this Chapter, the requirement incorporated by reference shall prevail.

(e) **Exceptions.** The provisions for enforcement in 10 CFR Part 2, subpart B referenced in 10 CFR 30.10 (b), 40.10(b), 61.9b (b) and 70.10 are not incorporated by reference. Any violation of Chapter 410 rules is subject to enforcement in accordance with the requirements of 27A O.S. § 2-3-501 *et seq.*, and OAC 252:4, Department of Environmental Quality Rules of Practice and Procedure.

252:410-10-3. Radioactive Materials Program authorizations

(a) **License.** Except as otherwise specifically provided in this Chapter or in the State Agreement, a person shall only manufacture, produce, transfer, receive, acquire, own, possess or use byproduct, source or special nuclear material in the State of Oklahoma when authorized under an NRC or agreement state general license, a DEQ-issued specific license, or a DEQ reciprocity recognition.

(b) **Certification.** Prior to performing work as an industrial radiographer using sealed sources in the state, an individual must be authorized through either DEQ certification or DEQ reciprocity recognition in accordance with Subchapters 5 and 7.

(c) **Related provisions.** Persons subject to this Subchapter are also subject to the requirements of Subchapters 1, 7, 9 and 20 and may be subject to Subchapter 21.

252:410-10-4. Specific licenses

(a) **Described.** Specific licenses require application, fee payment, and DEQ review and approval. For licensing requirements, an applicant must comply with Subchapter 7 and the following Parts from 10 CFR which are incorporated by reference in this Subchapter:

- (1) Domestic licensing of Byproduct Material [Part 30]
- (2) Manufacture or initial transfer of items containing byproduct material. [Part 32]
- (3) Broad scope licenses, Types A, B and C. [Part 33]
- (4) Sealed sources in radiography. [Part 34]
- (5) Medical use of byproduct material. [Part 35]
- (6) Sealed sources in irradiators. [Part 36]
- (7) Licensed materials in well logging. [Part 39]
- (8) Low-level radioactive waste disposal. [Part 61]
- (9) Special nuclear material not reserved to NRC. [Part 70]

(b) **Term.** Specific licenses shall be issued for a fixed term, not to exceed ten (10) years from the date of issuance.

(c) **Reciprocity.** To apply for reciprocity, an applicant must comply with Part 3 of Subchapter 7.

(d) **Other licensing requirements.** For other licensing requirements, see Subchapter 7.

(e) **Criteria for issuance.** To be approvable, a Radioactive Materials Program license application must comply with applicable requirements of the state agreement; the Oklahoma Radiation Management Act, 27A O.S. §2-9-101 *et seq.*; and this Chapter.

252:410-10-5. General licenses

General licenses are effective without application, fees or issued authorization. For general licenses, see 10 CFR including the following provisions which are incorporated by reference in this Subchapter:

- (1) **Byproduct material general licenses.**
 - (A) Certain devices and equipment. [§ 31.3 (a) and (d)]
 - (B) Measuring, gauging or controlling devices. [§ 31.5]
 - (C) Install devices generally licensed in § 31.5. [§ 31.6]
 - (D) Luminous safety devices used in aircraft. [§ 31.7]
 - (E) Americium-241/calibration/reference sources. [§ 31.8]
 - (F) Ownership. [§ 31.9]
 - (G) Strontium 90 in ice detection devices. [§ 31.10]
 - (H) *In vitro* clinical or laboratory testing, including registration. [§ 31.11]
- (2) **Source material general licenses.** Certain industrial products or devices. [§ 40.25]
- (3) **Special nuclear material general licenses.**
 - (A) Calibration or reference sources. [§ 70.19]
 - (B) Ownership. [§ 70.20]

PART 19. WORKER COMMUNICATIONS

252:410-10-19. 10 CFR 19 incorporations by reference [AMENDED AND RENUMBERED TO 252:410-23-4]

PART 30. BYPRODUCT MATERIAL LICENSING IN GENERAL

252:410-10-30. 10 CFR 30 incorporations by reference

The following provisions are hereby incorporated by reference from 10 CFR 30, Rules of General Applicability to Domestic Licensing of Byproduct Material:

(1) General Provisions.

- (A) 30.1 - Scope
- (B) 30.2 - Resolution of conflict
- (C) 30.3(a), (c) and (d) - Activities requiring license
- (D) 30.4 - Definitions
- (E) 30.7 - Employee protection
- (F) 30.9 - Completeness and accuracy of information
- (G) 30.10 - Deliberate misconduct

(2) Exemptions.

- (A) 30.11 - Specific exemptions
- (B) 30.12 - Persons using byproduct material under certain Department of Energy and Nuclear Regulatory Commission contracts
- (C) 30.13 - Carriers
- (D) 30.14 - Exempt concentrations
- (E) 30.15 - Certain items containing byproduct material
- (F) 30.18 - Exempt quantities
- (G) 30.19 - Self luminous products containing tritium, krypton-85 or promethium-147
- (H) 30.20 - Gas and aerosol detectors containing byproduct material
- (I) 30.21 - Radioactive drug: Capsules containing carbon-14 urea for "*in vivo*" diagnostic use for humans
- (J) 30.22 - Certain industrial devices

(3) Licenses.

- (A) 30.31 - Types of licenses
- (B) 30.32 (a) through (d) and (g) through (j) - Application for specific licenses
- (C) 30.33 - General requirements for issuance of specific licenses
- (D) 30.34(a), (b), (c), (e)(2), (e)(4), (f), (g), (h), (i), and (j) - Terms and conditions of licenses
- (E) 30.35 - Financial assurance and recordkeeping for decommissioning
- (F) 30.36 - Expiration and termination of licenses and decommissioning of sites and separate buildings or outdoor areas, except (a)(2)
- (G) 30.37 - Application for renewal of licenses
- (H) 30.38 - Application for amendment of licenses
- (I) 30.39 - Commission action on applications to renew or amend
- (J) 30.41 - Transfer of byproduct material, except (b)(6)

(4) Records, inspections, tests and reports.

- (A) 30.50 - Reporting requirements
- (B) 30.51 - Records
- (C) 30.52 - Inspections
- (D) 30.53 - Tests

(5) Enforcement.

- (A) 30.61 - Modification and revocation of licenses
- (B) 30.62 - Right to cause the withholding or recall of byproduct material

(6) Schedules.

- (A) 30.70 - Schedule A - Exempt concentrations

- (B) 30.71 - Schedule B
- (C) 30.72 - Schedule C - Quantities of radioactive materials requiring consideration of the need for an emergency plan for responding to a release.

(7) **Appendices.**

- (A) Appendix A - Criteria relating to use of financial tests and parent company guarantees for providing reasonable assurance of funds for decommissioning.
- (B) Appendix B - Quantities of licensed material requiring labeling.
- (C) Appendix C - Criteria relating to use of financial tests and self-guarantees for providing reasonable assurance of funds for decommissioning.
- (D) Appendix D - Criteria relating to use of financial tests and self-guarantee for providing reasonable assurance of funds for decommissioning by commercial companies that have no outstanding rated bonds.
- (E) Appendix E - Criteria relating to use of financial tests and self-guarantee for providing reasonable assurance of funds for decommissioning by nonprofit colleges, universities, and hospitals.

PART 31. BYPRODUCT MATERIAL: GENERAL LICENSES

252:410-10-31. 10 CFR 31 incorporations by reference

The following provisions are hereby incorporated by reference from 10 CFR 31, General Domestic Licenses for Byproduct Material:

(1) **General provisions.**

- (A) 31.1 - Purpose and scope
- (B) 31.2 - Terms and conditions

(2) **General licenses.**

- (A) [RESERVED]
- (B) 31.5 - Certain detecting, measuring, gauging, or controlling devices and certain devices for producing light or an ionized atmosphere
- (C) 31.6 - General license to install devices generally licensed in 31.5
- (D) 31.7 - Luminous safety devices for use in aircraft
- (E) 31.8 - Americium-241 and radium-226 in the form of calibration or reference sources
- (F) 31.9 - General license to own byproduct material.
- (G) 31.10 - General license for strontium 90 in ice detection devices
- (H) 31.11 - General license for use of byproduct material for certain *in vitro* clinical or laboratory testing.
- (I) 31.12 - General license for certain items and self-luminous products containing radium-226

(3) **Recordkeeping.** 31.21 - Maintenance of records.

PART 32. BYPRODUCT MATERIAL: SPECIFIC LICENSES FOR MANUFACTURING AND TRANSFERRING CERTAIN ITEMS

252:410-10-32. 10 CFR 32 incorporations by reference

The following provisions are hereby incorporated by reference from 10 CFR 32, Specific Domestic Licenses to Manufacture or Transfer Certain Items Containing Byproduct Material:

(1) **General provisions.**

- (A) 32.1(a), (b) and (c)(2) - Purpose and scope, excluding issuance of certificates of

- registration
- (B) 32.2 - Definitions
- (C) 32.3 - Maintenance of records
- (2) **Subpart A - Exempt concentrations and items.**
 - (A) 32.13 - Same: Prohibition of introduction
 - (B) 32.24 - Same: Table of organ doses
- (3) **Subpart B - Generally licensed items.**
 - (A) Byproduct material contained in devices for use under 31.5:
 - (i) 32.51 - Requirements for license to manufacture or initially transfer
 - (ii) 32.51a - Conditions of licenses
 - (iii) 32.52 - Material transfer reports and records
 - (B) Luminous safety devices for use in aircraft:
 - (i) 32.53 - Requirements for license to manufacture, assemble, repair or initially transfer
 - (ii) 32.54 - Labeling of devices
 - (iii) 32.55 - Quality assurance; prohibition of transfer
 - (iv) 32.56 - Material transfer reports
 - (C) Calibration or reference sources containing americium 241:
 - (i) 32.57 - Calibration or reference sources containing americium-241 or radium-226: Requirements for license to manufacture or initially transfer
 - (ii) 32.58 - Same: Labeling of devices
 - (iii) 32.59 - Same: Leak testing of each source
 - (D) Ice detection devices containing strontium-90:
 - (i) 32.61 - Requirements for license to manufacture or initially transfer
 - (ii) 32.62 - Quality assurance; prohibition of transfer
 - (E) 32.71 - Manufacture and distribution of byproduct material for certain *in vitro* clinical or laboratory testing under general license
 - (F) 32.72 - Manufacture, preparation or transfer for commercial distribution of radioactive drugs containing byproduct material for medical use under part 35
 - (G) 32.74 - Manufacture and distribution of sources or devices containing byproduct material for medical use
- (4) **Subpart D - Specifically licensed items.** 32.201 - Serialization of nationally tracked sources

PART 33. BYPRODUCT MATERIAL: SPECIFIC LICENSES OF BROAD SCOPE

252:410-10-33. 10 CFR 33 incorporations by reference

The following provisions are hereby incorporated by reference from 10 CFR 33, Specific Domestic Licenses of Broad Scope for Byproduct Material:

- (1) **General provisions.** 33.1 - Purpose and scope
- (2) **Specific licenses of broad scope.**
 - (A) 33.11 - Types of specific licenses of broad scope
 - (B) 33.12 - Applications for specific licenses of broad scope
 - (C) 33.13 - Requirements for the issuance of a Type A specific license of broad scope
 - (D) 33.14 - Requirements for the issuance of a Type B specific license of broad scope
 - (E) 33.15 - Requirements for the issuance of a Type C specific license of broad scope
 - (F) 33.16 - Application for other specific licenses

- (G) 33.17 - Conditions of specific licenses of broad scope
- (3) **Schedule.** 33.100 - Schedule A

PART 34. INDUSTRIAL RADIOGRAPHIC OPERATIONS

252:410-10-34. 10 CFR 34 incorporations by reference

The following provisions are hereby incorporated by reference from 10 CFR Part 34, Licenses for Radiography and Radiation Safety Requirements for Radiographic Operations:

- (1) **Subpart A; General provisions.**
 - (A) 34.1 - Purpose and scope
 - (B) 34.3 - Definitions
- (2) **Subpart B; Specific licensing provisions.**
 - (A) 34.11 - Application for a specific license
 - (B) 34.13 - Specific license for industrial radiography
- (3) **Subpart C; Equipment.**
 - (A) 34.20 - Performance requirements for industrial radiography equipment
 - (B) 34.21 - Limits on external radiation levels from storage containers and source changers
 - (C) 34.23 - Locking of radiographic exposure devices, storage containers and source changers
 - (D) 34.25 - Radiation survey instruments
 - (E) 34.27 - Leak testing and replacement of sealed sources
 - (F) 34.29 - Quarterly inventory
 - (G) 34.31 - Inspection and maintenance of radiographic exposure devices, transport and storage containers, associated equipment, source changers and survey instruments
 - (H) 34.33 - Permanent radiographic installations
 - (I) 34.35 - Labeling, storage and transportation
- (4) **Subpart D; Radiation safety requirements.**
 - (A) 34.41 - Conducting industrial radiographic operations
 - (B) 34.42 - Radiation safety officer for industrial radiography
 - (C) 34.43 - Training
 - (D) 34.45 - Operating and emergency procedures
 - (E) 34.46 - Supervision of radiographers' assistants
 - (F) 34.47 - Personnel monitoring
 - (G) 34.49 - Radiation surveys
 - (H) 34.51 - Surveillance
 - (I) 34.53 - Posting
- (5) **Subpart E; Recordkeeping requirements.**
 - (A) 34.61 - Records of the specific license for industrial radiography
 - (B) 34.63 - Records of the receipt and transfer of sealed sources
 - (C) 34.65 - Records of radiation survey instruments
 - (D) 34.67 - Records of leak testing of sealed sources and devices containing depleted uranium
 - (E) 34.69 - Records of quarterly inventory
 - (F) 34.71 - Utilization logs
 - (G) 34.73 - Records of inspection and maintenance of radiographic exposure devices, transport and storage containers, associated equipment, source changers and survey

instruments

(H) 34.75 - Records of alarm system and entrance control checks at permanent radiographic installations

(I) 34.79 - Records of training and certification

(J) 34.81 - Copies of operating and emergency procedures

(K) 34.83 - Records of personnel monitoring procedures

(L) 34.85 - Records of radiation surveys

(M) 34.87 - Form of records

(N) 34.89 - Location of documents and records

(6) **Subpart F; Notifications** - 34.101

(7) **Appendix** - Appendix A to 10 CFR 34 - Radiographer Certification.

PART 35. MEDICAL USE OF BYPRODUCT MATERIAL

252:410-10-35. 10 CFR 35 incorporations by reference

(a) **Incorporations by reference.** The following provisions are hereby incorporated by reference from 10 CFR 35, Medical Use of Byproduct Material:

(1) **Subpart A; General Information.**

(A) 35.1 - Purpose and scope

(B) 35.2 - Definitions

(C) 35.5 - Maintenance of records

(D) 35.6 - Provisions for the protection of human research subjects

(E) 35.7 - FDA, other Federal and State requirements

(F) 35.10 - Implementation

(G) 35.11(a), (b) and (c)(2) - License required

(H) 35.12 - Application for license, amendment or renewal

(I) 35.13(a)(2), and (b) through (g) - License amendments

(J) 35.14 - Notifications

(K) 35.15 - Exemptions regarding Type A specific licenses of broad scope

(L) 35.18 - License issuance

(M) 35.19 - Specific exemptions

(2) **Subpart B; General Administrative Requirements.**

(A) 35.24 - Authority and responsibilities for the radiation protection program

(B) 35.26 - Radiation protection program changes

(C) 35.27 - Supervision

(D) 35.40 - Written directives

(E) 35.41 - Procedures for administrations requiring a written directive

(F) 35.49 - Suppliers for sealed sources or devices for medical use

(G) 35.50 - Training for Radiation Safety Officer

(H) 35.51 - Training for an authorized medical physicist

(I) 35.55 - Training for an authorized nuclear pharmacist

(J) 35.57 - Training for experienced Radiation Safety Officer, teletherapy or medical physicist, authorized user, nuclear pharmacist, and authorized nuclear pharmacist

(K) 35.59 - Recentness of Training

(3) **Subpart C; General Technical Requirements.**

(A) 35.60 - Possession, use, and calibration of instruments used to measure the activity of unsealed byproduct material

- (B) 35.61 - Calibration of survey instruments
 - (C) 35.63 - Determination of dosages of unsealed byproduct material for medical use
 - (D) 35.65 - Authorization for calibration, transmission, and reference sources
 - (E) 35.67 - Requirements for possession of sealed sources and brachytherapy sources
 - (F) 35.69 - Labeling of vials and syringes
 - (G) 35.70 - Surveys of ambient radiation exposure rate
 - (H) 35.75 - Release of individuals containing unsealed byproduct material or implants containing byproduct material
 - (I) 35.80 - Provision of mobile medical service
 - (J) 35.92 - Decay-in-storage
- (4) **Subpart D; Unsealed Byproduct Material–Written Directive Not Required.**
- (A) 35.100 - Use of unsealed byproduct material for uptake, dilution, and excretion studies for which a written directive is not required
 - (B) 35.190 - Training for uptake, dilution, and excretion studies
 - (C) 35.200 - Use of unsealed byproduct material for imaging and localization studies for which a written directive is not required
 - (D) 35.204 - Permissible molybdenum-99, strontium-82, and strontium-85 concentrations
 - (E) 35.290 - Training for imaging and localization studies
- (5) **Subpart E; Unsealed Byproduct Material – Written Directive Required.**
- (A) 35.300 - Use of unsealed byproduct material for which a written directive is required
 - (B) 35.310 - Safety instruction
 - (C) 35.315 - Safety precautions
 - (D) 35.390 - Training for use of unsealed byproduct material for which a written directive is required
 - (E) 35.392 - Training for the oral administration of sodium iodide I-131 requiring a written directive in quantities less than or equal to 1.22 gigabecquerels (33 millicuries)
 - (F) 35.394 - Training for the oral administration of sodium iodide I-131 requiring a written directive in quantities greater than 1.22 gigabecquerels (33 millicuries)
 - (G) 35.396 - Training for the parenteral administration of unsealed byproduct material requiring a written directive
- (6) **Subpart F; Manual Brachytherapy.**
- (A) 35.400 - Use of sources for manual brachytherapy
 - (B) 35.404 - Surveys after source implant and removal
 - (C) 35.406 - Brachytherapy sources accountability
 - (D) 35.410 - Safety instruction
 - (E) 35.415 - Safety precautions
 - (F) 35.432 - Calibration measurements of brachytherapy sources
 - (G) 35.433 - Decay of strontium-90 sources for ophthalmic treatments
 - (H) 35.457 - Therapy related computer systems
 - (I) 35.490 - Training for use of manual brachytherapy sources
 - (J) 35.491 - Training for ophthalmic use of strontium-90
- (7) **Subpart G; Sealed Sources for diagnosis.**
- (A) 35.500 - Use of sealed sources for diagnosis
 - (B) 35.590 - Training for use of sealed sources for diagnosis
- (8) **Subpart H; Photon Emitting Remote Afterloader Units, Teletherapy Units, and**

Gamma Stereotactic Radiosurgery Units.

- (A) 35.600 - Use of a sealed source in a remote afterloader unit, teletherapy unit, or gamma stereotactic radiosurgery unit
- (B) 35.604 - Surveys of patients and human research subjects treated with a remote afterloader unit
- (C) 35.605 - Installation, maintenance, adjustment, and repair
- (D) 35.610 - Safety procedures and instructions for remote afterloader units, teletherapy units, and gamma stereotactic radiosurgery units
- (E) 35.615 - Safety precautions for remote afterloader units, teletherapy units, and gamma stereotactic radiosurgery units
- (F) 35.630 - Dosimetry equipment
- (G) 35.632 - full calibration measurements on teletherapy units
- (H) 35.633 - Full calibration measurements on remote afterloader units
- (I) 35.635 - Full calibration measurements on gamma stereotactic radiosurgery units
- (J) 35.642 - Periodic spot-checks for teletherapy units
- (K) 35.643 - Periodic spot-checks for remote afterloader units
- (L) 35.645 - Periodic spot-checks for gamma stereotactic radiosurgery units
- (M) 35.647 - Additional technical requirements for mobile remote afterloader units
- (N) 35.652 - Radiation surveys
- (O) 35.655 - Five year inspection for teletherapy and gamma stereotactic radiosurgery units
- (P) 35.657 - Therapy-related computer systems
- (Q) 35.690 - Training for use of remote afterloader units, teletherapy units, and gamma stereotactic radiosurgery units

(9) **Subpart I.**

(10) **Subpart K; Other Medical Uses of Byproduct Material or Radiation From Byproduct Material.** 35.1000 - Other medical uses of byproduct material or radiation from byproduct material

(11) **Subpart L; Records.**

- (A) 35.2024 - Records of authority and responsibilities for radiation protection programs
- (B) 35.2026 - Records of radiation protection program changes
- (C) 35.2040 - Records of written directives
- (D) 35.2041 - Records for procedures for administration requiring a written directive
- (E) 35.2060 - Records of calibrations of instruments used to measure the activity of unsealed byproduct materials
- (F) 35.2061 - Records of radiation survey instrument calibrations
- (G) 35.2063 - Records of dosages of unsealed byproduct material for medical use
- (H) 35.2067 - Records of leaks tests and inventory of sealed sources and brachytherapy sources
- (I) 35.2070 - Records of survey for ambient radiation exposure rate
- (J) 35.2075 - Records of the release of individuals containing unsealed byproduct material or implants containing byproduct material
- (K) 35.2080 - Records of mobile medical services
- (L) 35.2092 - Records of decay-in-storage
- (M) 35.2204 - Records of molybdenum-99, strontium-82, and strontium 85 concentrations.

- (N) 35.2310 - Records of safety instruction
- (O) 35.2404 - Records of surveys after source implant and removal
- (P) 35.2406 - Records of brachytherapy source accountability
- (Q) 35.2432 - Records of calibration measurements of brachytherapy sources
- (R) 35.2433 - Records of decay of strontium-90 sources for ophthalmic treatments
- (S) 35.2605 - Records of installation, maintenance, adjustment, and repair of remote afterloader units, teletherapy units, and gamma stereotactic radiosurgery units
- (T) 35.2610 - Records of safety procedures
- (U) 35.2630 - Records of dosimetry equipment used with remote afterloader units, teletherapy units, and gamma stereotactic radiosurgery units
- (V) 35.2632 - Records of teletherapy, remote afterloader, and gamma stereotactic radiosurgery full calibrations
- (W) 35.2642 - Records of periodic spot-checks for teletherapy units
- (X) 35.2643 - Records of periodic spot-checks for remote afterloader units
- (Y) 35.2645 - Records of periodic spot checks for gamma stereotactic radiosurgery units
- (Z) 35.2647 - Records of additional technical requirements for mobile remote afterloader units
- (AA) 35.2652 - Records of surveys of therapeutic treatment units
- (BB) 35.2655 - Records of 5-year inspection for teletherapy and gamma stereotactic radiosurgery units

(12) **Subpart M; Reports.**

- (A) 35.3045 - Report and notification of a medical event
- (B) 35.3047 - Report and notification of a dose to an embryo/fetus or a nursing child
- (C) 35.3067 - Report of a leaking source

(b) **Exceptions.** The provisions for communication with NRC of 10 CFR § 30.6 referenced in §§ 35.12 and 35.14 are not incorporated by reference. All correspondence regarding license requirements, and any notifications or reports required by this Part, shall be directed to DEQ.

PART 36. IRRADIATOR LICENSES AND RADIATION SAFETY REQUIREMENTS

252:410-10-36. 10 CFR 36 incorporations by reference

The following provisions are hereby incorporated by reference from 10 CFR 36, Licenses and Radiation Safety Requirements for Irradiators:

(1) **Subpart A; General provisions.**

- (A) 36.1 - Purpose and scope
- (B) 36.2 - Definitions

(2) **Subpart B; Specific licensing requirements.**

- (A) 36.11 - Application for a specific license, except fees and fee exemptions which are set forth in Part 101 of this Subchapter
- (B) 36.13 - Specific licenses for irradiators
- (C) 36.15 - Start of construction
- (D) 36.17 - Applications for exemptions
- (E) 36.19 - Request for written statements

(3) **Subpart C; Design and performance requirements.**

- (A) 36.21 - Performance criteria for sealed sources
- (B) 36.23 - Access control
- (C) 36.25 - Shielding

- (D) 36.27 - Fire protection
 - (E) 36.29 - Radiation monitors
 - (F) 36.31 - Control of source movement
 - (G) 36.33 - Irradiator pools
 - (H) 36.35 - Source rack protection
 - (I) 36.37 - Power failures
 - (J) 36.39 - Design requirements
 - (K) 36.41 - Construction monitoring and acceptance testing
- (4) **Subpart D; Operation of irradiators.**
- (A) 36.51 - Training
 - (B) 36.53 - Operating and emergency procedures
 - (C) 36.55 - Personnel monitoring
 - (D) 36.57 - Radiation surveys
 - (E) 36.59 - Detection of leaking sources
 - (F) 36.61 - Inspection and maintenance
 - (G) 36.63 - Pool water purity
 - (H) 36.65 - Attendance during operation
 - (I) 36.67 - Entering and leaving the radiation room
 - (J) 36.69 - Irradiation of explosive or flammable materials
- (5) **Subpart E; Records.**
- (A) 36.81 - Records and retention periods
 - (B) 36.83 - Reports

**PART 37. PHYSICAL PROTECTION OF CATEGORY 1 AND CATEGORY 2
QUANTITIES OF RADIOACTIVE MATERIAL**

252:410-10-37. 10 CFR 37 Incorporations by reference

Incorporations by reference. The following provisions are hereby incorporated by reference from 10 CFR 37, Physical Protection of Category 1 and Category 2 Quantities of Radioactive Material:

(1) Subpart A; General Provisions.

- (A) 37.1 - Purpose
- (B) 37.3 - Scope
- (C) 37.5 - Definitions
- (D) 37.7 - Communications
- (E) 37.9 - Interpretations
- (F) 37.11 - Specific exemptions
- (G) 37.13 - Information collection requirements: OMB approval

(2) Subpart B; Background Investigations and Access Control Program.

- (A) 37.21 - Personnel access authorization requirements for category 1 or category 2 quantities of radioactive material
- (B) 37.23 - Access authorization program requirements
- (C) 37.25 - Background investigations
- (D) 37.27 - Requirements for criminal history records checks of individuals granted unescorted access to category 1 or category 2 quantities of radioactive material
- (E) 37.29 - Relief from fingerprinting identification, and criminal history records checks and other elements of background investigations for designated categories of individuals

- permitted unescorted access to certain radioactive materials
- (F) 37.31 - Protection of information
 - (G) 37.33 - Access authorization program review
- (3) **Subpart C; Physical Protection Requirements During Use.**
- (A) 37.41 - Security program
 - (B) 37.43 - General security program requirements, except (d)(9)
 - (C) 37.45 - LLEA coordination
 - (D) 37.47 - Security zones
 - (E) 37.49 - Monitoring, detection, and assessment
 - (F) 37.51 - Maintenance and testing
 - (G) 37.53 - Requirements for mobile devices
 - (H) 37.55 - Security program review
 - (I) 37.57 - Reporting of events
- (4) **Subpart D; Physical Protection in Transit.**
- (A) 37.71 - Additional requirements for transfer of category 1 and category 2 quantities of radioactive material
 - (B) 37.73 - Applicability of physical protection of category 1 and category 2 quantities of radioactive material during transit
 - (C) 37.75 - Preplanning and coordination of shipment of category 1 or category 2 quantities of radioactive material
 - (D) 37.77 - Advance notification of shipment of category 1 quantities of radioactive material.
 - (E) 37.79 - Requirements for physical protection of category 1 and category 2 quantities of radioactive material during shipment
 - (F) 37.81 - Reporting of events
- (5) **Subpart E; Reserved.**
- (6) **Subpart F; Records.**
- (A) 37.101 - Form of records
 - (B) 37.103 - Record retention
- (7) **Appendix A to Part 37.** Category 1 and Category 2 Radioactive Materials

PART 39. WELL LOGGING

252:410-10-39. 10 CFR 39 incorporations by reference

(a) **Incorporations by reference.** The following provisions are hereby incorporated by reference from 10 CFR 39, Licenses and Radiation Safety Requirements for Well Logging:

- (1) **Subpart A; General provisions.**
 - (A) 39.1 - Purpose and scope
 - (B) 39.2 - Definitions
- (2) **Subpart B; Specific licensing requirements.**
 - (A) 39.11 - Application for a specific license
 - (B) 39.13 - Specific licenses for well logging
 - (C) 39.15 - Agreement with well owner or operator
 - (D) 39.17 - Request for written statements
- (3) **Subpart C; Equipment.**
 - (A) 39.31 - Labels, security and transportation precautions
 - (B) 39.33 - Radiation detection instruments

- (C) 39.35 - Leak testing of sealed sources
- (D) 39.37 - Physical inventory
- (E) 39.39 - Records of material use
- (F) 39.41 - Design and performance criteria for sources
- (G) 39.43 - Inspection, maintenance and opening of source or source holder
- (H) 39.45 - Subsurface tracer studies
- (I) 39.47 - Radioactive markers
- (J) 39.49 - Uranium sinker bars
- (K) 39.51 - Use of a sealed source in a well without surface casing
- (L) 39.53 - Energy compensation source
- (M) 39.55 - Tritium neutron generator target source
- (4) **Subpart D; Radiation safety requirements.**
 - (A) 39.61 - Training
 - (B) 39.63 - Operating and emergency procedures
 - (C) 39.65 - Personnel monitoring
 - (D) 39.67 - Radiation surveys
 - (E) 39.69 - Radioactive contamination control
- (5) **Subpart E; Security, Records, Notifications.**
 - (A) 39.71 - Security
 - (B) 39.73 - Documents and records required at field stations
 - (C) 39.75 - Documents and records required at temporary job-sites
 - (D) 39.77 - Notification of incidents and lost sources; abandonment procedures for irretrievable sources

(b) **Exceptions.** The provisions to apply for exemption from the requirements of this Part contained in § 39.91 are not incorporated by reference. Applications for exemption should be addressed to DEQ as authorized in 252:410-1-3.

PART 40. DOMESTIC LICENSING OF SOURCE MATERIAL

252:410-10-40. 10 CFR 40 incorporations by reference

The following provisions are hereby incorporated by reference from 10 CFR 40, Domestic Licensing of Source Material.

- (1) **General Provisions.**
 - (A) 40.1 - Purpose
 - (B) 40.2 - Scope
 - (C) 40.4 - Definitions
 - (D) 40.7 - Employee Protection
 - (E) 40.9 - Completeness and accuracy of information
 - (F) 40.10 - Deliberate misconduct
- (2) **Exemptions.** 40.13(c)(6) and 10 - Unimportant quantities of source material
- (3) **General Licenses.** 40.25 - General license for use of certain industrial products or devices.
- (4) **License Applications.**
 - (A) 40.31 (a) through (e) - Application for specific licenses
 - (B) 40.32 (a) through (c) - General requirements for issuance of licenses.
 - (C) 40.36 - Financial assurance and recordkeeping for decommissioning
- (5) **Licenses.**

- (A) 40.41 (a) through (c) and (e) - Terms and conditions of licenses
- (B) 40.43 - Renewal of licenses
- (C) 40.44 - Amendment of licenses at request of licensee
- (D) 40.45 - Commission action on applications to renew or amend
- (6) **Transfer of Source Material.**
 - (A) 40.51 (a), (b)(1) through (5), (b)(7), (c) and (d) - Transfer of source or byproduct material
 - (B) 40.54 - Requirements for license to initially transfer source material for use under the "small quantities of source material" general license
 - (C) 40.55 - Conditions of licenses to initially transfer source material for use under the "small quantities of source material" general license. Quality control, labeling, safety instructions, and records and reports
- (7) **Records, Reports and Inspections.**
 - (A) 40.60 (a), (b), (c)(1) and (2) - Reporting requirements
 - (B) 40.61 (a) through (f) - Records
 - (C) 40.62 - Inspections
 - (D) 40.63 - Tests
- (8) **Modification and Revocation of Licenses.** 40.71 - Modification and revocation of licenses

PART 61. LOW-LEVEL RADIOACTIVE WASTE: LAND DISPOSAL

252:410-10-61. 10 CFR 61 incorporations by reference

(a) The following provisions are hereby incorporated by reference from 10 CFR 61, Licensing Requirements for Land Disposal of Radioactive Waste:

- (1) **Subpart A; General Provisions.**
 - (A) 61.1 - Purpose and scope
 - (B) 61.2 - Definitions
 - (C) 61.3 - License required
 - (D) 61.7 - Concepts
 - (E) 61.9 - Employee Protection
 - (F) 61.9a - Completeness and accuracy of information
 - (G) 61.9b - Deliberate Misconduct
- (2) **Subpart B; Licenses.**
 - (A) 61.10 - Content of application
 - (B) 61.11 - General information
 - (C) 61.12 - Specific technical information
 - (D) 61.13 - Technical analyses
 - (E) 61.14 - Institutional information
 - (F) 61.15 - Financial information
 - (G) 61.20 - Filing and distribution of application
 - (H) 61.21 - Elimination of repetition
 - (I) 61.22 - Updating of application
 - (J) 61.23 (a) through (h) - Standards for license issuance
 - (K) 61.24 - Conditions of licenses
 - (L) 61.25 (a) and (b) - Changes
 - (M) 61.26 - Amendment of license

- (N) 61.27 - Application for renewal or closure
 - (O) 61.28 - Contents of application for closure
 - (P) 61.29 - Post-closure observation and maintenance
 - (Q) 61.30 - Transfer of license
 - (R) 61.31 - Termination of license
 - (3) **Subpart C; Performance objectives.**
 - (A) 61.40 - General requirement
 - (B) 61.41 - Protection of general population from releases of radioactivity
 - (C) 61.42 - Protection of individuals from inadvertent intrusion
 - (D) 61.43 - Protection of individuals during operations
 - (E) 61.44 - Stability of the disposal site after closure
 - (4) **Subpart D; Technical requirements for disposal facilities.**
 - (A) 61.50 - Disposal site suitability requirements for land disposal
 - (B) 61.51 - Disposal site design for land disposal
 - (C) 61.52 - Land disposal facility operation and disposal site closure
 - (D) 61.53 - Environmental monitoring
 - (E) 61.54 - Alternative requirements for design and operations
 - (F) 61.55 - Waste classification
 - (G) 61.56 - Waste characteristics
 - (H) 61.57 - Labeling
 - (I) 61.58 - Alternative requirements for waste classification and characteristics
 - (J) 61.59 - Institutional requirements
 - (5) **Subpart E; Financial assurances.**
 - (A) 61.61 - Applicant qualifications and assurances
 - (B) 61.62 - Funding for site closure and stabilization
 - (C) 61.63 - Financial assurances for institutional controls
 - (6) **Subpart G; Records, reports, tests and inspections.**
 - (A) 61.80 - Maintenance of records, reports and transfers
 - (B) 61.81 - Tests at land disposal facilities
 - (C) 61.82 - Commission inspections of facilities
- (b) **Central Interstate Low-Level Radioactive Waste Compact.** This incorporation by reference shall not supersede, conflict with or interfere with the legal rights and duties of the State of Oklahoma under the Central Interstate Low-Level Radioactive Waste Compact.
- (c) **Terms.** For purposes of this incorporation by reference:
- (1) "100-year floodplain" means an area designated by the Federal Emergency Management Agency as being subject to a one percent or greater chance of flooding in any given year.
 - (2) "Coastal high hazard area" means 100-year floodplain.
 - (3) "Wetland" means an area determined by the Corps of Engineers to be inundated by surface or ground water with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction.

PART 70. SPECIAL NUCLEAR MATERIAL: LICENSING

252:410-10-70. 10 CFR 70 incorporations by reference

The following provisions are hereby incorporated by reference from 10 CFR 70, Domestic

Licensing of Special Nuclear Material:

(1) Subpart A; General provisions.

- (A) 70.1 - Purpose, except (c),(d) and (e)
- (B) 70.2 - Scope
- (C) 70.3 - License requirements
- (D) 70.4 - Definitions
- (E) 70.7 - Employee protection
- (F) 70.9 - Completeness and accuracy of information
- (G) 70.10 - Deliberate misconduct

(2) Subpart B; Exemptions.

- (A) 70.11 - Persons using special nuclear material under certain Department of Energy and Nuclear Regulatory Commission contracts
- (B) 70.12 - Carriers
- (C) 70.17 - Specific exemptions

(3) Subpart C; General licenses.

- (A) 70.18 - Types of licenses
- (B) 70.19 - General license for calibration or reference sources
- (C) 70.20 - General license to own special nuclear material

(4) Subpart D; License applications.

- (A) 70.22 (a), (d) and (e) - Contents of applications
- (B) 70.23 (a)(1) through (5) - Requirements for the approval of applications
- (C) 70.25 - Financial assurance and recordkeeping for decommissioning.

(5) Subpart E; Licenses.

- (A) 70.31 (a) and (d) - Issuance of licenses
- (B) 70.32 (a)(2), (a)(3),(a)(8), (a)(9), (b)(2) and (b)(5) - Conditions of licenses
- (C) 70.33 - Renewal of licenses
- (D) 70.34 - Amendment of licenses
- (E) 70.35 - Commission action on applications to renew or amend
- (F) 70.36 - Inalienability of licenses
- (G) 70.38 - Expiration and termination of licenses and decommissioning of sites and separate buildings or outdoor areas.
- (H) 70.39 - Specific licenses for the manufacture or initial transfer of calibration or reference sources.

(6) Subpart F; Acquisition, use and transfer of special nuclear material; Creditor's rights.

- (A) 70.41 - Authorized use of special nuclear material
- (B) 70.42 - Transfer of special nuclear material, except (b)(6)

(7) Subpart G; Special nuclear material control, records, reports and inspections.

- (A) 70.50 (a), (b) and (c)(1) and (2) - Reporting requirements.
- (B) 70.51 (a) and (b) - Material balance, inventory, and records requirements
- (C) 70.55 (a) and (b) - Inspections
- (D) 70.56 (a) and (b) - Tests

(8) Subpart I; Modification and revocation of licenses. 70.81 - Modification and revocation of licenses

PART 71. PACKAGING AND TRANSPORTING RADIOACTIVE MATERIAL

252:410-10-71. 10 CFR 71 incorporations by reference

The following provisions are hereby incorporated by reference from 10 CFR 71, Packaging and Transportation of Radioactive Material:

(1) Subpart A; General provisions.

- (A) 71.0 - Purpose and scope
- (B) 71.1(b) - Communications and records
- (C) 71.3 - Requirement for license
- (D) 71.4 - Definitions
- (E) 71.5 - Transportation of licensed material
- (F) 71.7 - Completeness and accuracy of information
- (G) 71.8 - Deliberate misconduct
- (H) 71.9 - Employee protection

(2) Subpart B; Exemptions.

- (A) 71.12 - Specific exemptions
- (B) 71.13 - Exemptions of physicians
- (C) 71.14(a) - Exemption for low-level materials
- (D) 71.15 - Exemption from classification as fissile material

(3) Subpart C; General licenses.

- (A) 71.17 - General license: NRC-approved package
- (B) 71.20 - General license: DOT specification container
- (C) 71.21 - General license: Use of foreign approved package
- (D) 71.22 - General license: Fissile material
- (E) 71.23 - General license: Plutonium-beryllium special form material

(4) Subpart E; Package Approval Standards. 71.47 - External radiation standards for all packages

(5) Subpart G; Operating controls and procedures.

- (A) 71.81 - Applicability of operating controls and procedures
- (B) 71.83 - Assumptions as to unknown properties
- (C) 71.85(d) - Preliminary determinations
- (D) 71.87 - Routine determinations
- (E) 71.88 - Air transport of plutonium
- (F) 71.89 - Opening instructions
- (G) 71.91(a), (c), and (d) - Records
- (H) 71.93 - Inspection and tests
- (I) 71.95 - Reports
- (J) 71.97 - Advance notice of shipment of irradiated reactor fuel and nuclear waste

(6) Subpart H; Quality assurance.

- (A) 71.101(a), (b), (c)(1), (f), and (g) - Quality assurance requirements
- (B) 71.103 - Quality assurance organization
- (C) 71.105 - Quality assurance program
- (D) 71.106 - Changes to quality assurance program
- (E) 71.127 - Handling, storage and shipping control
- (F) 71.129 - Inspection, test and operating status
- (G) 71.131 - Nonconforming materials, parts or components
- (H) 71.133 - Corrective action
- (I) 71.135 - Quality assurance records
- (J) 71.137 - Audits

(7) Appendix A to Part 71--Determination of A₁ and A₂.

PART 101. RADIOACTIVE MATERIALS PROGRAM FEES

252:410-10-101. Fee schedules

(a) Radioactive Materials Program fees are set forth in this part. Categories of Radioactive Materials Program licenses set forth in this Part, but not the amount of the fees, are the same as categories of materials licenses set forth by NRC in a schedule following 10 CFR §171.16. The NRC schedule number for each license category is noted in brackets.

(b) **Fees for additional storage or use sites.** For licenses authorizing two or more locations of use or storage, the annual fee and application fee shall be the base fee plus 25% of the base fee for each additional use or storage site. Annual and application fees shall not exceed twice the base fee for each fee category. Temporary job sites will not be counted as a location of use or storage for the purpose of calculating fees.

252:410-10-102. Fees for special nuclear material licensing

(a) **Industrial measuring systems.** Licenses to possess and use special nuclear material in sealed sources contained in devices used in industrial measuring systems, including x-ray fluorescence analyzers. License application fee and annual fee - \$1,270.00 [1.C.].

(b) **Other.** All other special nuclear material licenses. License application fee and annual fee - \$2,880.00.[1.D.].

252:410-10-103. Fees for source material licensing

(a) **Shielding.** Licenses to possess, use and/or install source material for shielding: License application fee and annual fee - \$490.00. [2.B.].

(b) **Other.** Other source material licenses: License application fee and annual fee - \$8,340.00. [2.C.].

252:410-10-104. Fees for byproduct material licensing

(a) **Processing and manufacturing.** Licenses to possess and use byproduct material for processing or manufacturing of items containing byproduct material for commercial distribution:

(1) **Broad scope.** Broad scope licenses issued under 252:410-10-30 and 252:410-10-33: License application fee and annual fee - \$15,960.00. [3.A.].

(2) **Other.** Other licenses issued under 252:410-10-30 for processing or manufacturing of items containing byproduct material for commercial distribution: License application fee and annual fee - \$5,470.00. [3.B.].

(b) **Medical Product Distribution.** Licenses issued under 252:410-10-32(3)(E), (F) and (G) authorizing, the processing or manufacturing and distribution or redistribution of radiopharmaceuticals, generators, reagent kits and/or sources and devices containing byproduct material:

(1) **Combined.** Processing or manufacturing and distribution or redistribution, including possession and use of source material for shielding authorized under 252:410-10-40 on the same license: License application fee and annual fee - \$10,790.00. [3.C.].

(2) **Distribution only.** Distribution or redistribution not involving processing or manufacturing of the byproduct material, including possession and use of source material for shielding authorized under 252:410-10-40 when included on the same license: License application fee and annual fee - \$4,320.00. [3.D.].

- (c) **Irradiation (self-shielded units).** Licenses to possess and use byproduct material in sealed sources for irradiation of materials in which the source is not removed from its shield (self-shielded units): License application fee and annual fee - \$3,020.00. [3.E.].
- (d) **Irradiation (small non self-shielded units).** Licenses to possess and use less than 10,000 curies of byproduct material in sealed sources for irradiation of materials in which the source is exposed for irradiation purposes, including underwater irradiators for irradiation of material in which the source is not exposed for irradiation purposes: License application fee and annual fee - \$3,740.00. [3.F.].
- (e) **Category 7. Irradiation (large non self-shielded units).** Licenses to possess and use 10,000 curies or more of byproduct material in sealed sources for irradiation of materials in which the source is exposed for irradiation purposes including underwater irradiators for irradiation of materials in which the source is not exposed for irradiation purposes: License application fee and annual fee - \$18,690.00. [3.G.].
- (f) **Distribution to exempt persons (reviewable items).** Licenses issued under 252:410-10-32.(2) to distribute items containing byproduct material that require review to persons exempt from 252:410-10-30 licensing requirements, except specific licenses authorizing redistribution of items that have been authorized for distribution to persons exempt from 252:410-10-30 licensing requirements: License application fee and annual fee - \$4,260.00. [3.H.].
- (g) **Distribution to exempt persons (non-reviewable items).** Licenses issued under 252:410-10-32(2) to distribute items containing byproduct material or quantities of byproduct material that do not require device evaluation to persons exempt from 252:410-10-30 licensing requirements, except specific licenses authorizing redistribution of items that have been authorized for distribution to persons exempt from 252:410-10-30 licensing requirements: License application fee and annual fee - \$6,790.00. [3.I.].
- (h) **Distribution to general licensees (reviewable items).** Licenses issued under 252:410-32(3) to distribute items containing byproduct material that require sealed source and/or device review to persons generally licensed under 252:410-10-31, except specific licenses authorizing redistribution of items that have been authorized for distribution to persons generally licensed under 252:410-10-31: License application fee and annual fee - \$3,020.00. [3.J.].
- (i) **Distribution to general licensees (non-reviewable items).** Licenses issued under 252:410-10-32(3) to distribute items containing byproduct material or quantities of byproduct material that do not require sealed source and/or device review to persons generally licensed under 252:410-10-31, except specific licenses authorizing redistribution of items that have been authorized for distribution to persons generally licensed under 252:410-10-31: License application fee and annual fee - \$1,990.00. [3.K.].
- (j) **Research and development (broad scope licenses).** Broad scope licenses issued under 252:410-10-30 and 252:410-10-33 to possess and use byproduct material for research and development that do not authorize commercial distribution: License application fee and annual fee - \$11,790.00. [3.L.].
- (k) **Research and development (licenses other than broad scope).** Licenses, other than broad scope licenses, issued under 252:410-10-30 to possess and use byproduct material for research and development that do not authorize commercial distribution: License application fee and annual fee - \$5,320.00. [3.M.].
- (l) **Service providers.** Licenses authorizing services for other licensees, except licenses that authorize only calibration and/or leak testing services which are subject to the fees specified in subsection (n) of this section, and waste disposal services which are subject to the fees specified in

252:410-10-105: License application fee and annual fee - \$5,900.00. [3.N.].

(m) **Industrial radiography.** Licenses issued under 252:410-10-34 to possess and use byproduct material for industrial radiography operations, including possession and use of source material for shielding authorized under 252:410-10-40 when authorized on the same license: License application fee and annual fee - \$13,520.00. [3.O.].

(n) **Miscellaneous including gauges and measuring devices.** All other specific byproduct material licenses or which no fees are identified in 252:410-10-104 through 110: License application fee and annual fee - \$1,590.00. [3.P.].

252:410-10-105. Fees for waste disposal and processing

(a) **Waste storage, processing and disposal.** Licenses specifically authorizing the receipt of waste byproduct, source or special nuclear material from others for the purpose of: contingency storage or commercial land disposal by the licensee or licenses for receipt of waste from other persons for incineration or other treatment including the packaging of resulting waste and residues and the transfer of the packages by the licensee to another authorized to receive or dispose of waste material: License application fee, license renewal fee, and license amendment fee at full cost; annual fee - There are no existing Radioactive Materials Program licenses for this category. When DEQ issues a license for this category, an annual fee will be established for the category. [4.A.].

(b) **Packaging for transfer and disposal.** Licenses specifically authorizing the receipt of waste byproduct, source or special nuclear material from others for the purpose of packaging or repackaging the waste material and transferring it to another authorized to receive or dispose of the material: License application fee and annual fee - \$12,260.00. [4.B.].

(c) **Prepackaged waste transfer.** Licenses specifically authorizing the receipt of prepackaged waste byproduct, source or special nuclear material from others and the transfer of it to another authorized to receive or dispose of the waste material: License application fee and annual fee - \$7,480.00. [4.C.].

252:410-10-106. Fees for well logging

(a) **Well logging, well surveys and non-field flooding tracer studies.** Licenses to possess and use byproduct, source material or special nuclear material for well logging, well surveys and tracer studies other than field flooding tracer studies: License application fee and annual fee - \$7,910.00. [5.A.].

(b) **Field flooding tracer studies.** Licenses to possess and use byproduct material for field flooding tracer studies: License application fee, license renewal fee and license amendment fee at full cost; annual fee - \$12,650.00. [5.B.].

252:410-10-107. Fees for nuclear laundries

Licenses to commercially collect and launder items contaminated with byproduct, source or special nuclear material: License application fee and annual fee - \$11,790.00. [6.A.].

252:410-10-108. Fees for human use of byproduct, source or special material licensing

(a) **Teletherapy.** Licenses issued under 252:410-10 parts 30, 35, 40 or 70 for human use of byproduct, source or special nuclear material in sealed sources contained in teletherapy devices, including possession and use of source material for shielding when authorized on the same license: License application fee and annual fee - \$9,920.00. [7.A.].

(b) **Medical research/development (broad scope).** Broad scope licenses issued under

252:410-10 parts 30, 33, 35, 40 or 70 to medical institutions or two or more physicians and authorizing research and development, including human use of byproduct material, except licenses for byproduct, source or special nuclear material in sealed sources contained in teletherapy devices. This fee category also includes the possession and use of source material for shielding when authorized on the same license: License application fee and annual fee - \$22,720.00. [7.B.].

(c) **Other.** Other licenses issued under 252:410-10-parts 30, 35, 40 and 70 for human use of byproduct, source or special nuclear material, except licenses for byproduct, source or special nuclear material in sealed sources contained in teletherapy devices. This fee category includes possession and use of source material for shielding when authorized on the same license - License application fee and annual fee - \$4,600.00. [7.C.].

252:410-10-109. Fees for civil defense activities

Licenses to possess and use byproduct, source or special nuclear material for civil defense activities - License application fee and annual fee - \$1,725.00. [8.A.].

252:410-10-110. Fees for decommissioning, decontamination, reclamation or site restoration activities

Byproduct, source or special nuclear material licenses and other approvals authorizing decommissioning, decontamination, reclamation or site restoration activities and oversight of authorized activities, including inspections, reviews and report preparation - License application fee, license renewal fee, license amendment fee and oversight fees - at full cost. [14.].

252:410-10-111. Fees for small entities

Small entities are subject to the lower annual fees set forth below. To be eligible for the lower fees, an individual empowered to act on behalf of a licensee must certify annually that the licensee meets the following qualifications.

- (1) **Small business.** A for-profit concern that provides a service, or a concern not engaged in manufacturing with annual gross receipts for the previous fiscal year within the ranges set forth below, averaged over its last 3 completed fiscal years.
 - (A) \$350,000 to \$5,000,000: Annual fee - \$1,730.00.
 - (B) Less than \$350,000: Annual fee - \$410.00.
- (2) **Manufacturing industry.** A manufacturing concern with an average number of employees within the ranges set forth below, based upon employment during each pay period for the preceding 12 calendar months.
 - (A) 35 to 500 employees: Annual fee - \$1,730.00.
 - (B) Less than 35 employees: Annual fee - \$410.00.
- (3) **Small organization.** A not-for-profit organization that is independently owned and operated and has annual gross receipts within the ranges set forth below.
 - (A) \$350,000 to \$5,000,000: Annual fee - \$1,730.00.
 - (B) Less than \$350,000: Annual fee - \$410.00.
- (4) **Small governmental jurisdiction.** (Includes publicly supported educational institutions.) A government of a city, county, town, township, village, school district, or special district with a population within the following ranges.
 - (A) 20,000 to 50,000 population: Annual fee - \$1,730.00.
 - (B) Less than 20,000 population: Annual fee - \$410.00.
- (5) **Small educational institution.** An education institution that is not state or publicly supported and employment within the following ranges.

- (A) 35 to 500 employees: Annual fee - \$1,730.00.
- (B) Less than 35 employees: Annual fee - \$410.00.

252:410-10-112. Application fees

Application fees for new, amended or renewed licenses are due when the application is filed.

252:410-10-113. Annual fees

The annual fee for each specific license is equal to the license's application fee and is due on or before each anniversary date of the license.

252:410-10-114. Full cost fees

Fees specified at "full cost" are based on costs calculated at \$115.00 per hour for DEQ staff time and actual costs of any contractual services.

252:410-10-115. Effect of multiple categories on fees

When a license or license application involves more than one category of use, the fee amount is determined by the category assigned the higher fee.

252:410-10-116. Small and very small entity fees [REVOKED]

252:410-10-117. Amendment fees

The fee to change to a category having a higher fee is the difference between the current category fee and the higher fee prorated by the number of months remaining until the license anniversary date.

252:410-10-118. Reciprocity fees

Applicants for reciprocity shall pay an annual fee as follows:

(1) For applications received three or more days before the work is to be performed, the higher of \$2,880.00 or full cost up to the applicable annual fee, and for applications received less than three days before the work is to be performed, the higher of \$4,030.00 or full cost, but not to exceed the applicable annual fee for the following license categories:

- (A) 252:410-10-104 (e) and (m);
- (B) 252:410-10-105;
- (C) 252:410-10-106(b);
- (D) 252:410-10-107;
- (E) 252:410-10-110.

(2) For applications received three or more days before the work is to be performed, \$1,730.00, and for applications received less than three days before the work is to be performed, \$2,880.00, for each license category not listed in paragraph (1) of this section.

(3) If an application has been approved or if the application for approval has been filed, the holder of that DEQ recognition or the person whose application is in process to receive DEQ recognition of reciprocity shall pay an additional fee of \$1,000.00 if such holder or person chooses to add one or more additional sites requiring reciprocity if such request for recognition of these additional sites is received less than three days before the work related to such request is to be performed.

252:410-10-119. Fee exemptions

The fee exemptions set forth in 10 CFR 170.11(a) and (b) are hereby incorporated by reference.

252:410-10-120. Effective date [REVOKED]

252:410-10-121. State agreement annual registration fee for generally licensed devices

The annual fee for generally licensed devices requiring registration shall be \$300.00 per general licensee and is due on or before each anniversary date of registration. For devices held under a general license as of July 1, 2003, the fee shall be due on September 1, 2003 and at each anniversary date thereafter. [See 252:410-10-31(2)(B)]

**PART 150. EXEMPTIONS AND CONTINUED REGULATORY AUTHORITY
IN AGREEMENT STATES AND IN OFFSHORE WATERS
UNDER SECTION 274 OF THE FEDERAL ATOMIC ENERGY ACT**

252:410-10-150. 10 CFR 150 incorporations by reference

The following provisions are hereby incorporated by reference from 10 CFR 150, Exemptions and continued regulatory authority in agreement states and in offshore waters under Section 274 of the federal Atomic Energy Act:

- (1) **General Provisions.** 150.3 - Definitions, except the terms *Act*, *Commission*, *Government agency*, *Production facility*, *State*, *Utilization facility*, and *Uranium enrichment facility*.
- (2) **Exemptions in Agreement States.** 150.11 - Critical Mass
- (3) **Reciprocity.** 150.20(a)-(b) - Recognition of Agreement State licenses.

**SUBCHAPTER 11. USE OF X-RAYS AND /OR PARTICLES FOR THERAPEUTIC
PURPOSES IN THE HEALING ARTS AND VETERINARY MEDICINE**

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PART 1. GENERAL PROVISIONS

252:410-11-1. General provisions and description

(a) **Scope.** This Subchapter establishes requirements for the use of radiation machines (x-ray systems and particle accelerators) for therapeutic purposes in the healing arts and in the practice

of veterinary medicine.

(b) **Applicability.** The requirements of this Subchapter apply to any person who possesses a therapeutic system described in subsection (a) of this section and causes radiation to be produced through the operation or testing of the machine in the state.

(c) **Authorization required.** No persons subject to this Subchapter may perform any radiation management activity with such a therapeutic system unless:

- (1) they hold a DEQ-issued radiation machine operating permit and have registered their system with DEQ;
- (2) their therapeutic systems and management of radiation safety meet the applicable requirements of this Chapter; and
- (3) they are supervised by a practitioner as defined in this section.

(d) **Related requirements.** Persons subject to this Subchapter are also subject to the general requirements of Subchapter 1, the permitting and registration requirements of Subchapters 3 and 7, the radiation protection standards in Subchapter 20, and all requirements of Subchapter 23.

(e) **Definitions.** As used in this Subchapter:

- (1) "**<1 MeV system**" means a therapeutic system with energies of less than 1 MeV.
- (2) "**Pre-1989 system**" means a therapeutic system manufactured prior to March 1, 1989.
- (3) "**Post-1989 system**" means a therapeutic system manufactured on or after March 1, 1989.
- (4) "**Medical event**" means any event, except for events resulting from a direct intervention by a patient or human research subject that could not have been reasonably prevented by the permittee, in which the administration of radiation therefrom results in either:
 - (A) a dose that differs from the prescribed dose by more than 0.05 Sv (5 rem) to an organ or tissue, or 0.5 Sv (50 rem) shallow dose equivalent to the skin; and
 - (i) the total dose or dosage delivered differs from the prescribed dosage by 20 percent or more or falls outside the prescribed dosage range; or
 - (ii) the fractionated dose delivered differs from the prescribed dose, for a single fraction, by 50 percent or more;
 - (B) a dose that exceeds 0.05 Sv (5 rem) effective dose equivalent, 0.5 Sv (50 rem) to an organ or tissue, or 0.5 Sv (50 rem) shallow dose equivalent to the skin from an administration of a dose or dosage to the wrong individual or human research subject; or
 - (C) a dose to the skin or an organ or tissue other than the treatment site that exceeds by 0.5 Sv (50 rem) to an organ or tissue and 20 percent the dose expected from the administration defined in the prescribed dose.
- (5) "**Practitioner**" means an individual who is licensed by either the State Board of Medical Licensure and Supervision or the State Board of Osteopathic Examiners to practice medicine and surgery or by the State Board of Veterinary Medicine Examiners to practice veterinary medicine. This licensed individual may delegate the task of applying radiation for purposes of therapy to others who are not so licensed but shall maintain control over and retain full responsibility for all radiation applications.
- (6) "**Prescribed dose**" means the localized therapeutic dose to be delivered as described in the treatment plan.
- (7) "**System of 1 MeV or more**" means a therapeutic system with energies of one MeV or more.
- (8) "**Therapeutic system**" means an x-ray system or particle accelerator that produces x-rays and/or particles used for therapeutic purposes in the healing arts and in the practice of veterinary medicine.

(9) "**Treatment Plan**" means an authorized practitioner's order for the administration of therapeutic radiation as specified in OAC 252:410-11-2(b).

252:410-11-2. Accountability for therapeutic systems used to treat humans

(a) **Designation of authorized practitioners.** Permit applicants, whose therapeutic systems will be used to treat humans, must designate in their application the practitioners who will supervise treatments and certify that those designees have had substantial training and experience in the therapy techniques for which they will be authorized.

(b) **Treatment plan.** A treatment plan in written or electronic form must be approved by an authorized practitioner before the initial administration of therapeutic radiation.

(1) The treatment plan must contain the patient's name, dose per fraction, number of doses, total dose, and sufficient information to accurately describe proper localization of the therapeutic dose.

(2) If, because of the emergent nature of the patient's condition, a delay in order to provide a treatment plan or revision to a treatment plan would jeopardize the patient's health, an oral directive is acceptable. The information in the oral directive must be documented in writing as soon as possible. A treatment plan must be prepared within 48 hours of the oral directive.

(3) Permittees shall retain records of each treatment plan for 3 years.

(c) **Procedures for treatment planning and administration of therapeutic radiation.**

Permittees shall develop, implement and maintain written procedures to provide high confidence that:

(1) The patient's identity is verified before each administration; and

(2) Each administration of therapeutic radiation is in accordance with the treatment plan.

252:410-11-3. Prohibitions

(a) **Machines.** DEQ may prohibit use of machines which pose significant threat or endanger health and safety.

(b) **Exposure.** Individuals shall not be exposed to the useful beam except for healing arts purposes and unless such exposure has been authorized by a practitioner. This provision specifically prohibits deliberate exposure of an individual for training, demonstration, or other non-healing arts purposes.

(c) **Security.** A therapeutic system shall not be left unattended unless the system is secured against unauthorized use.

252:410-11-4. Operational requirements for practitioners; Medical event

Therapeutic system permittees shall notify DEQ by telephone of any treatment of a human which results in a medical event. Notice must be given no later than the next business day after the event and followed up with a written report within 15 days after discovery of the medical event. The written report shall include the names of the permittee, the prescribing practitioner, the radiological physicist and the radiological technician, a brief description of the event, why the event occurred, the effect on the individual who received the treatment, what improvements are needed to prevent recurrence, actions taken to prevent recurrence, whether the permittee notified the individual or individual's responsible relative or guardian and if not, why, and if there was notification, what information was provided. Neither the notice or report shall identify the individual receiving the treatment by name.

252:410-11-5. Veterinary x-ray systems used for therapeutic purposes

Veterinary permittees are responsible for providing adequate measures to assure that the dose of any human individual who is, or who may be, exposed to radiation used for the irradiation of animals for therapeutic purposes meets the requirements of Subchapter 20.

252:410-11-6. Therapeutic x-ray systems of less than 1 MeV

Therapeutic x-ray systems of less than 1 MeV must be in compliance with Part 3 of this Subchapter.

252:410-11-7. X-ray and particle therapy systems with energies of 1 MeV and above

X-ray and particle therapy systems with energies of 1 MeV and above must be in compliance with Part 5 of this Subchapter.

PART 3. THERAPEUTIC SYSTEMS OF LESS THAN 1 MeV

252:410-11-31. Leakage radiation

When the tube of a <1 MeV system is operated at its leakage technique factors, the leakage radiation shall not exceed the values shown in Appendix C for the system's classification and specified measurement location.

252:410-11-32. Beam-limiting devices

(a) **Removable beam-limiting devices.** Removable beam-limiting devices shall, for the portion of the useful beam to be blocked by these devices, transmit not more than 1 percent of the useful beam at the maximum kV and maximum treatment filter. This requirement does not apply to auxiliary blocks or materials placed in the useful beam to shape the useful beam to the individual patient.

(b) **Adjustable beam-limiting devices.**

(1) Pre-1989 adjustable beam-limiting devices shall, for the portion of the x-ray beam to be blocked by these devices, transmit not more than 5 percent of the useful beam at the maximum kV and maximum treatment filter.

(2) Post-1989 adjustable beam-limiting devices shall meet the requirements of Subsection (a) of this Section.

(c) **Permanent beam-limiting devices.** Permanent fixed diaphragms or cones used for limiting the size of the useful beam shall provide the same or a higher degree of protection as required for the tube housing assembly.

252:410-11-33. Filters

The filter system of a <1 MeV system must be designed so that:

(1) the filters cannot be accidentally displaced at any possible tube orientation;

(2) for post-1989 generation equipment, an interlock system prevents irradiation if the proper filter is not in place;

(3) the radiation at 5 centimeters from the filter insertion slot opening does not exceed 30 Roentgens per hour under any operating condition; and

(4) each filter is marked as to its material of construction and its thickness. For wedge filters, the wedge angle shall appear on the wedge or wedge tray.

252:410-11-34. Tube housing assemblies

The tube housing assemblies of a <1 MeV system must:

- (1) be capable of being immobilized for stationary treatments;
- (2) be marked so the location of the focal spot can be determined to within 5 millimeters. This marking must be readily accessible for use during calibration procedures; and
- (3) for contact therapy tube housing assemblies, have a removable shield of at least 0.5 millimeter lead equivalency at 100 kVp that can be positioned over the entire useful beam exit port during periods when the beam is not in use.

252:410-11-35. Timers

Each <1 MeV system must be equipped with a timer having a display at the treatment control panel and a pre-set time selector. The timer must:

- (1) activate with the production of radiation and retain its reading after irradiation is interrupted. After irradiation is terminated and before irradiation can be reinitiated, it shall be necessary to reset the elapsed time indicator to zero;
- (2) terminate irradiation when a pre-selected time has elapsed if any dose monitoring system present has not previously terminated irradiation;
- (3) permit accurate presetting and determination of exposure times as short as 1 second;
- (4) not permit an exposure if set at zero;
- (5) not activate until the shutter is opened when irradiation is controlled by a shutter mechanism unless calibration includes a timer factor to compensate for mechanical lag; and
- (6) be accurate to within 1 percent of the selected value or 1 second, whichever is greater.

252:410-11-36. Control panel functions

The control panel of a <1 MeV system must have:

- (1) an indication of whether electrical power is available at the control panel and if activation of the x-ray tube is possible;
- (2) an indication of whether x-rays are being produced;
- (3) means for indicating x-ray tube potential and current;
- (4) means for terminating an exposure at any time;
- (5) a locking device which prevents unauthorized use of the x-ray system; and
- (6) for post-1989 systems, a positive display of specific filters in the beam.

252:410-11-37. Multiple tubes

When a control panel of a <1 MeV system can be used to energize multiple tubes, the operator must be able to activate only one x-ray tube at a time and confirm which x-ray tube is activated by viewing a control panel display. The machine must also have a display on each tube housing assembly which confirms that a specific tube is energized.

252:410-11-38. Source-to-skin distance measurement

In a <1 MeV system, a means must be present to initially determine the source to skin distance, which is the distance between the focal point of the tube and the skin of the patient, to within 1 centimeter and to reproduce this measurement to within 2 millimeters thereafter.

252:410-11-39. Shutters

Unless an x-ray output of a <1 MeV system can be brought to the prescribed exposure parameters within 5 seconds, a shutter with a lead equivalency not less than that of the tube housing assembly must attenuate the beam. After the unit is at operating parameters, the

operator must be able to control the shutter electrically from the control panel. A indication of shutter position must appear at the control panel.

252:410-11-40. Low-filtration x-ray tubes

When a <1 MeV system has a beryllium or other low-filtration window, that fact must be clearly labeled on the machine's tube housing assembly and control panel.

252:410-11-41. Additional design requirements for <1 MeV systems capable of operating above 50 kVp

(a) **Communication and viewing requirements.** Therapeutic systems with energies of less than 1 MeV that are capable of operating above 50 kVp must provide the operator at the control panel:

- (1) a means of two-way communication with the patient at all times. This communication must be aural unless excessive noise levels or treatment requirements make an alternate method of communication necessary; and
- (2) a means to be able to continuously observe the patient from the treatment control panel during irradiation via a primary viewing system such as a window, mirror, closed-circuit television or the equivalent. When the primary system is electronic, an alternate viewing system, which may also be electronic, must be available in case the primary system fails. Should both viewing systems fail or become inoperative, treatment must be stopped until at least one of the systems is restored.

(b) **Additional requirements for <1 MeV systems capable of operating above 150 kVp.** In addition to subsection (a) of this Section, <1 MeV systems capable of operating above 150 kVp must have the following features:

- (1) all protective barriers must be fixed except for entrance doors or beam interceptors;
- (2) the control panel must be located outside the treatment room; and
- (3) the system must have interlocks which require all entrance doors to be closed, including doors to any interior booths, before treatment can be begin or continue. If the radiation beam is interrupted by any door opening, the system must be designed to:
 - (A) reduce the exposure at a distance of 1 meter from the focal spot to less than 100 milliRoentgens per hour; and
 - (B) prevent operation from being resumed until the door is closed and the operator reinitiates irradiation by manual action at the control panel.

PART 5. THERAPEUTIC SYSTEMS OF 1 MeV AND ABOVE

252:410-11-51. Leakage radiation

(a) **Leakage radiation measurements.** For operating conditions producing maximum leakage radiation in systems of 1 MeV or more, the absorbed dose in rads due to leakage radiation, including x-rays, electrons and neutrons, shall not exceed 0.1 percent of the maximum absorbed dose in rads of the unattenuated useful beam. For purposes of this subsection, the leakage absorbed dose is to be measured at any point in a circular plane of 2 meters radius centered on and perpendicular to the central axis of the beam at the isocenter or normal treatment distance and outside the maximum useful beam size; and the maximum absorbed dose shall be measured at the point of intersection of the central axis of the beam and the plane surface.

- (1) Measurements excluding those for neutrons shall be averaged over an area up to but not exceeding 100 square centimeters at the positions specified.

(2) Measurements of the portion of the leakage radiation dose contributed by neutrons shall be averaged over an area up to but not exceeding 200 square centimeters.

(b) **Specifications.** Permittees must determine or obtain from the manufacturer the leakage radiation existing at the positions specified in subsection (a) of this section for specified operating conditions.

252:410-11-52. Beam-limiting devices

Systems of 1 MeV or more must have adjustable or interchangeable beam-limiting devices. The devices must transmit no more than 2 percent of the useful beam at the normal treatment distance for the portion of the useful beam which is to be attenuated by the beam-limiting device. The neutron component of the useful beam is not to be included in this requirement.

252:410-11-53. Filters

(a) **Markings.** Each filter which is removable from a system of 1 MeV or more shall be clearly marked with an identification number. A description of the filter must be kept at the control panel. For wedge filters, the wedge angle shall appear on the wedge or wedge tray.

(b) **Design criteria.**

(1) If the absorbed dose rate data required by 252:410-11-64 relates exclusively to operation with a field flattening filter in place that is used to provide dose uniformity over the area of the useful beam of x-rays at a specified depth or a beam scattering filter in place, such filter shall be removable only by the use of tools.

(2) For post-1989 systems which utilize wedge filters, interchangeable field flattening filters, or interchangeable beam scattering foils:

(A) irradiation shall not be possible until a selection of a filter has been made at the treatment control panel or a positive selection to use "no filter";

(B) an interlock system shall prevent irradiation if the filter selected is not in the correct position;

(C) a display shall be provided at the treatment control panel identifying the filter(s) in use; and

(D) an interlock shall prevent irradiation if any filter selection operation carried out in the treatment room does not agree with the filter selection operation carried out at the treatment control panel.

272:410-11-54. Beam quality

For systems of 1 MeV or more, the permittee must determine, or obtain from the manufacturer, data sufficient to assure that the following beam energy requirements are met.

(1) The absorbed dose resulting from x-rays in a useful electron beam at a point on the central axis of the beam 10 centimeters greater than the practical range of the electrons shall not exceed the values stated in Appendix D. Linear interpolation shall be used for values not stated. Compliance with this subsection shall be determined using:

(A) a measurement within a phantom with the incident surface of the phantom at the normal treatment distance and normal to the central axis of the beam;

(B) the largest field size available which does not exceed 15 by 15 centimeters; and

(C) a phantom whose cross-sectional dimensions exceed the measurement radiation field by at least 5 centimeters and whose depth is sufficient to perform the required measurement.

(2) The absorbed dose at a surface located at the normal treatment distance, at the point of

intersection of that surface with the central axis of the useful beam during x-ray irradiation, shall not exceed the limits stated in the Appendix E. Linear interpolation shall be used for values not stated. Compliance with this subsection shall be determined by measurements made:

- (A) within a phantom using an instrument which will allow extrapolation to the surface absorbed dose;
 - (B) using a phantom whose size and placement meet the requirements of paragraphs (1)(A) and (C) of this section;
 - (C) after removal of all beam modifying devices which can be removed without the use of tools, except for beam scattering or beam flattening filters; and
 - (D) using the largest field size available which does not exceed 15 by 15 centimeters.
- (3) The permittee shall determine, or obtain from the manufacturer, the maximum percentage absorbed dose in the useful beam due to neutrons, excluding stray neutron radiation, for specified operating conditions.

252:410-11-55. Beam monitors

(a) **Radiation detectors and dose monitors.** All systems of 1 MeV or more must have radiation detectors in the radiation head. Post-1989 systems must have at least two radiation detectors which are incorporated into two separate dose monitoring systems. Pre-1989 systems must have at least one radiation detector which is incorporated into the primary dose monitoring system. The detector and the dose monitor system into which that detector is incorporated must meet the following requirements:

- (1) The detector must be removable only with tools and be interlocked to prevent incorrect positioning;
- (2) Each detector must form part of a dose monitoring system. The detector must show dose monitor units which can be used to calculate the absorbed dose at a reference point in the treatment volume; and
- (3) Each dose monitoring system must be capable of independently monitoring, interrupting and terminating irradiation. For post-1989 systems with two or more dose monitoring systems, the malfunctioning of one system must not affect the correct functioning of the second system. If any element common to both systems that could affect the correct function of both systems fails, the dose monitoring system must terminate irradiation.

(b) **Display.** Each dose monitoring system shall have a legible display at the control panel. Post-1989 systems displays shall:

- (1) maintain a reading until intentionally reset to zero;
- (2) have only one scale and no scale multiplying factors;
- (3) show increasing dosage as increasing numbers; and
- (4) in the event of an overdosage of radiation, ensure the absorbed dose may be accurately determined.

(c) **Dose monitor data retrieval.** In the event of power failure, the dose monitor information displayed at the control panel at the time of failure shall be retrievable in at least one system for at least 20 minutes.

252:410-11-56. Beam symmetry

When a post-1989 system of 1 MeV or more is inherently capable of producing useful beams with unintentional asymmetry exceeding 5 percent, the asymmetry of the radiation beam in two orthogonal directions shall be monitored before the beam passes through the beam-limiting

device. If the difference in dose rate between one region and another region symmetrically displaced from the central axis of the beam exceeds 5 percent of the central axis dose rate, devices shall be provided which will indicate this condition on the control panel. If the difference exceeds 10 percent, the system must terminate irradiation.

252:410-11-57. Selection and display of dose monitor units

Therapeutic systems of 1 MeV or more shall be designed so that:

- (1) irradiation cannot be possible until a selection of a number of dose monitor units has been made at the control panel;
- (2) the pre-selected number of dose monitor units are displayed on the treatment control panel until reset manually for the next irradiation;
- (3) after irradiation is terminated, the dosimeter display must be reset to zero before subsequent treatment can be initiated; and
- (4) for post-1989 systems, after termination of irradiation, the preselected dose monitor units must be manually reset before irradiation can be initiated.

252:410-11-58. Termination of irradiation by dose monitoring systems during stationary beam therapy

Dose monitoring systems in systems of 1 MeV or more must be able to terminate irradiation in the following ways:

- (1) Each primary dose monitoring system must terminate irradiation when the pre-selected number of dose monitor units has been detected by the system;
- (2) For pre-1989 systems in which the original design included a secondary dose monitoring system, the system must be capable of terminating irradiation when not more than 15 percent or 40 dose monitor units above the pre-selected number of dose monitor units set at the control panel have been detected by the secondary system; and
- (3) For post-1989 systems, the secondary dose monitoring system must be capable of terminating irradiation when not more than 10 percent or 25 dose monitor units set at the control panel have been detected by the secondary system. Post-1989 systems must have also have an indicator on the treatment control panel that shows which dose monitoring system has terminated irradiation.

252:410-11-59. Interruption and termination switches

(a) **Interruption.** The control panel of a system of 1 MeV or more must have a switch available to the operator during irradiation which allows the operator to interrupt irradiation and equipment movements at any time. Following an interruption, the operator must be able to restart irradiation by using a control panel switch without reselecting any operating conditions. However, if any pre-selected value is changed during an interruption, the system must prohibit further irradiation and equipment movements.

(b) **Termination.** Through switches at the control panel, an operator, at any time during irradiation, must be able to terminate irradiation and equipment movements or go from interruption status to complete termination.

252:410-11-60. Timer

(a) Systems of 1 MeV or more must have a timer which has a display at the control panel. The timer must have a pre-set time selector and an elapsed time indicator.

(b) The timer must terminate irradiation when a pre-selected time has elapsed if a dose

monitoring system has not previously terminated irradiation.

(c) The timer must be cumulative and activate with the production of radiation. It must retain its reading after irradiation is interrupted or terminated. After irradiation is terminated and before irradiation can be reinitiated, it shall be necessary to reset the elapsed time indicator to zero.

(d) When irradiation is terminated, post-1989 systems must require an operator to manually reset the preset time selector before irradiation can be initiated again.

252:410-11-61. Selection of radiation type

Systems of 1 MeV or more that are capable of both x-ray therapy and electron therapy must meet the following additional requirements:

(1) Irradiation must not be possible until a selection of radiation type has been made at the control panel. The radiation type must be displayed at the control panel before and during irradiation.

(2) The system must have an interlock system which:

(A) ensures that the therapeutic system can emit only the radiation type which has been selected;

(B) prevents irradiation if any selected operations carried out in the treatment room do not agree with the operations selected at the control panel;

(C) prevents irradiation with x-rays, except to obtain a port film, when electron applicators are fitted; and

(D) prevents irradiation with electrons when accessories specific for x-ray therapy are fitted.

252:410-11-62. Selection of energy

Systems of 1 MeV or more which are capable of generating radiation beams of different energies must meet the following requirements:

(1) Irradiation shall not be possible until a selection of energy has been made at the control panel;

(2) An interlock system must prevent irradiation if any selected operations carried out in the treatment room do not agree with the selected operations carried out at the control panel;

(3) The nominal energy value selected is displayed at the control panel before and during irradiation; and

(4) For post-1989 systems, the interlock system will terminate irradiation if the energy of the electrons striking the x-ray target or electron window deviates by more than 20 percent from the selected nominal energy.

252:410-11-63. Selection of stationary beam therapy or moving beam therapy

Systems of 1 MeV or more that are capable of both stationary beam therapy and moving beam therapy must:

(1) prevent the initiation of irradiation until the operator selects either stationary beam therapy or moving beam therapy at the control panel. The mode of operation must be displayed at the control panel;

(2) have an interlock system which:

(A) ensures that the therapeutic systems can operate only in the mode which has been selected;

(B) prevents irradiation if any selected operations carried out in the treatment room do

not agree with the operations selected at the control panel; and

(C) for post-1989 systems, terminates irradiation if movement of the gantry occurs during stationary beam therapy or stops during moving beam therapy unless the stoppage is a preplanned function;

(3) be able to control moving beam therapy to obtain the selected relationships between incremental dose monitor units and incremental angle of movement. Post-1989 systems must have an interlock system that:

(A) terminates irradiation if the number of dose monitor units delivered in any 10 degrees of arc differs by more than 20 percent from the selected value;

(B) when gantry angle terminates the irradiation in arc therapy, the dose monitor units must differ by less than 5 percent from the value calculated from the absorbed dose per unit angle relationship; and

(C) when the dose monitor system is capable of terminating irradiation in arc therapy, the requirements of 252:410-11-58 shall also apply.

252:410-11-64. Absorbed dose rate; post-1989 systems

Post-1989 systems of 1 MeV or more must have a system that produces readings from which the absorbed dose rate at a reference point in the treatment volume can be calculated. Radiation detectors may form part of this system. In addition:

(1) **Rate displays.** The dose monitor unit rate must be displayed at the control panel; and

(2) **Termination devices.** If under any conditions, a post-1989 system can, at the normal treatment distance, deliver an absorbed dose rate of more than twice the maximum value specified by the manufacturer for any machine parameters utilized, the permittee must:

(A) ensure the system has an operable device which terminates irradiation when the absorbed dose rate exceeds twice the specified maximum value; and

(B) maintain a record of the manufacturer's specified maximum value.

252:410-11-65. Location of virtual source and beam orientation

For systems having energies of 1 MeV or more, the permittee shall obtain from the manufacturer or determine, with reference to an accessible point on the radiation head, the location of:

(1) the x-ray target or the virtual source of x-rays; and

(2) the electron window or the virtual source of electrons if the system has electron beam capabilities.

252:410-11-66. System checking facilities

All systems of 1 MeV or more must have the capability of being checked for the correct operation of all radiation safety interlocks.

252:410-11-67. Facility and shielding requirements

(a) **Design.** Permittees with systems of 1 MeV or more must ensure that the systems are designed to comply with 252:410-11-41 and Subchapter 20.

(b) **Warning lights.** Permittees must also ensure that all treatment room entrances are equipped with easily seen warning lights that indicate when the useful beam is "on" and "off". A light must be located on the outside of the room near each access door.

(c) **Entrance interlocks.** Interlocks shall be provided such that all entrance doors must be closed before treatment can be initiated or continued. If the radiation beam is interrupted by any door opening, it shall not be possible to restore the machine to operation without closing the door

and reinitiating irradiation by manual action at the control panel.

PART 7. RADIATION SAFETY MANAGEMENT

252:410-11-71. Radiation protection plan

All therapeutic system permittees and applicants shall comply with applicable requirements in Subchapter 3.

252:410-11-72. Area surveys

(a) **Surveys required.** All persons subject to Subchapters 11 and 17 must perform surveys according to the requirements of 252:410-20-2 and this Section.

(1) **Initial survey and audit.** Applicants for new operating permits or permittees adding a new therapeutic system must have an initial audit. The audit must include a physical radiation survey and determine whether the therapy system meets the design requirements of this Subchapter and operates within the manufacturer's specifications.

(2) **Subsequent surveys.** Permittees must also conduct subsequent surveys:

(A) whenever any change occurs in a facility which might cause a significant increase in radiation hazard; and

(B) to confirm the results of corrective actions.

(b) **Survey performance and report.** A qualified expert must perform each audit and survey. The applicant or permittee must receive a report from the expert which summarizes survey results, and identifies all instances where the installation, in the opinion of the qualified expert, is in violation of this Chapter and/or does not meet manufacturer specifications.

(c) **Report submittal.** The applicant or permittee shall transmit a copy of the report to the DEQ within 30 days of receipt of the report from the qualified expert.

(d) **Corrective action.** When the report shows deficiencies, the applicant or permittee must describe corrective actions taken or proposed. No radiation machine operation shall be performed until a subsequent audit confirms and DEQ is notified in writing that all deficiencies have been corrected.

252:410-11-73. Calibrations of <1 MeV systems

(a) **Frequency.** The calibration of a <1 MeV system shall be performed at intervals not to exceed one (1) year and after any change or replacement of components which could cause a change in the radiation output.

(b) **Dosimetry system.** The calibration of the radiation output of <1 MeV systems shall be performed with a dosimetry system that has been calibrated within the preceding two (2) years with calibration that is traceable to a national standard.

(c) **Performance.** The therapy system calibration shall be performed by or under the direction of a qualified expert.

(d) **Precision.** Calibrations must be in sufficient detail so that the dose at a reference point in water or plastic phantom can be calculated to within an uncertainty of 5 percent.

(e) **Outcome.** Calibrations must include, but are not be limited to, the following determinations:

(1) verification that the system is operating in compliance with the design specifications;

(2) half-value layer for each kV setting and filter combination used;

(3) exposure rates as a function of field size, technique factors, filter, and treatment distance used; and

(4) the degree of congruence between the radiation field and the field indicated by the localizing device if such device is present which shall be within 5 millimeters for any field edge.

252:410-11-74. Calibrations of systems of 1 MeV or more

(a) **Frequency.** A system of 1 MeV or more must be calibrated before it is first used for irradiation of a patient and thereafter at least every 12 months and when any change occurs in the system which might significantly alter the calibration, spatial distribution, or other characteristics of the therapy beam.

(b) **Protocol and procedures.** The calibration of systems of 1 MeV or more shall be performed using an established calibration protocol acceptable to DEQ. One acceptable calibration protocol is entitled "AAPM's TG-51 Protocol for Clinical Reference Dosimetry of high-energy photon and electron beams.", Medical Physics 26 (9): 1847-1890, Sept. 1999. If another protocol is used, the person performing the calibration needs to record the name and methods used in the calibration report. Upon review of the report, DEQ may require a copy of the protocol for review and/or may require that calibration be performed under another protocol.

(c) **Performance.** The calibration shall be performed under the direct supervision of a radiological physicist.

(d) **Dosimetry system.** Full calibration radiation measurements of systems of 1 MeV or more shall be performed with a dosimetry system that has:

- (1) a calibration factor for cobalt-60 gamma rays traceable to a national standard;
- (2) been calibrated within the previous two years and after any servicing that may have affected its calibration;
- (3) been calibrated in such a fashion that an uncertainty can be stated for the radiation quantities monitored by the system; and
- (4) had constancy checks performed on the system as specified by a radiological physicist.

(e) **Precision.** Calibrations shall be in sufficient detail that the dose at a reference point in soft tissue may be calculated to within an uncertainty of 5 percent.

(f) **Outcome.** The calibration of the therapy beam shall include but not be limited to:

- (1) verification that the therapeutic system is operating in compliance with the design specifications concerning the:
 - (A) light localizer and back-pointer alignment with the isocenter when applicable,
 - (B) variation in the axis of rotation for the table, gantry and jaw system, and
 - (C) beam flatness and symmetry at the specified depth;
- (2) the absorbed dose rate at various depths of water for the range of field sizes used, for each effective energy, that will verify the accuracy of the dosimetry of all therapy procedures utilized with that therapy beam;
- (3) the uniformity of the radiation field to include symmetry and flatness;
- (4) dependency of beam output on gantry angle;
- (5) verification that existing isodose charts applying to the machine continue to be valid or are updated to existing machine conditions; and
- (6) verification of transmission and electron buildup factors for all accessories such as wedges, shadow trays attached to the radiation head to support auxiliary beam blocking material, and compensators.

252:410-11-75. Treatment planning simulators and other imaging equipment used in the therapeutic process.

(a) **Policies and procedures for imaging equipment.** Therapeutic system permittees shall develop policies and procedures to ensure the proper operation of all imaging equipment used in the treatment planning or treatment process.

(b) **Calibration of imaging equipment.** Imaging equipment used for treatment planning and delivery must be calibrated annually by a qualified expert. This calibration must include:

(1) For conventional simulators:

- (A) Collimator, gantry, and couch isocenter determination, and coincidence;
- (B) verification of table positioning under typical patient load;
- (C) high and low contrast resolution;
- (D) imaging dose and
- (E) all monthly and daily spot checks required by OAC 252:410-11-75(c).

(2) For CT simulators:

- (A) Indexing and positioning accuracy under scanner control;
- (B) gantry tilt indication accuracy and reproducibility;
- (C) spatial and contrast resolution;
- (D) imaging dose and
- (E) all monthly and daily spot checks required by OAC 252:410-11-75(c).

(3) For other x-ray imaging equipment used in treatment planning or delivery:

- (A) Beam quality and energy if applicable;
- (B) imaging dose and
- (C) all monthly and daily spot checks required by OAC 252:410-11-75(c).

(c) **Periodic Spot Checks.** Periodic spot checks are required to ensure that the previous calibration is still valid. Daily and Monthly Spot checks of imaging equipment may be performed by radiation therapy technologists, x-ray technologist or other similarly qualified personnel. Spot checks shall be reviewed by a qualified expert at least annually. These spot checks must include:

(1) Monthly checks for conventional simulators:

- (A) Accuracy verification for field size, gantry and collimator angle, cross hair centering, and focal spot indicator;
- (B) light field, radiation field coincidence and
- (C) image quality.

(2) Daily checks for conventional simulators:

- (A) Localizing laser alignment and
- (B) distance indicator.

(3) Monthly checks for CT simulators:

- (A) Orientation of gantry, wall and ceiling lasers with respect to imaging plane;
- (B) orientation of CT table top with respect to imaging plane;
- (C) table position indicator accuracy, reproducibility;
- (D) x-ray field uniformity and
- (E) CT number verification for 4 or more materials.

(4) Daily checks for CT simulators:

- (A) Alignment of gantry lasers with imaging plane;
- (B) CT number verification for water;
- (C) image noise and
- (D) in plane spatial integrity.

(5) Monthly checks for other x-ray imaging equipment used in treatment planning or delivery:

- (A) Imaging and treatment coordinate system coincidence (four cardinal angles for planar imaging);
 - (B) scaling or geometric distortion and
 - (C) image quality.
- (6) Daily checks for other x-ray imaging equipment used in treatment planning or delivery: Imaging and treatment coordinate system coincidence.

252:410-11-76. Spot-checks

- (a) **Required.** Spot-checks must be performed on therapeutic systems which are capable of operation at greater than 150 kVp.
- (b) **Procedure.** Written spot-check procedures must be developed by a radiological physicist which:
- (1) state the frequency at which tests or measurements are to be performed;
 - (2) set the acceptable tolerance for each parameter measured in the spot-check when compared to the value for that parameter determined in the calibration;
 - (3) include special operating instructions to be used when a parameter measured in the spot-check exceeds an acceptable tolerance level of the value for that parameter which was determined in the calibration.
 - (4) require that spot-checks be performed during calibration.
- (c) **Performance and review.** Each spot-check must be performed by or under the direction of a radiological physicist according to the written spot-check procedures. When a spot-check is performed by someone other than a radiological physicist, the physicist must review the resulting measurements and record his review. The review must occur within ten (10) treatment days.
- (d) **Additional frequency requirements.** Systems of 1 MeV or more must have:
- (1) spot-checks performed during calibrations and thereafter at intervals not to exceed one month;
 - (2) a spot-check of system output performed each day before any patient is treated; and
 - (3) a spot-check of absorbed dose measurements taken at a minimum of two (2) depths in a phantom at intervals not to exceed one (1) month.
- (e) **Measurements.** A spot-check record must state the acceptable tolerance for each parameter measured in the spot-check when compared to the value for that parameter determined in the calibration.
- (1) Whenever a spot-check indicates a significant change in the operating characteristics of a system, as specified in the spot-check procedures, the system must be recalibrated.
 - (2) When a spot-check involves a radiation measurement, such measurement shall be obtained using a system satisfying the requirements of 252:410-11-73(b) or which has been intercompared with a system meeting those requirements within the previous year.
- (f) **Measurement restriction.** For systems of 1 MeV or more, any built-in devices which provide a measurement of any parameter during irradiation cannot be utilized for spot-check measurements.

252:410-11-77. Safety checks for particle accelerators

All safety and warning devices, including interlocks, shall be checked for proper operation at intervals not to exceed three months. Results of such tests shall be maintained at the accelerator facility in accordance with 252:410-1-4(b).

252:410-11-78. Added requirements for particle accelerators

The following requirements apply to all particle accelerators:

(1) **Circuit diagrams.** When the accelerator has not been commercially manufactured, electrical circuit diagrams of the particle accelerator and the associated safety interlock systems shall be kept current and maintained for inspection by DEQ and shall be available to the operator at each accelerator facility.

(2) **Bypassing safety interlock.** If, for any reason, it is necessary to intentionally bypass a safety interlock or interlocks, such action shall be:

- (A) authorized by the radiation safety committee and/or radiation safety officer;
- (B) recorded in a permanent log and a notice posted at the accelerator control console; and
- (C) terminated as soon as possible.

252:410-11-79. Computer quality control

To ensure that software and hardware associated with the operation of therapeutic systems work properly, the computer systems must be checked when installed, and when modified if the changes could affect critical therapeutic system functions.

252:410-11-80. Operating restrictions

(a) For <1 MeV systems, radiation therapy shall not be administered unless the therapeutic system to be used has met the requirements of 252:410-11-73 and 76.

(b) For <1 MeV systems operating at or below 150 kVp, an individual other than the patient may be in the room during radiation exposures if protected by a barrier sufficient to meet the requirements in Subchapter 20.

(c) The tube housing assembly of any system shall not be held by hand during operation unless the system is designed to require such holding and the peak tube potential of the system does not exceed 50 kVp. In such cases, the holder shall wear protective gloves and apron of not less than 0.5 millimeter lead equivalency.

(d) For therapeutic systems operating above 150 kVp, no individual other than the patient shall be in the treatment room during exposures to x-ray.

(e) If a patient must be held in position during treatment, mechanical supporting or restraining devices shall be used.

(f) Systems of 1 MeV or more can not be used in the administration of radiation therapy until the requirements of 252:410-11-72, 74 and 76 have been met.

252:410-11-81. Records

Records required by this Subchapter shall be maintained as required by 252:410-1-4(b) and 252:410-3-33, except that records of calibration determinations required by 252:410-11-73 and 252:410-11-74 shall be maintained for five (5) years after completion of the full calibration. Records of manufacturer specified maximum dose rate, acceptance testing and initial surveys required in 252:410-11-64 and 252:410-11-72 must be maintained until the permit holder is no longer subject to radiation management requirements.

SUBCHAPTER 13. ANALYTICAL AND INDUSTRIAL X-RAY SYSTEMS

PART 1. GENERAL REQUIREMENTS

Section

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- 252:410-13-2. Equipment requirements
- 252:410-13-3. Area requirements
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PART 3. RADIATION SAFETY MANAGEMENT

- 252:410-13-31. Radiation safety requirements
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PART 5. OPEN-BEAM X-RAY SYSTEMS

- 252:410-13-51. Open-beam safety devices
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PART 7. CERTIFIED CABINET X-RAY SYSTEMS

- 252:410-13-71. Incorporation by reference
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PART 1. GENERAL REQUIREMENTS

252:410-13-1. General provisions and requirements

- (a) **Scope.** This Subchapter pertains to analytical and industrial x-ray systems including open-beam and certified cabinet x-ray systems.
- (b) **Exception.** Industrial radiography x-ray systems are only subject to the requirements in Parts 1 and 7 of this Subchapter.
- (c) **Applicability.** The requirements of this Subchapter apply to any person who possesses an industrial or analytical x-ray system and causes radiation to be produced through the operation or testing of the machine in the State.
- (d) **Authorization required.** No persons subject to this Subchapter may perform any radiation management activity with an analytical or industrial x-ray system unless they:
 - (1) hold a DEQ-issued radiation machine operating permit and have registered their systems with DEQ; and
 - (2) their x-ray systems and management of radiation safety meet the applicable requirements of this Chapter.
- (e) **Related requirements.** Persons subject to this Subchapter are also subject to the general requirements of Subchapter 1, the permitting and registration requirements of Subchapters 3 and 7, and the standards in Subchapter 20.

252:410-13-2. Equipment requirements

- (a) **Warnings.** Each x-ray system must:
 - (1) have a warning light labeled "X-RAY ON", or words having similar intent, located near any switch that turns on an x-ray tube and which lights up only when the tube is energized; and

(2) be labeled with a sign or signs bearing the radiation symbol and the following words or words having similar intent:

(A) "CAUTION - HIGH INTENSITY X-RAY BEAM" on the x-ray source housing if the source housing is visible and accessible without the use of tools; and

(B) "CAUTION RADIATION - THIS EQUIPMENT PRODUCES RADIATION WHEN ENERGIZED" near any switch that energizes a x-ray tube.

(b) **X-ray tube housings.**

(1) Unused ports on x-ray tube housings must be secured in the closed position to prevent unintentional opening.

(2) Each x-ray tube housing must be constructed so that when all shutters are closed the leakage radiation measured at a distance of 5 centimeters from the housing's surface is not capable of producing a dose in excess of 2.5 millirems in one hour at any specified tube rating.

(c) **Caution signs, labels and signals; control device testing.** Caution signs, labels and signals and control device testing are subject to the requirements of Subchapter 20.3.

252:410-13-3. Area requirements

(a) **Radiation levels.** The local components of an analytical x-ray system shall be located and arranged and include sufficient shielding or access control so that no radiation levels exist in any area surrounding the local components which could result in a dose to an individual present there in excess of the dose limits in Subchapter 20. Dose limits shall be met at any specified tube rating.

(b) **Surveys.**

(1) **Frequency.** Unless exempted or alternative compliance measures are approved by DEQ, a permittee must demonstrate compliance with dose limits by conducting surveys of all x-ray systems according to Subchapter 20. Surveys must be conducted:

(A) when the x-ray system is installed;

(B) at least once every 12 months after installation;

(C) following any change in the initial arrangement, number or type of local components in the system;

(D) following any maintenance requiring the disassembly or removal of a local component in the system;

(E) during the performance of maintenance or alignment procedures if the procedures require the presence of a primary x-ray beam;

(F) any time observation of the local components in the system reveals an abnormal condition; and

(G) whenever personnel monitoring devices show a significant increase over the previous monitoring period.

(2) **Records.** In addition to the record requirements of 252:410-20-2, records of surveys of x-ray systems should include the manufacturer model and serial number of the radiation machine being surveyed and the kV and mA settings used during the survey.

(c) **Posting.** Each area or room containing an x-ray system shall be posted with a sign or signs bearing the radiation symbol and the words "CAUTION - X-RAY EQUIPMENT" or words having similar intent.

(d) **Calibration requirements.** Survey instruments shall be calibrated in accordance with 252:410-20-2(b).

252:410-13-4. Operating requirements

- (a) **Written procedures.** Procedures shall be written in accordance with 252:410-3-32(a).
- (b) **Bypassing.** No individual shall bypass a safety device or interlock unless such individual has obtained the approval of the radiation safety officer. Such approval shall be for a specified period of time. When a safety device or interlock has been bypassed, a readily discernible sign bearing the words "SAFETY DEVICE NOT WORKING" or words having similar intent shall be placed on the radiation source housing.
- (c) **Repair or modification of x-ray tube systems.** No operation involving removal of covers, shielding materials, or tube housings or modifications to shutters, collimators, or beam stops shall be performed without verifying the tube is off and will remain off until safe conditions have been restored. The main switch, rather than interlocks, shall be used for routine shutdown in preparation for repairs.

252:410-13-5. Personnel training

Each permittee shall provide system operators with the equipment manufacturers manuals if available, at least one hour of initial training that meets the requirements of 252:410-3-32(c) and annual refresher training in radiation safety.

PART 3. RADIATION SAFETY MANAGEMENT

252:410-13-31. Radiation safety requirements

The requirements of this Part apply to permittees and operators of open-beam and cabinet x-ray systems used for analytical or industrial purposes and of x-ray systems used for enclosed radiography.

252:410-13-32. Personnel monitoring

- (a) **Required devices.** Finger or wrist dosimetric monitoring devices are required for individuals working with any analytical or industrial x-ray system that:
 - (1) has open-beam equipment without safety devices; or
 - (2) requires the primary beam to be on during maintenance.
- (b) **Use.** Personnel monitoring devices required by 10 CFR 20.1502 must be assigned individually to each individual who operates or assists in operating x-ray systems. No individual may wear another's monitoring device. Assigned devices must be worn at all times during x-ray operations.

252:410-13-33. Recordkeeping

Records of surveys, survey instrument calibrations and repairs, personnel training, safety device or interlock bypass approvals, equipment repairs and modifications and personnel monitoring results must be maintained by the permittee according to 252:410-1-4 and Part 3 of Subchapter 3.

PART 5. OPEN-BEAM X-RAY SYSTEMS

252:410-13-51. Open-beam safety devices

- (a) **System safety device.** All open-beam x-ray systems must have a safety device which prevents the entry of any portion of an individual's body into the primary x-ray beam path or which causes the beam to shut off when

any part of an individual's body enters the primary beam path.

(b) **Alternate safety measures.** Any permittee seeking to use a safety measure other than the device described in subsection (a) of this section must submit a request to DEQ and document the reasons for the proposed alternative and the procedures of its use. DEQ may approve the alternative safety measure if it finds it will adequately protect all persons against accidental exposures.

252:410-13-52. Open-beam warning devices

All open-beam systems must have an indication that the:

- (1) x-ray tube is "ON" or "OFF" located near the radiation source housing if the primary beam is controlled in this manner; and/or
- (2) shutter is "OPEN" or "CLOSED" located near each port on the radiation source housing if the primary beam is controlled in this manner.

PART 7. CERTIFIED CABINET X-RAY SYSTEMS

252:410-13-71. Incorporation by reference

Title 21 CFR 1020.40 (a),(b) and (c)(1),(2) and (4) through (9) is hereby incorporated by reference.

252:410-13-72. Cabinet x-ray system requirements

(a) **Certification required.** An owner/operator of a cabinet x-ray system must document that the system is certified in accordance with 21 CFR 1010.2 as being manufactured and assembled pursuant to 21 CFR 1020.40 (a),(b) and (c)(1),(2) and (4) through (9).

(b) **Modified systems.** If a certified cabinet x-ray system is modified in any way, it shall be deemed to be an open-beam system and subject to the requirements of this Subchapter for open-beam systems unless it is recertified under 21 CFR 1010.2.

(c) **Exemptions for certain certified systems.** Owners/operators of certified cabinet x-ray systems that do not contain a port or aperture are exempt from the refresher training requirements of 252:410-3-32(c), the annual surveys required by 252:410-13-3(b)(1)(B) and the area posting required by 252:410-13-3(c). Owners/operators of cabinet systems with a maximum kVp of 10 or less and a maximum mA of 1 or less are exempt from 252:410-13-3(b).

SUBCHAPTER 15. INDUSTRIAL X-RAY RADIOGRAPHY

Section

- 252:410-15-1. Scope and applicability
- 252:410-15-2. Controls and security
- 252:410-15-3. Survey instruments
- 252:410-15-4. Surveys
- 252:410-15-5. System checks, inspection and maintenance
- 252:410-15-6. Personnel training
- 252:410-15-7. Recordkeeping
- 252:410-15-8. Utilization logs
- 252:410-15-9. Personnel monitoring
- 252:410-15-10. Notifications

252:410-15-1. Scope and applicability

- (a) **Scope.** This Subchapter pertains to x-ray systems used for industrial radiography.
- (b) **Applicability.** The requirements of this Subchapter apply to any person who possesses an industrial x-ray radiography system and causes radiation to be produced through the operation or testing of the machine in the state.
- (c) **Authorization required.** No persons subject to this Subchapter may perform any radiation management activity with an industrial radiography system unless:
 - (1) they hold a DEQ-issued radiation machine operating permit and have registered the system with DEQ in accordance with Subchapters 3 and 7; and
 - (2) the industrial radiography system and management of radiation safety meet the applicable requirements of this Chapter.
- (d) **Related requirements.** Persons subject to this Subchapter are also subject to the general requirements of Subchapter 1, the permitting and registration requirements of Subchapters 3 and 7, Part 1 of Subchapter 13 and the standards for protection against radiation in Subchapter 20.
- (e) **Industrial radiography operators.** DEQ certification in industrial x-ray radiography is available to individual industrial radiographers on a voluntary basis according to Subchapter 5.

252:410-15-2. Controls and security

- (a) **Area controls.** Permanent x-ray industrial radiographic installations shall have high radiation area entrance controls as described in 10 CFR 34.33.
- (b) **Temporary job sites.** At temporary job sites, a radiographer must maintain surveillance over the radiation area during each operation to ensure no one enters the area when radiation is being produced.
 - (1) **Barriers.** Ropes and/or barriers should be used when practical to help prevent entry. During pipeline industrial radiographic operations radiation signs and barriers must be positioned in a manner to prevent individuals from entering the area when radiation is being produced.
 - (2) **Posting of radiation areas.** Before beginning an industrial radiography operation at a temporary job site, a permittee must identify and post the radiation areas and high radiation areas, or designate a single restricted area based on the exposure limits established in 10 CFR 20.1301 for members of the public. If only a single area is designated, both signs must be posted at the area boundary.
- (c) **System security.** The control panel of each system shall be equipped with a locking device that prevents unauthorized use of the system or accidental production of radiation. This control panel must be kept locked and the key stored in a separate secure location except when a radiographer or assistant radiographer has the system under direct visual surveillance.
- (d) **Labeling.** X-ray tube housings and control boxes must be labeled according to 252:410-13-2(a).

252:410-15-3. Survey instruments

- Before any industrial radiography is conducted, at least one operable radiation survey instrument must be on hand for each radiation machine to be used. Each instrument must be:
- (1) appropriate for the types and energies of radiation used;
 - (2) able to measure from 2 to 1000 millirems or milliRoentgens per hour;
 - (3) calibrated at least semi-annually; and
 - (4) tested with a check source or other source of radiation at the beginning of each day of use and at the beginning of each work shift to verify it is operating properly.

252:410-15-4. Surveys

(a) **Verification survey.** After each industrial radiography exposure at either a temporary work site or a permanent x-ray radiographic installation, a physical radiation survey must be made to verify that each radiation machine has been turned off.

(b) **Temporary job sites.** In addition to verification survey, an area survey must also be made at each temporary job site, to ensure radiation areas have been accurately posted. The results must be recorded according to 252:410-20-2 and include the kV and mA settings used during the survey.

(c) **Permanent installations.** Surveys required for permanent installations are also subject to the requirements of 252:410-13-3(b).

252:410-15-5. System checks, inspection and maintenance

(a) All components of industrial x-ray radiography systems must be maintained according to manufacturers' specifications and repaired whenever defects are found. Checks for obvious defects in radiation machines must be conducted at the beginning of each day of the equipment's use. A system's components affecting safety must be inspected for:

- (1) changes in the unit's general operating characteristics;
- (2) wear of electrical cables and connectors;
- (3) proper labeling of the control panel and tube housing;
- (4) proper control panel for machine;
- (5) proper operation of locking mechanism;
- (6) timer run-down cutoff; and
- (7) damage to tube head housing that might result in excessive radiation levels.

(b) Records shall be made of day-of-use inspections which include findings and corrective actions taken. Records shall be dated and signed by the individual responsible for the inspection.

252:410-15-6. Personnel training

A permittee shall provide each operator of his industrial x-ray radiography systems with at least 16 hours of initial radiation safety training which meets the requirements of 252:410-3-32(c) and annual refresher training.

252:410-15-7. Recordkeeping

Permittees shall maintain records as required by 252:410-1-4 and 252:410-3-33.

252:410-15-8. Utilization logs

(a) Each permittee shall maintain utilization logs showing for each industrial radiography machine the following information:

- (1) A description, including the make, model, and serial number of the radiation machine or transport or storage container in which the tube is located;
- (2) The identity and signature of the radiographer to whom assigned; and
- (3) The location where used and dates of use, including the dates removed and returned to storage.

(b) Utilization logs are records which shall be maintained as required by 252:410-1-4 and 252:410-3-33.

252:410-15-9. Personnel monitoring

(a) **Monitoring devices.** The permittee shall not allow any individual to perform radiographic operations unless, at all times during radiographic operations, each individual wears on the trunk of the body:

- (1) an individual badge, such as a film badge, optically stimulated luminescent device (OSL) or thermoluminescent dosimeter (TLD), which must be assigned to and worn only by one individual;
- (2) a direct reading dosimeter (such as a pocket dosimeter) or electronic dosimeter; and
- (3) an alarm ratemeter.

(b) **Daily Maintenance of monitoring devices.** Direct reading and electronic dosimeters shall be read and the exposures recorded at the beginning and end of each shift or change of job location.

- (1) At a minimum, direct reading dosimeters shall be recharged and electronic dosimeters reset, and "start" readings recorded immediately before checking out any source of radiation from an authorized storage location for the purposes of conducting industrial radiographic operations, and before beginning radiographic operations on any subsequent calendar day (if the source of radiation has not been checked back into an authorized storage site).
- (2) Whenever radiographic operations are concluded for the day, the "end" readings on direct reading and electronic dosimeters shall be recorded and the accumulated occupational doses for that day determined and recorded.

(c) **Periodic Maintenance of monitoring devices.**

- (1) Film badges shall be replaced at least monthly. Other individual badges shall be replaced at periods not to exceed three months.
- (2) All individual badges shall be processed and evaluated by a processor accredited by the National Voluntary Laboratory Accreditation Program (NVLAP).
- (3) After replacement, each individual badge shall be submitted for processing as soon as practicable.
- (4) Direct reading and electronic dosimeters shall be checked at periods not to exceed 12 months for correct response to radiation, and records of such checks shall be maintained. Acceptable range is within plus or minus 20 percent of the true radiation exposure.
- (5) At any time a direct reading dosimeter is discharged beyond its range, or reads greater than 200 mrem (2mSv), and the possibility of radiation exposure can not be ruled out as the cause, industrial radiographic operations by that worker shall cease and the worker's individual badge shall be processed immediately. The individual shall not return to work with sources of radiation until a determination of the radiation exposure has been made by the RSO or the RSO's designee. The results of this determination shall be included in records maintained by the facility.

(d) **Lost or damaged monitoring device.** If a worker's individual badge, direct reading or electronic dosimeter is lost or damaged, the worker shall cease work immediately until a replacement monitoring device meeting the requirements of this section is provided. If the worker's individual badge is lost or damaged, the exposure shall be calculated for the time period from issuance to loss or damage of the individual badge. The results of the calculated exposure and the time period for which the individual badge was lost or damaged shall be included and maintained in the facility's records.

(e) **Exception.** At permanent x-ray radiographic installations where other appropriate alarming or warning devices are in routine use, the wearing of an alarming ratemeter is not required.

(f) **Alarm ratemeters.** Each alarm ratemeter must:

- (1) Be checked to ensure that the alarm functions properly (sounds) before using at the start of each shift;
- (2) Be set to give an alarm signal at a preset dose rate of 5 mSv/hr (500 mrem/hr, with an accuracy of plus or minus 20 percent of the true radiation dose rate);
- (3) Require special means to change the preset alarm; and
- (4) Be calibrated at periods not to exceed 12 months for correct response to radiation.

(g) **Records of personnel monitoring.** The licensee shall maintain exposure records for the time periods specified:

- (1) Direct reading dosimeter readings, as required by 252:410-15-9(b), shall be maintained for three (3) years after the record is made;
- (2) Yearly operability checks, as required by 252:410-15-9(c)(4), shall be maintained for three (3) years after the record is made;
- (3) Alarm ratemeter calibrations, as required by 252:410-15-9(f)(4), shall be maintained for three (3) years after the record is made;
- (4) Personnel dosimeter results received from the accredited NVLAP processor, as required by 252:410-15-9(c)(2), shall be maintained until the DEQ terminates the license;
- (5) Records of estimates of exposures as a result of off-scale personal direct reading dosimeters, as required by 252:410-15-9(c)(5), shall be maintained until the DEQ terminates the license;
- (6) Records of lost or damaged personnel dosimeters, as required by 252:410-15-9(d), shall be maintained until the DEQ terminates the license.

252:410-15-10. Notifications

In addition to the reporting requirements listed in OAC 252:410-1-4(a)(4) and specified in OAC 252:410-20-7, each permittee shall provide a written report to the DEQ within 30 days of the occurrence of any of the following incidents involving radiographic equipment:

- (1) Failure of any component, which is critical to safe operation of the device, to properly perform its intended function; or
- (2) An indicator on a radiation machine fails to show that radiation is being produced, an exposure switch fails to terminate production of radiation when turned to the off position, or a safety interlock fails to terminate x-ray production.

SUBCHAPTER 17. PARTICLE ACCELERATORS USED FOR NON-THERAPEUTIC PURPOSES

Section

- 252:410-17-1. General provisions and requirements
- 252:410-17-2. Shielding and safety design requirements
- 252:410-17-3. Particle accelerator controls and interlock systems
- 252:410-17-4. Warning devices
- 252:410-17-5. Operating procedures
- 252:410-17-6. Radiation monitoring requirements
- 252:410-17-7. Ventilation systems
- 252:410-17-8. Industrial electron beam systems

252:410-17-1. General provisions and requirements

(a) **Scope.** This Subchapter pertains to particle accelerators used for purposes other than

therapy.

(b) **Applicability.** The requirements of this Subchapter apply to any person who possesses such a particle accelerator and causes radiation to be produced through the operation or testing of the machine in the state.

(c) **Authorization required.** No persons subject to this Subchapter may perform any radiation management activity with such an accelerator unless:

- (1) they hold a DEQ-issued radiation machine operating permit and have registered their system with DEQ; and
- (2) their accelerator and management of radiation safety meet the applicable requirements of this Chapter.

(d) **Related requirements.** Persons subject to this Subchapter are also subject to general requirements of Subchapter 1, permitting and registration requirements of Subchapters 3 and 7, and standards for protection against radiation in Subchapter 20.**252:410-17-2. Shielding and safety design requirements**

(a) **Design and survey.** A qualified expert shall be consulted in the design of a particle accelerator installation.

(b) **Barriers.** Each particle accelerator installation must have primary and/or secondary barriers to ensure compliance with the dose limits in Subchapter 20.

252:410-17-3. Particle accelerator controls and interlock systems

(a) **Labeling.** Instrumentation, readouts and controls on the particle accelerator control panel shall be clearly labeled and easily discernible.

(b) **Safety interlock system.**

- (1) Each entrance into a target room or other high radiation area must have a safety interlock that shuts off the machine under conditions of barrier penetration.
- (2) Each safety interlock shall must be on a circuit which allows it to operate independently of all other safety interlocks.
- (3) All safety interlocks shall be designed so that any defect or component failure in the safety interlock system prevents operation of the accelerator.
- (4) When a safety interlock system has been tripped, it shall only be possible to resume operation of the accelerator by first manually resetting controls at the position where the safety interlock has been tripped and lastly at the main control panel.

(c) **Scram button.** A scram button or other emergency power cutoff switch shall be located and easily identifiable in all high radiation areas. Each cutoff switch must include a manual reset so that the accelerator cannot be restarted from the accelerator control panel until the switch is reset.

252:410-17-4. Warning devices

(a) **Warning lights.** Each entrance to a location designated as a high radiation area shall be equipped with easily observable warning lights that operate only when radiation is being produced.

(b) **Audible warning device.** Each high radiation area must have a device that sends a clear, audible warning that can be heard in all high radiation areas. The warning must be activated for 15 seconds before a location becomes, or could become, a high radiation area.

(c) **Posting.** Barriers, temporary or otherwise, and pathways leading to high radiation areas be posted in accordance with Subchapter 20 requirements.

252:410-17-5. Operating procedures

- (a) **When not in use.** Particle accelerators, when not in operation, shall be secured to prevent unauthorized use.
- (b) **Safety interlock.** The safety interlock system shall not be used to turn off the accelerator beam except in an emergency.
- (c) **Safety checks.** All safety and warning devices, including interlocks, shall be checked for proper operation at intervals not to exceed three months.
- (d) **Diagrams.** For accelerators not commercially manufactured, electrical circuit diagrams of the accelerator and the associated safety interlock systems shall be kept current and shall be available to the operator at each accelerator facility. Requirements of 252:410-1-4 also apply.
- (e) **Bypassing safety interlock.** If, for any reason, it is necessary to intentionally bypass a safety interlock or interlocks, the bypass must be:
 - (1) authorized for the specific purpose by the radiation safety committee and/or radiation safety officer;
 - (2) recorded in a permanent log and posted as notice at the accelerator control panel; and
 - (3) terminated as soon as possible.
- (f) **Procedures.** A copy of the current operating and emergency procedures shall be maintained at the accelerator control panel.

252:410-17-6. Radiation monitoring requirements

- (a) **General.** Each particle accelerator facility must have appropriate monitoring equipment which:
 - (1) is operable;
 - (2) has been appropriately calibrated for the radiations being produced at the facility;
 - (3) is tested for proper operation daily when used; and
 - (4) is calibrated at least once per year and after each servicing and repair.
- (b) **Radiation protection survey.** A radiation protection survey shall be performed and documented by a qualified expert, when changes have been made in shielding, operation, equipment, or occupancy of adjacent areas.
- (c) **High radiation areas.** Radiation levels in all high radiation areas shall be continuously monitored.
- (d) **Area monitors calibration.** All area monitors shall be calibrated at intervals not to exceed 1 year and after each servicing and repair.
- (e) **Air monitoring.** Whenever conditions warrant, periodic surveys shall be made to determine the amount of airborne particulate radioactivity present.
- (f) **Smear surveys.** Whenever conditions warrant, periodic smear surveys shall be made to determine the degree of contamination.
- (g) **Area surveys.** The requirements of 252:410-11-72 apply.
- (h) **Records.** Permittees shall maintain records as required by 252:410-1-4 and Subchapter 3.

252:410-17-7. Ventilation systems

- (a) **Ventilation.** Adequate ventilation shall be provided in areas where ozone or airborne radioactivity may be produced.
- (b) **Airborne radioactive material.** No permittee shall discharge any radioactive material to any unrestricted area in concentrations higher than those allowed in 252:410-20-1(c)(4). For purposes of this subsection, concentrations may be averaged over a period not greater than 1 year. Every effort should be made to maintain releases of radioactive material to unrestricted

areas as far below the limits set in Subchapter 20 as is reasonably achievable.

252:410-17-8. Industrial electron beam systems

(a) **Defined.** An industrial electron beam system means a radiation machine which is a type of particle accelerator used in manufacturing processes including curing, polymer linking, thickness measurements or coating weight, and quality control on continuously moving webs.

(b) **System requirements.** Prior to using an industrial electron beam system, a permittee must ensure each system meets the following requirements:

- (1) The system must use only electrons that are accelerated by voltages of less than 500 kV;
- (2) The high radiation area created when the system is energized must not be large enough for a person to enter;
- (3) Ionizing radiation produced by such a system must be contained within an interlocked, shielded cabinet designed to maintain surface doses below 0.2 mR/hr;
- (4) Each system must have a sign, located near any control that energizes the system, bearing the radiation symbol and the following words, "CAUTION RADIATION - THIS EQUIPMENT PRODUCES RADIATION WHEN ENERGIZED" or words having similar intent;
- (5) Each area or room containing a system shall be posted with a sign or signs bearing the radiation symbol and the words: "CAUTION - RADIATION PRODUCING EQUIPMENT" or words having similar intent; and
- (6) The system must be maintained to the manufacturer's specifications and operated in compliance with the manufacturer's operating procedures.

(c) **Surveys.** In addition to the requirements of this Subchapter, persons using such systems must comply with the survey requirements of 252:410-13-3(b).

(d) **Exemptions.** Systems meeting the requirements of subsections (a) and (b) of this section are exempt from:

- (1) the scram button requirements of 252:410-17-3(c);
- (2) the audible warning and posting requirements of 252:410-17-4(b) and (c); and
- (3) the monitoring requirements of 252:410-17-6(c)-(f).

**SUBCHAPTER 19. X-RAY FLUORESCENCE INSTRUMENTS USED FOR
LEAD-BASED PAINT DETECTION [REVOKED]**

Section

- 252:410-19-1. General provisions and requirements [REVOKED]
- 252:410-19-2. Definitions [REVOKED]
- 252:410-19-3. XRF permit required [REVOKED]
- 252:410-19-4. LBP-XRF permit application [REVOKED]
- 252:410-19-5. Action on applications [REVOKED]
- 252:410-19-6. LBP-XRF permit application fee [REVOKED]
- 252:410-19-7. Conditions of LBP-XRF permit [REVOKED]
- 252:410-19-8. Instrument and source management [REVOKED]
- 252:410-19-9. Radiation safety [REVOKED]
- 252:410-19-10. Recordkeeping [REVOKED]
- 252:410-19-11. Disposition of LBP-XRF instruments [REVOKED]

SUBCHAPTER 20. STANDARDS FOR PROTECTION AGAINST RADIATION

Section

- 252:410-20-1. Standards for protection against radiation
- 252:410-20-2. Surveys
- 252:410-20-3. Control devices and testing
- 252:410-20-4. Restriction on proposed disposal procedure
- 252:410-20-5. Disposal by burial in soil
- 252:410-20-6. Vacating premises
- 252:410-20-7. Reports

252:410-20-1. Standards for protection against radiation

(a) **Scope and applicability.** This Subchapter applies to all persons possessing source(s) of ionizing radiation subject to DEQ jurisdiction. Incorporated exposure limits do not apply to doses an individual has received due to background radiation or any medical administration or from his voluntary participation in medical research programs. Nothing in these rules shall be interpreted as limiting the intentional exposure of patients to radiation for the purpose of medical diagnosis or therapy.

(b) **Terms.** For purposes of this Subchapter:

- (1) **"Licensed material"** means any radioactive material under DEQ jurisdiction.
- (2) **"Licensee"** means the holder of any DEQ radiation management authorization.

(c) **10 CFR 20 incorporations.** The following provisions of 10 CFR 20, Standards for Protection Against Radiation, are hereby incorporated by reference.

(1) **Subpart A, General Provisions.**

- (A) 20.1001(b) - Purpose
- (B) 20.1002 - Scope
- (C) 20.1003 - Definitions
- (D) 20.1004 - Units of radiation dose
- (E) 20.1005 - Units of radioactivity
- (F) 20.1008 (b) through (e) - Implementation

(2) **Subpart B, Radiation Protection Programs.** - 20.1101

(3) **Subpart C, Occupational Dose Limits.**

- (A) 20.1201 - Occupational dose limits for adults
- (B) 20.1202 - Compliance with requirements for summation of external and internal doses
- (C) 20.1203 - Determination of external dose from airborne radioactive material
- (D) 20.1204 - Determination of internal exposure
- (E) 20.1206 - Planned special exposures
- (F) 20.1207 - Occupational dose limits for minors
- (G) 20.1208 - Dose to embryo/fetus

(4) **Subpart D, Radiation Dose Limits for Individual Members of the Public.**

- (A) 20.1301 (a), (b), (c) and (e) - Dose limits for individual members of the public
- (B) 20.1302 - Compliance with dose limits for individual members of the public

(5) **Subpart E, Radiological Criteria for License Termination.**

- (A) 20.1401 - General provisions and scope
- (B) 20.1402 - Radiological criteria for unrestricted use
- (C) 20.1403 - Criteria for license termination under restricted conditions
- (D) 20.1404 - Alternate criteria for license termination

- (E) 20.1405 - Public notification and public participation
- (F) 20.1406 - Minimization of contamination
- (6) **Subpart F, Surveys and Monitoring.**
 - (A) 20.1501 - General
 - (B) 20.1502 - Conditions requiring individual monitoring of external and internal occupational dose
- (7) **Subpart G, Control of Exposure From External Sources in Restricted Areas.**
 - (A) 20.1601 - Control of access to high radiation areas
 - (B) 20.1602 - Control of access to very high radiation areas
- (8) **Subpart H, Respiratory Protection and Controls to Restrict Internal Exposure in Restricted Areas.**
 - (A) 20.1701 - Use of process or other engineering controls
 - (B) 20.1702 - Use of other controls
 - (C) 20.1703 - Use of individual respiratory protection equipment
 - (D) 20.1704 - Further restrictions on the use of respiratory protection equipment
 - (E) 20.1705 - Application for use of higher assigned protection factors
- (9) **Subpart I, Storage and Control of Licensed Material.**
 - (A) 20.1801 - Security of stored material
 - (B) 20.1802 - Control of material not in storage
- (10) **Subpart J, Precautionary Procedures.**
 - (A) 20.1901 - Caution signs
 - (B) 20.1902 - Posting requirements
 - (C) 20.1903 - Exceptions to posting requirements
 - (D) 20.1904 - Labeling containers
 - (E) 20.1905 (a) through (f) - Exemptions to labeling requirements
 - (F) 20.1906 - Procedures for receiving and opening packages
- (11) **Subpart K, Waste Disposal.**
 - (A) 20.2001 - General requirements
 - (B) 20.2002 - Method for obtaining approval of proposed disposal procedures
 - (C) 20.2003 - Disposal by release into sanitary sewerage
 - (D) 20.2004(a)(2) and (3) - Treatment or disposal by incineration
 - (E) 20.2005 - Disposal of specific wastes
 - (F) 20.2006 - Transfer for disposal and manifests
 - (G) 20.2007 - Compliance with environmental and health protection regulations
 - (H) 20.2008 - Disposal of certain byproduct material
- (12) **Subpart L, Records.**
 - (A) 20.2101 - General provisions
 - (B) 20.2102 - Records of radiation protection programs
 - (C) 20.2103 - Records of surveys
 - (D) 20.2104 - Determination of prior occupational dose
 - (E) 20.2105 - Records of planned special exposures
 - (F) 20.2106 - Records of individual monitoring results
 - (G) 20.2107 - Records of dose to individual members of the public
 - (H) 20.2108 - Records of waste disposal
 - (I) 20.2110 - Form of records
- (13) **Subpart M, Reports.**
 - (A) 20.2201 - Reports of theft or loss of licensed material

- (B) 20.2202 - Notification of incidents
- (C) 20.2203 (a), (b) and (d) - Reports of exposures, radiation levels, and concentrations of radioactive material exceeding the limits
- (D) 20.2204 - Reports of planned special exposures
- (E) 20.2205 - Reports to individuals of exceeding dose limits
- (F) 20.2207 - Reports of transactions involving nationally tracked sources
- (14) **Subpart N, Exemptions and Additional Requirements.**
 - (A) 20.2301 - Applications for exemptions
 - (B) 20.2302 - Additional requirements
- (15) **Appendices to Part 20.**
 - (A) Appendix A. Protection Factors for Respirators
 - (B) Appendix B.
 - (i) Table 1. Annual limits on intake (ALIs) and derived air concentration (DACs) of radionuclides for occupational exposure
 - (ii) Table 2. Effluent concentrations
 - (iii) Table 3. Concentrations for release to sewerage
 - (iv) List of Elements
 - (C) Appendix C. Quantities of Licensed Material Requiring Labeling
 - (D) Appendix E. Nationally Tracked Source Thresholds
 - (E) Appendix G. Requirements for transfers of low-level radioactive waste intended for disposal at licensed land disposal facilities and manifests.

252:410-20-2. Surveys

(a) **Survey records content.** For each required survey conducted, a survey report must be prepared. The report must identify the persons who conducted the survey and prepared the report. The report must also give the date, location and instruments used, and describe the results and corrective actions taken or needed.

(b) **Calibration requirements.** Each radiation survey instrument used to make physical radiation surveys shall be operable and calibrated:

- (1) by a person who has been trained and has demonstrated competence in calibration;
- (2) at intervals not to exceed 12 months unless a more restrictive time interval is specified in another Subchapter of this Chapter;
- (3) after each survey instrument repair or servicing other than battery replacement;
- (4) for the types of radiation used and at energies appropriate for use as specified by this Chapter or if not specified that are standard for the particular type of instrument being calibrated;
- (5) at an accuracy within plus or minus 20 percent of the true radiation level; and
- (6) appropriate for the task at hand and in accordance with good health physics practice.

252:410-20-3. Control devices and testing

Any permittee whose radiation machine produces a high radiation area into which humans can enter shall comply with the following:

- (1) The controls required by 10 CFR 20.1601(a)(1) shall be constructed in such a manner that the primary radiation cannot be reactivated until all entrances have been secured, and the radiation on/off control is reset at the control panel.
- (2) The controls required by 10 CFR 20.1601(a)(1) shall be constructed in such a manner that when the warning device is activated, it shall be necessary to shut off the system and

secure all tripped entrances prior to being able to de-activate the alarm system.

(3) Control devices required by 10 CFR 20.1601(a)(1) and (2) shall be tested for proper operation at intervals not to exceed six months. If such testing indicates failure of the device, corrective action shall be taken immediately to restore the control device to proper working order.

(4) Each permittee shall prepare a record of control device tests that indicate the date of testing, the person who tested, the test results and corrective actions taken or planned.

252:410-20-4. Restriction on proposed disposal procedure

Alternative disposal methods may be employed in accordance with this Subchapter. DEQ will not approve any application for a license to receive radioactive material from other persons for disposal on land not owned by the state or the federal government.

252:410-20-5. Disposal by burial in soil

No person shall dispose of radioactive material in soil except by burial as specifically approved by DEQ pursuant to 252:410-20-4.

252:410-20-6. Vacating premises

(a) **"Property" defined.** For purposes of this section, "property" means a site, facility, outdoor areas, buildings, structures and/or equipment within the possession or control of a person who is subject to this Chapter which may contain residual radioactivity as a result of the person's activities.

(b) **Notice, certification and remediation.** No person subject to this Chapter may relinquish possession or control or vacate any property until he gives DEQ 30 days written notice of his intent to vacate or relinquish possession or control, identifies the types and quantities of radioactive materials used, stored or disposed on the property, and either:

(1) certifies and provides documentation to DEQ that the property is in compliance with the acceptable limits of 252:410-20-1(c)(5) and Appendix B of this Chapter; or

(2) submits a remediation plan to DEQ for approval that contains survey documentation and remediation proposals for bringing impacted areas of the property into compliance with the standards described in subsection (c) of this section, performs the plan as approved and certifies its completion to DEQ.

(c) **Compliance standards.** DEQ shall only approve the vacating or relinquishing possession or control of property when documentation shows that:

(1) all radioactive contamination in impacted areas has been remediated to levels as low as reasonably achievable; and/or

(2) the property is in compliance with 252:410-20-1(c)(5) and Appendix B of this Chapter; or

(d) **Unrestricted use standard.** No property may be released for unrestricted use unless compliance with subsection (c)(2) of this section has been documented and certified by the property owner and approved by DEQ.

(e) **Exception for decommissioning.** Any person subject to decommissioning regulations incorporated by reference from 10 CFR into this Chapter shall comply with the provisions incorporated by reference rather than this section.

252:410-20-7. Reports

(a) **Reports of theft or loss of radiation machines.**

- (1) **Telephone Report.** Each permittee shall report by telephone as follows:
 - (A) Immediately after its occurrence becomes known to the permittee, any lost, stolen, or missing radiation machine(s) under such circumstances that it appears to the permittee that an exposure could result to persons in unrestricted areas.
 - (B) All reports should be made to a member of the Radiation Management staff at 405-702-5100 business days between the hours of 8:00 am to 4:30 pm., and at all other times to the DEQ Hotline, 1-800-522-0206.
 - (2) **Written report.** Each permittee required to report under paragraph (1) of this section shall, within 30 days after making the telephone report, file a written report with DEQ setting forth the following information:
 - (A) A description of the radiation machine(s) involved including the manufacturer, model number, serial number, maximum design kilovoltage and the maximum design milliamperage;
 - (B) A description of the circumstances under which the loss or theft occurred;
 - (C) A statement of the disposition, or probable disposition of the radiation machine involved;
 - (D) Exposures of individuals to radiation, circumstances under which the exposures occurred, and the possible doses to persons in unrestricted areas;
 - (E) Actions that have been taken, or will be taken, to recover the radiation machine(s); and
 - (F) Procedure or measures that have been, or will be, adopted to ensure against recurrence of loss or theft of radiation machine(s).
 - (3) **Updates.** When additional information is received subsequent to filing the written report, the permittee shall also provide written notice to DEQ about the loss or theft within 30 days after the permittee learns of such information.
- (b) **Notification of incidents**
- (1) **Immediate Notification.** Notwithstanding any other requirements for notification, each permittee shall immediately upon discovery report to DEQ, any event involving radiation machines that may have caused or threatens to cause an individual to receive:
 - (A) A whole body dose of 25 rems (0.25 Sv) or more; or
 - (B) A lens dose of 75 rems (0.75 Sv) or more; or
 - (C) A shallow dose to the skin or extremities of 250 rads or more.
 - (2) **Twenty-four hour notification.** Each permittee shall, within 24 hours of discovery of the event, report any event involving a radiation machine that may have caused, or threatens to cause, a person to receive in a period of 24 hours:
 - (A) a dose exceeding 5 rems, (0.05 Sv); or
 - (B) a lens dose exceeding 15 rems (0.15 Sv); or
 - (C) a shallow dose to the skin or extremities exceeding 50 rems (0.5 Sv).
- (c) **Reports of exposures from radiation machines exceeding the constraints or limits.**
- (1) **Reportable events.** Each permittee shall submit a written report within 30 days after learning of any of the following occurrences:
 - (A) Any incident for which notification is required by OAC 252:410-20-7(b), or
 - (B) Doses in excess of any of the following:
 - (i) the occupational dose limits for adults in 10 CFR 20.1201;
 - (ii) the occupational dose limits for a minor in 10 CFR 20.1207;
 - (iii) the limits for an embryo/fetus of a declared pregnant woman in 10 CFR 20.1208;

- (iv) the limits for an individual member of the public in 10 CFR 20.1301; or
 - (v) any applicable limit in the permit.
- (2) **Contents of reports.** Each report required by paragraph (1) of this subsection must describe the extent of exposure of individuals to radiation including, as appropriate:
- (A) estimates of each individual's dose;
 - (B) levels of radiation involved;
 - (C) cause of the elevated exposures and dose rates; and
 - (D) corrective steps taken or planned to ensure against a recurrence, including a schedule.

SUBCHAPTER 21. RADIONUCLIDE NESHAP

Section

- 252:410-21-1. General provisions
- 252:410-21-2. 40 CFR 61

252:410-21-1. General provisions

- (a) **Scope and applicability.** This Subchapter incorporates by reference federal requirements for the use and management of radionuclides which have been designated by the federal Environmental Protection Agency as hazardous air pollutants. Any owner or operator of a stationary air quality source for which a radionuclide standard is prescribed must comply with the provisions of this Subchapter. Owners and operators may also be required to obtain a DEQ-issued air quality operating permit in accordance with 252:100, Air Pollution Control.
- (b) **Incorporations.** The regulations incorporated by reference into this Subchapter as rules of the DEQ are from Title 40 of the Code of Federal Regulations, Part 61, National Emission Standards for Hazardous Air Pollutants (NESHAP) as referenced by date in 252:410-1-7.
- (c) **Effective date.** This Subchapter shall become effective when the USEPA delegates authority to the DEQ for radionuclide NESHAP.
- (d) **Extent of incorporations.** Each cited federal regulation is incorporated by reference in its entirety unless specified otherwise.
- (e) **Interfacing terms. "Administrator"** as used in 40 CFR 61 shall mean the DEQ's Executive Director.

252:410-21-2. 40 CFR 61

The following regulations of 40 CFR 61 are hereby incorporated by reference:

- (1) Subpart A except 61.01, 61.04, 61.17, 61.18(a),(b) and (d);
- (2) Subparts H, I, and Q;
- (3) Subpart R except 61.206; and
- (4) Appendices D and E.

SUBCHAPTER 23. NOTICES, INSTRUCTIONS AND REPORTS TO WORKERS: INSPECTION AND INVESTIGATIONS

Section

- 252:410-23-1. Scope and applicability
- 252:410-23-2. Interfacing terms
- 252:410-23-3. Alternate forms

- 252:410-23-4. Incorporations by reference
- 252:410-23-5. Additional requirements

252:410-23-1. Scope and applicability

The rules in this Subchapter establish requirements for all persons possessing source(s) of ionizing radiation subject to DEQ jurisdiction.

252:410-23-2. Interfacing terms

For purposes of this Subchapter, these 10 CFR terms shall be interpreted as follows unless specified otherwise in specific incorporating sections:

- (1) **"Licensee"** means the holder of any DEQ radiation management authorization.
- (2) **"Commission"** or **"The Nuclear Regulatory Commission"** or **"NRC"** means DEQ.
- (3) **"Commissioner"**, **"Regional Administrator"**, **"Administrator"**, **"Director"** or **"Executive Director"** means DEQ's Executive Director.

252:410-23-3. Alternate forms

In lieu of a referenced NRC form, persons reporting to DEQ may use their own computer-generated form or a State form available from DEQ.

252:410-23-4. Incorporations by reference

The following provisions are hereby incorporated by reference from 10 CFR 19, Notices, Instructions and Reports to Workers: Inspection and Investigations:

- (1) **General provisions.**
 - (A) 19.1 - Purpose.
 - (B) 19.3 - Definitions, except the terms "Exclusion", "License", and "Sequestration" are not incorporated by reference.
- (2) **Licensee notice requirements.**
 - (A) 19.11 - Posting of notices to workers
 - (B) 19.12 - Instruction to workers
 - (C) 19.13 - Notifications and reports to individuals
- (3) **Compliance inspections.**
 - (A) 19.14 - Presence of representatives of licensees and workers during inspections
 - (B) 19.15 - Consultation with workers during inspections
 - (C) 19.16 - Requests by workers for inspections
 - (D) 19.17 - Inspections not warranted; informal review
- (4) Compliance and procedures. 19.31 - Application for exemptions.

252:410-23-5. Additional requirements

- (a) **Posting notices.** In addition to the requirements of 10 CFR 19.11 for posting notices to workers, which is incorporated by reference, licensees shall post current copies of this Subchapter 23 and Subchapter 20 of this Chapter, or a notice of where these rules can be examined.
- (b) **Enforcement.** DEQ compliance inspections, investigations and administrative enforcement, 27A O.S. § 2-3-501 *et seq.*, and OAC 252:4, Department of Environmental Quality Rules of Practice and Procedure, also apply.

**APPENDIX A. APPLICATION AND ANNUAL FEE SCHEDULE FOR
RADIATION MACHINES**

	DESCRIPTION	FIRST MACHINE	ADDITIONAL MACHINES
*Group A.	Particle accelerators used for the production of radionuclides - OAC 252:410-17	\$2300.00	\$460.00
*Group B-1.	Particle accelerators used for therapeutic purposes with beam energies of 1 MeV and above - OAC 252:410-11, Part 5	\$1150.00	\$230.00
*Group B-2.	X-ray systems and particle accelerators used for therapeutic purposes with beam energies less than 1 MeV - OAC 252:410-11, Part 3; and simulators used for therapy treatment planning - OAC 252:410-11-75	\$350.00	\$90.00
*Group C-1.	Particle accelerators for non-therapeutic uses not covered in Group A or Group C-2 - OAC 252:410-17	\$1150.00	\$230.00
*Group C-2.	Industrial electron beam systems - OAC 252:410-17-8	\$580.00	\$120.00
*Group D-1.	Open beam x-ray machines - OAC 252:410-13, Part 5; and x-ray machines used for industrial radiography - OAC 252:410-15	\$350.00	\$90.00
*Group D-2.	Analytical or industrial x-ray machines not included in Group D-1 with energies greater than 10 kVp and 1 mA - OAC 252:410-13	\$230.00	\$60.00

*Maximum Fee for Group A - \$3450.00
Maximum Fee for Group B - \$2300.00
Maximum Fee for Group C - \$1380.00
Maximum Fee for Group D - \$ 870.00

For applicants with multiple types of machines:

Use the highest “First Machine” fee, and add the “Additional Machines” fee based on the actual Group of the additional machine (not necessarily the same group as the first machine). For example, the fee for a facility with a particle accelerator used for industrial purposes (Group C-1) and an industrial electron beam system (Group C-2) would be \$1150.00+ \$120.00= \$1270.00

APPENDIX B. ACCEPTABLE SURFACE CONTAMINATION LEVELS

NUCLIDE ^a	AVERAGE ^{b c f}	MAXIMUM ^{b d f}	REMOVABLE ^{b c e f}
U nat, U-235, U-238, and associated decay products except Ra-226, Th-230, Ac-227, and Pa-231	5,000 dpm alpha/ 100 cm ²	15,000 dpm alpha/ 100 cm ²	1,000 dpm alpha/ 100 cm ²
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, and I-129	100 dpm/100 cm ²	300 dpm/100 cm ²	20 dpm/100 cm ²
Th nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-125, I-126, I-131, and I-133	1,000 dpm/100 cm ²	3,000 dpm/100 cm ²	200 dpm/100 cm ²
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above.	5,000 dpm beta, gamma/ 100 cm ²	15,000 dpm beta, gamma/ 100 cm ²	1,000 dpm beta, gamma/ 100 cm ²

^a Where surface contamination by both alpha and beta-gamma emitting nuclides exists, the limits established for alpha and beta-gamma nuclides should apply independently.

^b As used in this table, dpm (disintegrations per minute) means the rate of emissions by radioactive materials as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency and geometric factors associated with the instrumentation.

^c Measurements of average contamination level should not be averaged over more than one square meter. For objects of less surface area, the average should be derived for each object.

^d The maximum contamination level applies to an area of not more than 100 cm².

^e The amount of removable radioactive material per 100 cm² of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.

^f The average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mRad/hr at 1 cm and 1.0 mRad/hr at 1 cm, respectively, measured through not more than 7 milligrams per square centimeter of total absorber.

APPENDIX C. LEAKAGE LIMITS FOR THERAPEUTIC X-RAY SYSTEMS OF LESS THAN 1 MeV

System	Leakage Limit	Measurement location
Contact therapy tube housing	100 mR/hr	5 cm from surface
0-150 kVp (Manufactured prior to March 1, 1989)	1 R in 1 hr	1 m from source
0-150 kVp (Manufactured on or after March 1, 1989)	100 mR in 1 hr	1 m from source
151-500 kVp	1 R in 1 hr	1 m from source
500-999 kVp	0.1 percent of useful beam or 1 R in 1 hr	1 m from source

APPENDIX D. TABLE OF X-RAY ABSORBED DOSE AS A FRACTION OF MAXIMUM ABSORBED DOSE

Maximum Energy of Electron Beam in MeV	X-ray Absorbed Dose as a Fraction of Maximum Absorbed Dose
1	0.03
15	0.05
35	0.10
50	0.20

APPENDIX E. ABSORBED DOSE AT THE SURFACE AS A FRACTION OF MAXIMUM ABSORBED DOSE

Maximum Photon Energy in MeV	Absorbed Dose at the Surface as a Fraction of Maximum Absorbed Dose
1	0.80
2	0.70
5	0.60
15	0.50
35	0.40
50	0.20