STATE OF NEW YORK
DEPARTMENT OF HEALTH
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February 25, 2010

Terrence Reis, Deputy Director
Division Materials Safety and State Agreements
Office of Federal and State Materials and
Environmental Management Programs
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dear Mr. Reis:

Enclosed please find copies of a draft new section 16.125, Industrial Radiography, to 10 NYCRR 16 (Attachment A), and a license condition (Attachment B) that contains the same requirements. Following the Commission's review of the license condition and resolution of comments if applicable, the Department will amend existing industrial radiography licenses to add the condition. Use of the license condition will be an interim measure while the new section 16.125 proceeds through the regulatory change process.

RATS ID	Title
1997-5	Licenses for Industrial Radiography and Radiation Safety Requirements for Industrial Radiography Operations.
1998-4	Licenses for Industrial Radiography and Radiation Safety Requirements for Industrial Radiography Operations.

We believe that the requirements in the license condition and draft 16.125 satisfy the compatibility and health and safety categories established in the Office of Federal and State Materials and Environmental Programs (FSME) Procedure SA-200.

If you have any questions, please feel free to contact me at 518-402-7550 or Robert Dansereau at 518-402-7550 or red07@health.state.ny.us.

Sincerely,

Stephen M. Gavitt, CHP, Director
Bureau of Environmental Radiation Protection
New York State Department of Health

Enclosures: As stated

Attachment A

A new section 16.125 is added to read as follows:
16.125 Additional requirements for industrial radiography.

(a) Definitions. As used in this section the following terms have these defined meanings:

"Associated equipment"-equipment used in conjunction with a radiographic exposure device to make radiographic exposures that drives, guides or comes in contact with the source, (i.e. guide tube, control tube, control (drive) cable, removable source stop, "J" tube and collimator when it is used as an exposure head).

“Certifying entity” -an independent certifying organization recognized by the Department, United States Nuclear Regulatory Commission or another Agreement State, with a certification program meeting the requirements in subdivision (l) of this section.

"Collimator"-a radiation shield that is placed on the end of the guide tube or directly onto a radiographic exposure device to restrict the size, shape, and direction of the primary radiation beam when the sealed source is cranked into position to make a radiographic exposure.

“Control (drive) cable” -the cable that is connected to the source assembly and used to drive the source to and from the exposure location.

"Control drive mechanism” -a device that enables the source assembly to be moved to and from the exposure device.

"Control tube"-protective sheath for guiding the control cable. The control tube connects the control drive mechanism to the radiographic exposure device.

"Exposure head"-a device that locates the gamma radiography sealed source at the working position. As used in this Part, exposure head is synonymous with source stop.

"Field examination"-a demonstration of practical application of the safety rules and principles in industrial radiography, including the use of all appropriate equipment and procedures. As used in this Part, field examination is synonymous with practical examination.

“Guide tube (projection sheath)” - a flexible or rigid tube (i.e., ``J" tube) for guiding the source assembly and the attached control cable from the exposure device to the exposure head. The guide tube may also include the connections necessary for attachment to the exposure device and to the exposure head.

“Hands-on experience” -experience in all of those areas considered to be directly involved in the radiography process.

“Independent certifying organization” -an independent organization that meets all of the criteria of Appendix A to this part.

“Industrial radiography” -an examination of the structure of materials by nondestructive methods, utilizing ionizing radiation to make radiographic images.

"Periodic training"-a periodic review conducted or provided by the licensee for its employees on radiation safety aspects of radiography. The review may include, as appropriate, the results of internal inspections, new procedures or equipment, new or revised regulations, accidents or errors that have been observed, and opportunities for employees to ask safety questions. As used in this Part, periodic training is synonymous with annual refresher training.

"Permanent radiographic installation"-an enclosed shielded room, cell, or vault, not located at a temporary jobsite, in which radiography is performed.

“Practical examination” – a demonstration through practical application of the safety rules and principles in industrial radiography including use of all approprate equipment and procedures.

"Projection sheath (guide tube)"-a flexible or rigid tube (i.e., "J" tube) for guiding the source assembly and the attached control cable from the exposure device to the exposure head or working position.

"Radiographer"-any individual who has successfully completed the training and testing requirements specified in this section for radiographers, and who performs or who, in attendance at the site where sealed source are being used, personally supervises industrial radiographic operations and who is responsible to the licensee for assuring compliance with the requirements of the Department's regulations and conditions of the license.

"Radiographer certification" -written approval received from a certifying entity stating that an individual has satisfactorily met certain established radiation safety, testing, and experience criteria.

"Radiographer's assistant"-any individual who has successfully completed the training and testing requirements specified in this section for a radiographer's assistant, and who must use radiographic exposure devices, sealed sources or related handling tools, or radiation survey instruments under the personal supervision of a radiographer.

"Radiographic exposure device"-(also known as a camera or projector) any instrument containing a sealed source fastened or contained therein, in which the sealed source or shielding thereof may be moved, or otherwise changed, from a shielded to unshielded position for purposes of making radiographic exposure.

"Radiographic operations" -all activities associated with the presence of radioactive sources in a radiographic exposure device during use of the device or transport (except when being transported by a common or contract transport), to include surveys to confirm the adequacy of boundaries, setting up equipment and any activity inside restricted area boundaries.

"S-tube" -a tube through which the radioactive source travels when inside a radiographic exposure device.

"Sealed source"-any radioactive material that is encased in a capsule designed to prevent leakage or escape of the radioactive material.

"Shielded position"-the location within the radiographic exposure device or source changer where the sealed source is secured and restricted from movement. (In this position the radiation exposure will be at a minimum. This position incorporates maximum shielding for the radioactive source.)

"Source assembly"-consists of the sealed source and a connector that attaches the source to the control cable. It may also include a stop ball used to secure the source in the shielded position.

"Source changer"-a device designed and used for replacement of sealed sources in radiographic exposure devices, including those also used for transporting and storage of sealed sources.

"Storage area"-any location, facility, or vehicle which is used to store or to secure a radiographic exposure device, a storage container, or a sealed source when it is not in use; and which is locked or has a physical barrier to prevent accidental exposure, tampering with, or unauthorized removal of the device, container, or source.

"Storage container"-a device in which sealed sources are secured and stored.

"Temporary jobsite" -a place where licensed materials are present for the purpose of performing radiography, other than any permanent radiographic installation.

(b) Equipment. Equipment used in industrial radiographic operations shall meet the following minimum criteria:
(1) Each radiographic exposure device, source assembly or sealed source, and all associated equipment shall meet the requirements specified in American National Standard N432-1980 "Radiological Safety for the Design and Construction of Apparatus for Gamma Radiography", NBS Handbook 136, US Department of Commerce.[1]
(2) In addition to the requirements specified in paragraph (1) of this subdivision, the following requirements apply to radiographic exposure devices, source changers, source assemblies and sealed sources.
(i) Each radiographic exposure device shall have attached to it by the user, a durable, legible, clearly visible label bearing the:
(a) chemical symbol and mass number of the radionuclide in the device;
(b) activity and the date on which this activity was last measured;
(c) model number and serial number of the sealed source;
(d) manufacturer of the sealed source; and
(e) licensee's name, address, and telephone number.

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[1] See section 16.200.

(ii) Radiographic exposure devices intended for use as Type B transport containers shall meet applicable requirements of Title 10 Code of Federal Regulations, Part 71, January 1, 2007[2], excluding Sections 71.2, 71.6, 71.13(c) and (d), 71.14(b), 71.19, 71.101(c)(2)(d)(&(e), 71.107,71.109,71.111, 71.113, 71.115, 71.117, 71.119, 71.121, 71.123, and 71.125.

(iii) Modification of any exposure devices and associated equipment is prohibited.
(3) In addition to the requirements specified in paragraphs (1) and (2) of this subdivision, the following requirements apply to radiographic exposure devices, source assemblies, and associated equipment that allow the source to be moved out of the device for routine operation.
(i) The coupling between the source assembly and the control cable shall be designed in such a manner that the source assembly will not become disconnected if cranked outside the guide tube. The coupling shall be such that it cannot be unintentionally disconnected under normal and reasonably foreseeable abnormal conditions.
(ii) The device shall automatically secure the source assembly when it is cranked back into the fully shielded position within the device. This securing system may only be released by means of a deliberate operation on the exposure device.
(iii) The outlet fittings, lock box, and drive cable fittings on each radiographic exposure device shall be equipped with safety plugs or covers which shall be installed during storage and transportation to protect the source assembly from water, mud, sand or other foreign matter.
(iv) Each sealed source or source assembly shall have attached to it or engraved on it, a durable, legible, visible label with the words: "DANGER-RADIOACTIVE. " The label shall not interfere with the safe operation of the exposure device or associated equipment.
(v) Guide tubes shall be used when moving the source out of the device.
(vi) The guide shall have passed the crushing tests for the control tube as specified in ANSI N432 - 1980 and a kinking resistance test that closely approximates the kinking forces likely to be encountered during use.
(vii) An exposure head or similar device designed to prevent the source assembly from passing out of the end of the guide tube shall be attached to the outermost end of the guide tube during radiographic operations.
(viii) The guide tube exposure head connection shall be able to withstand the tensile test for control units specified in ANSI N432 - 1980.
(ix) Source changers shall provide a system for assuring that the source will not be accidentally withdrawn from the changer when connecting or disconnecting the drive cable to or from a source assembly.
(4) All associated equipment acquired after January 10, 1996 shall be labeled to identify that the components have met the requirements of this section.

(c) Limits on external radiation levels from storage containers and source changers.
The maximum exposure rate limits for storage containers and source changers are 200 millirem (2 millisieverts) per hour at any exterior surface, and 10 millirem (0.1 millisieverts) per hour at 1 meter from any exterior surface with the sealed source in the shielded position.

(d) Locking and relocation of radiographic exposure devices, storage containers, and source changers.
(1) Locked radiographic exposure devices and storage containers shall be physically secured to prevent tampering.
(i) Each radiographic exposure device shall have a lock or outer locked container designed to prevent unauthorized or accidental removal of the sealed source from its shielded position. The exposure device or its container shall be kept locked, (and if a keyed lock, with the key removed at all times), when not under the direct surveillance of a radiographer or a radiographer's assistant or as otherwise may be authorized in subdivision (p) of this section. In addition, during radiographic operations the sealed source assembly shall be manually secured in the shielded position each time the source is returned to that position
(ii) Each sealed source storage container and source changer shall have a lock or outer locked container designed to prevent unauthorized or accidental removal of the sealed source from its shielded position. Storage containers and source changers shall be kept locked when containing sealed sources except when under the direct surveillance of a radiographer or a radiographer's assistant.
(2) Radiographic exposure devices, source changers, and storage containers, prior to being moved from one location to another, shall be disassembled, safety plugs or covers applied, locked and physically secured to prevent accidental loss, tampering or removal of licensed material; and shall be surveyed to assure that the sealed source is in the shielded position before being moved.

(e) Radiation survey instruments.
(1) The licensee shall keep sufficient calibrated and operable radiation survey instruments at each location where radioactive material is present to make the radiation surveys required by this Part. Instrumentation required by this section shall have a range such that 2 millirems (0.02 millisieverts) per hour through 1 rem (0.01 Sievert) per hour can be measured. Survey instruments shall be checked for operability prior to use. This may be accomplished by evaluating the instrument response to

[2] See section 16.200.

the previously measured fields at the projection sheath port or the control cable sheath port on a radiographic exposure device.
(2) The licensee shall have each radiation survey instrument required under paragraph (1) of this subdivision calibrated:
(i) at intervals not to exceed six months and after instrument servicing, except for battery changes;
(ii) for linear scale instruments, at two points located approximately 1/3 and 2/3 of full- scale on each scale; for logarithmic scale instruments, at midrange of each decade, and at two points of at least one decade; and for digital instruments, at appropriate points; and
(iii) so that an accuracy within plus or minus 20 percent of the calibration standard can be demonstrated on each scale.
(3) The licensee shall maintain records of the results of the instrument calibrations in accordance with subdivision (u) of this section.

(f) Leak testing and replacement of sealed sources.
(1) The replacement of any sealed source fastened to or contained in a radiographic exposure device, leak testing of any sealed source, and the opening, repair, or modification of any sealed source shall be performed only by persons specifically authorized by an Agreement State or the United States Nuclear Regulatory Commission to do so.
(2) Testing and recordkeeping requirements.
(i) Each licensee who uses a sealed source shall have the source tested for leakage at intervals not to exceed six months.
(ii) The licensee shall maintain records of the leak tests in accordance with subdivision (v) of this section.
(iii) In the absence of a certificate from the transferor that a test has been made within the six months before the transfer, the sealed source may not be used until tested.
(3) Method of testing. The wipe of a sealed source shall be performed using a leak test kit or method approved by an Agreement State or the United States Nuclear Regulatory Commission, and shall be analyzed by a person or company so approved. The wipe sample shall be taken from the nearest accessible point to the sealed source where contamination might accumulate.
(4) Any test conducted pursuant to paragraphs (2) and (3) of this subdivision which reveals the presence of 0.005 microcuries (185 Bq) or more of removable radioactive material shall be considered evidence that the sealed source is leaking. The licensee shall immediately withdraw the equipment involved from use and shall cause it to be decontaminated and repaired or to be disposed of, in accordance with this Part. A report shall also be filed, within five days of the test, with the Department.
(5) Each exposure device using depleted uranium (DU) shielding and an "S" tube configuration shall be tested for depleted uranium contamination at intervals not to exceed 6 months. The wipe of a sealed source shall be performed using a leak test kit or method approved by an Agreement State or the United States Nuclear Regulatory Commission, and shall be analyzed by a person or company so approved Should such testing reveal the presence of 0.005 microcuries (185 Bq) or more of DU contamination, the exposure device shall be removed from use and the until an evaluation of the wear on the S-tube has been made. Should the evaluation reveal that the S-tube is worn through, the device may not be used again. DU shielded devices do not have to be tested for DU contamination while in storage and not in use. Before using or transferring such a device however, the device must be tested for DU contamination if the interval of storage exceeded 12 months.

(g) Quarterly inventory.
(1) Each radiography licensee shall conduct a quarterly physical inventory to account for all sealed sources and for all devices containing depleted uranium, received and possessed under a license.
(2) The licensee shall maintain records of the quarterly inventory in accordance with subdivision (w) of this section.

(h) Inspection and maintenance of radiographic exposure devices, storage containers, associated equipment, and source changers.
(1) The licensee shall visually check for obvious defects in radiographic exposure devices, storage containers, associated equipment, and source changers prior to use each day the equipment is used, and ensure that the equipment is in good working condition and that required labeling is present. If defects are found, the equipment shall be removed from service until repaired, and a record shall be made in accordance with subdivision (y) of this section.
(2) Each licensee shall have a program for inspection and routine maintenance of radiographic exposure devices, source changers, associated equipment and storage containers prior to the first use and at intervals not to exceed three months thereafter to ensure the proper functioning of components important to safety. Replacement components shall meet design specifications. If equipment problems are found, the equipment shall be removed from service until repaired. Records of such inspection, maintenance, removal from service and repair shall be made in accordance with subdivision (y) of this section.
(3) Each licensee shall have a program for inspection and maintenance necessary to maintain the Type B packaging used to transport radioactive materials. The inspection and maintenance program shall include procedures to assure that Type B packages are shipped and maintained in accordance with the certificate of compliance or other approval. Records of such inspection, maintenance, removal from service and repair shall be made in accordance with subdivision (y) of this section.

(i) Permanent radiographic installations.
(1) Permanent radiographic installations shall have high radiation area entrance controls of the types described in subdivision 16.12(d) of this Part , and shall also meet the following special requirements.
(2) Each entrance that is used for personnel access to the high radiation area in a permanent radiographic installation to which this section applies shall have both visible and audible warning signals to warn of the presence of radiation. The visible signal shall be actuated by radiation whenever the source is exposed. The audible signal shall be actuated when an attempt is made to enter the installation while the source is exposed.
(3) The alarm system shall be tested for proper operation with a radiation source each day before the installation is used for radiographic operations, and at intervals not to exceed three months. The test shall include a check of both the visible and audible signals. Entrance control devices that reduce the radiation level upon entry (designated in subdivsion (d) of this section) shall be tested monthly. If an entrance control device or an alarm is operating improperly, it shall be immediately labeled as defective and repaired within 7 calendar days. The facility may continue to be used during this 7-day period, provided the licensee implements the continuous surveillance requirements of subdivison (p) and uses an alarming ratemeter. Test records for entrance controls and audible and visual alarm shall be maintained in accordance with subdivison (z).

(j) Labels, storage, and transportation precautions.
(1) Labels.
(i) The licensee may not use a source changer or container to store licensed material unless the source changer or the container has securely attached to it a durable, legible, and clearly visible label. The label shall contain the radiation symbol specified in section 16.12 of this Part that has a minimum diameter of 1 inch (25mm) and the wording "CAUTION (OR DANGER) RADIOACTIVE MATERIAL-DO NOT HANDLE, NOTIFY CIVIL AUTHORITIES (OR NAME OF COMPANY)".
(ii) The licensee may not transport licensed material unless the material is packaged, labeled, marked, and accompanied with appropriate shipping papers in accordance with the requirements of section 16.17 of this Part.
(2) Security precautions during storage and transportation.
(i) Locked radiographic exposure devices and storage containers shall be physically secured to prevent tampering or removal by unauthorized personnel. The licensee shall store licensed material in a manner which will minimize danger from explosion or fire.
(ii) The licensee shall lock and physically secure the transport package containing licensed material in the transporting vehicle to prevent accidental loss, tampering, or unauthorized removal of the licensed material from the vehicle.

(k) Radiation Safety Officer. The Radiation Safety Officer (RSO) shall ensure that radiation safety activities are being performed in accordance with approved procedures and regulatory requirements in the daily operation of the licensee's program.
(1) The RSO's qualification shall include:
(i) completion of the training and testing requirements of paragraph (l)(1) of this section; and
(ii) two years of hands-on experience as a qualified radiographer in industrial radiographic operations, and
(iii) formal training in the establishment and maintenance of a radiation protection program., or
(iii) The Department will consider alternatives when the individual has appropriate training and/or experience in the field of ionizing radiation, and in addition, has adequate formal training with respect to the establishment and maintenance of a radiation safety protection program.
(2) The specific duties of the RSO include, but are not limited to, the following:
(i) to establish and oversee operating, emergency, and ALARA procedures, and to review them regularly to ensure that the procedures are current and conform with these regulations and to the license conditions;
(ii) to oversee and approve all phases of the training program for radiographic personnel so that appropriate and effective radiation protection practices are taught;
(iii) to ensure that required radiation surveys and leak tests are performed and documented in accordance with these regulations, including any corrective measures when levels of radiation exceed established limits;
(iv) to ensure that personnel monitoring devices are calibrated and used properly by occupationally exposed personnel, that records are kept of the monitoring results, and that timely notifications are made as required by section 16.15 of this Part ; and
(v) to ensure that operations are conducted safely and to assume control and have the authority to institute corrective actions, including stopping of operations, when necessary in emergency situations or unsafe conditions.

(l) Training.
(1) The licensee shall not permit any individual to act as radiographer until such individual:
(i) has been instructed in the subjects outlined in paragraph (6) of this subdivision;
(ii) has received a minimum of 2 months of on-the-job training;

(iii) is certified through a radiographer certification program by a certifying entity in accordance with the criteria specified in subparagraph (vii) of this paragraph;
(iv) has received copies of, and instruction in, regulations contained in this Part; in the license under which the radiographer will perform radiography, and the licensee's operating and emergency procedures;
(v) has demonstrated competence to use the licensee's radiographic exposure devices, sealed sources, related handling tools, and survey instruments; nd
(vi) has demonstrated understanding of the instructions in this paragraph by successful completion of a written test and a field examination on the subjects covered in paragraph (6) of this subdivision.
(vii) All certification programs shall:
(*a*). Require applicants for certification to (a) receive training in the topics set forth in subdivision (l) of this section or equivalent requirements of the United States Nuclear Regulatory Commission or another Agreement State, and (b) satisfactorily complete a written examination covering these topics;
(*b*) Require applicants for certification to provide documentation that demonstrates that the applicant has: (a) received training in the topics set forth in subdivision (l) of this section or equivalent requirements of the United States Nuclear Regulatory Commission or another Agreement State; (b) satisfactorily completed a minimum period of on-the-job training; and (c) has received verification by an Agreement State or a NRC licensee that the applicant has demonstrated the capability of independently working as a radiographer;
(*c*) Include procedures to ensure that all examination questions are protected from disclosure;
(*d*) Include procedures for denying an application, revoking, suspending, and reinstating a certificate;
(*e*) Provide a certification period of not less than 3 years nor more than 5 years;
(*f*) Include procedures for renewing certifications and, if the procedures allow renewals without examination, require evidence of recent full-time employment and annual refresher training.
(*g*) Provide a timely response to inquiries, by telephone or letter, from members of the public, about an individual's certification status.
(*h*) Requirements for Written Examinations. All examinations shall be:
(*1*) Designed to test an individual's knowledge and understanding of the topics listed in subdivision (l) of this section or equivalent requirements of the United States Nuclear Regulatory Commission or another Agreement State;
(*2*) Written in a multiple-choice format;
(*3*) Have test items drawn from a question bank containing psychometrically valid questions based on the material in subdivision (l) of this section or equivalent requirements of the United States Nuclear Regulatory Commission or another Agreement State.
(2) The licensee shall not permit any individual to act as a radiographer's assistant until such individual:
(i) has received copies of and instruction in regulations contained in this Part, in the license under which the assistant radiographer will work, and the licensee's operating and emergency procedures;
(ii) has demonstrated competence to use, under the personal supervision of the radiographer, the radiographic exposure devices, sealed sources, associated equipment, related handling tools, and radiation survey instruments that the assistant will use; and
(iii) has demonstrated understanding of the instructions in this paragraph by successfully completing a written or oral test and has demonstrated competence in the use of hardware described in this paragraph by successful completion of a practical examination on the use of such hardware.
(3) The licensee shall provide periodic training for radiographers and radiographer's assistants at least once during each calendar year.
(4) The licensee shall conduct a semi-annual inspection program of the job performance of each radiographer and radiographer's assistant to ensure that these regulations, license requirements, and the applicant's operating and emergency procedures are followed. The inspection program shall:
(i) include observation of the performance of each radiographer and radiographer's assistant during an actual radiographic operation at intervals not to exceed six months; and
(ii) provide that, if a radiographer or a radiographer's assistant has not participated in a radiographic operation for more than six months since the last inspection, the radiographer shall demonstrate knowledge in the training requirements in ths subdivision and the radiographer’s assistant shall re-demonstrate knowledge of the training requirements in this subdivision by a practical examination before these individuals can next participate in a radiographic operation.
(5) The licensee shall maintain records of the above training; to include written, oral, and practical examinations, periodic training, and semi-annual inspections of job performance in accordance with subdivision (aa) of this section.
(6) The licensee shall include the following subjects in the training required in subparagraph (1)(i) of this subdivision:
(i) fundamentals of radiation safety including:
(a) characteristics of gamma radiation;
(b) units of radiation dose and quantity of radioactivity;
(c) hazards of exposure to radiation;
(d) levels of radiation from licensed material; and
(e) methods of controlling radiation dose (time, distance, and shielding);

(ii) radiation detection instruments including:
(a) use, operation, calibration, and limitations of radiation survey instruments;
(b) survey techniques; and
(c) use of personnel monitoring equipment;
(iii) equipment to be used including:
(a) operation and control of radiographic exposure equipment, remote handling equipment, and storage containers, including pictures or models of source assemblies (pigtails);
(b) storage, control, and disposal of licensed material; and
(c) inspection and maintenance of equipment;
(iv) the requirements of this Part and of pertinent Federal regulations; and
(v) case histories of accidents in radiography.

(m) Operating and emergency procedures.
(1) Operating and emergency procedures shall include instructions in at least the following:
(i) the handling and use of licensed sealed sources and radiographic exposure devices to be employed, such that no person is likely to be exposed to radiation doses in excess of the limits established in this Part;
(ii) methods and occasions for conducting radiation surveys;
(iii) methods for controlling access to radiographic areas;
(iv) methods and occasions for locking and securing radiographic exposure devices, storage containers and sealed sources;
(v) personnel monitoring and the use of personnel monitoring equipment;
(vi) transporting sealed sources to field locations, including packing of radiographic exposure devices and storage containers in the vehicles, placarding of vehicles when needed, and control of the sealed sources during transportation;
(vii) the inspection, maintenance, and operability checks of radiographic exposure devices, survey instruments, transport containers, and storage containers;
(viii) steps that shall be taken immediately by radiography personnel in the event a pocket dosimeter is found to be off-scale, or an alarming ratemeter alarms unexpectedly;
(ix) the procedure(s) for identifying and reporting equipment malfunction, as required by section 16.15(b)(2)(iii) of this Part (rule).
(x) the procedure for notifying proper persons in the event of an accident;
(xi) minimizing exposure of persons in the event of an accident;
(xii) source recovery procedure if licensee will perform source recovery; and
(xiii) maintenance of records.
(2) The licensee shall maintain copies of current operating and emergency procedures in accordance with subdivision (bb) of this section.

(n) Personnel monitoring.
(1) The licensee shall not permit any individual to act as a radiographer or a radiographer's assistant unless, at all times during radiographic operations, each such individual wears a direct reading dosimeter, an alarm ratemeter, and a personnel dosimeter that is processed and evaluated by an accredited National Voluntary Laboratory Accreditation Program (NVLAP) processor. At permanent radiography facilities where other appropriate alarming or warning devices are in routine use, the wearing of an alarm ratemeter is not required. Direct reading dosimeters shall have a range from zero to 200 millirems (2 millisieverts) () and shall be recharged at the start of each shift. In cases where the exposure will be greater than 200 millirems (2 millisieverts) an exemption shall be applied for to use a direct reading dosimeter with a higher endpoint. Electronic personal dosimeters may only be used in place of pocket ion-chamber dosimeters. Each personnel dosimeter shall be assigned to and worn by only one individual. Personnel monitoring devices shall be replaced at least monthly. After replacement, each personnel monitoring device sshall be processed as soon as possible.
(2) Direct reading dosimeters such as pocket ion-chamber dosimeters or electronic personal dosimeters shall be read and the exposures recorded at the beginning and end of each shift, and records shall be maintained in accordance with subdivision (cc) of this section.
(3) Pocket ion-chamber dosimeters or electronic personal dosimeters shall be checked at periods not to exceed 12 months for correct response to radiation, and records shall be maintained in accordance with subdivision (cc) of this section. Acceptable dosimeters shall read within plus or minus 20 percent of the true radiation exposure.
(4) If an individual's pocket dosimeter is found to be off scale, or electronic personal dosimeter reads greater than 200 millirems (2 millisieverts), and the possibility of radiation exposure cannot be ruled out as the cause, his/her personnel monitoring device shall be immediately sent for processing. In addition, the individual shall not work with licensed material until a determination of his/her radiation exposure has been made. This determination shall be made by the RSO or his/her designee. The results of this determination shall be included in the records maintained in accordance with subdivision (cc) of this section.
(5) If a personnel monitoring device is lost or damaged, the worker shall cease work immediately until a replacement unit is provided and the exposure is calculated for the time period from issuance to loss or damage. The results of the calculated

exposure shall be included in the records maintained in accordance with subdivision (cc) of this section.(6) Reports received from the NVLAP accredited personnel dosimeter processor shall be retained in accordance with subdivision (cc) of this section.
(7) Each alarm ratemeter shall:
(i) be checked to ensure that the alarm functions properly (sounds) prior to use at the start of each shift;
(ii) be set to give an alarm signal at a preset dose rate of 500 mrem/hr (5 mSv/hr); with an accuracy of plus or minus 20 percent of the true radiation dose rate;
(iii) require special means to change the preset alarm function;
(iv) have the alarm function turned "on" at all times during radiographic operations; and
(v) be calibrated at periods not to exceed 12 months for correct response to radiation. The licensee shall maintain records of alarm ratemeter calibrations in accordance with subdivision (cc) of this section.

(o) Radiation surveys.
The licensee shall:
(1) Maintain at least one calibrated and operable radiation survey instrument that meets the requirements of subdivision (e) of this section at each location of its radiographic operations whenever radiographic operations are being performed, including a source exchange; and at the storage area, as defined in subdivision (a) of this section, whenever a radiographic exposure device, a storage container, or source is being placed in storage.
(2) Conduct a survey of the radiographic exposure device (camera) and guide tube with a radiation survey instrument after each exposure to determine that the sealed source has been returned to its shielded position.
(3) Conduct a survey of the source guide tube to determine that the source has been returned to its shielded position prior to exchanging films, repositioning the collimator, or dismantling equipment.
(4) Conduct a survey with a radiation survey instrument any time the source is exchanged and whenever a radiographic exposure device is placed in a storage area, as defined in subdivision (a) of this section to determine that the sealed source is in its shielded position.
(5) Maintain records in accordance with subdivision (dd) of this section.

(p) Security. During each radiographic operation the radiographer or radiographer's assistant shall maintain a continuous direct visual surveillance of the operation to protect against unauthorized entry into a high radiation area, as defined in this Part, except at permanent radiographic installations where all entryways to the high radiation area are locked to protect against unauthorized or accidental entry and the requirements of subdivison (I) of this section are met.

(q) Posting. Notwithstanding any provisions in section 16.12(b)(2) of this Part, areas in which radiography is being performed shall be conspicuously posted as required by section 16.12(b)(1) of this Part.

(r) Supervision of radiographers' assistants. Whenever a radiographer's assistant uses radiographic exposure devices, associated equipment, sealed sources or related source handling tools, or conducts radiation surveys required by paragraph (o)(2) of this section to determine that the sealed source has returned to the shielded position after an exposure, the assistant shall be under the personal supervision of a radiographer. The personal supervision shall include:
(1) the radiographer's personal presence at the site where the sealed sources are being used;
(2) the ability of the radiographer to give immediate assistance if required; and
(3) the radiographer's direct observation of the assistant's performance of the operations referred to in this section.

(s) Requirements for radiographic operations conducted outside of a permanent radiographic installation. (1) Whenever radiography will be performed outside of a permanent radiographic installation the radiographer shall be accompanied by another qualified radiographer, or an individual with at least the qualifications of a radiographer's assistant. That individual shall observe the operations and shall be capable of providing immediate assistance to prevent unauthorized entry. Radiography shall not be performed if only one qualified individual is present.
(2) All radiographic operations conducted at the location of use authorized on the license shall be conducted in a permanent radiographic installation, unless specifically authorized by the Department.

(t) Records of receipt and transfer of sealed sources.
(1) Each licensee shall maintain records showing the receipts and transfers of sealed sources, and devices using depleted uranium shielding.
(2) These records shall include the date, the name of the individual making the record, the radionuclide, number of curies (becquerels) or mass of depleted uranium, and make, model, and serial number of each sealed source and device, as appropriate.
(3) The licensee shall retain the records required by paragraph (1) of this subdivision for three years after the record is made.

(u) Records of radiation survey instruments.

(1) Each licensee shall maintain records of the calibrations of it's radiation survey instruments.
(2) The licensee shall retain the records required by paragraph (1) of this subdivision for three years after the record is made.

(v) Records of leak testing and replacement of sealed sources.
(1) Each licensee shall maintain records of leak test results in units of microcuries (becquerels) per test sample..
(2) The licensee shall retain the records required by paragraph (1) of this subdivision for three years after the record is made.

(w) Records of quarterly inventory.
(1) Each licensee shall maintain records of the quarterly inventory of sealed sources and devices containing depleted uranium.
(2) The record shall include the model number, serial number and manufacturer of each source/device, the radionuclide and the quantity in each source/device, the location of each, the name of the individual conducting the inventory, and the date of the inventory.
(3) The licensee shall retain the records required by paragraph (1) of this subdivision for three years after the record is made.

(x) Utilization logs.
(1) Each licensee shall maintain current utilization logs at the address specified in the license, showing for each sealed source the following information:
(i) a description, including the make, model number, and serial number of the radiographic exposure device or storage container in which the sealed source is located;
(ii) the identity and signature of the radiographer to whom assigned; and
(iii) the plant or site where used and dates of use, including the dates removed and returned to storage.
(2) The licensee shall retain the logs required by paragraph (1) of this subdivision for three years after the log is made.

(y) Records of inspection and maintenance of radiographic exposure devices, transport and storage containers, associated equipment, source changers and survey instruments.
(1) Each licensee shall maintain records of inspection and maintenance of radiographic exposure devices, transport and storage containers, associated equipment, source changers and survey instruments.
(2) The record shall include the date of check, name of inspector, equipment involved, any defects found, and repairs made.
(3) The licensee shall retain the records required by paragraph (1) of this subdivision for three years after the record is made.

(z) Records of permanent radiographic installations.
(1) Each licensee shall maintain records of alarm system and entrance control device tests.
(2) The licensee shall retain the records required by paragraph (1) of this subdivision for three years after the record is made.

(aa) Records of training and certification.
(1) Each licensee shall maintain records of training and certification of each radiographer and each radiographer's assistant, to include copies of written tests,dates of oral tests, and practical examinations. The record shall also include radiographer certification documents and verification of certification status.
(2) Each licensee shall maintain records of annual refresher training and semi-annual inspections of job performance for each radiographer and each radiographer's assistant. The records shall list the topics discussed, the dates of the reviews, and names of the instructor and attendees. For inspections of job performance, the records shall also include a list showing the items checked and any non-compliances observed by the RSO.
(3) The licensee shall retain the records required by paragraphs (1) and (2) of this subdivision for three years after the record is made

(bb) Copies of operating and emergency procedures.
(1) Each licensee shall maintain a copy of current operating and emergency procedures.
(2) The licensee shall retain the records until the Department terminates the license.
(3) If procedures are superseded, the licensee shall retain the superseded material for three years after each change.

(cc) Records of personnel monitoring.
(1) Each licensee shall maintain records of daily exposures recorded from direct reading dosimeters, and of yearly checks for correct dosimeter response to radiation within plus or minus 20 percent of true radiation exposure.
(2) The licensee shall retain the records required by paragraph (1) of this subdivision for three years after the record is made.
(3) Each licensee shall maintain records of personnel dosimeter results received from the accredited NVLAP processor.
(4) The licensee shall retain the records required by paragraph (3) until the Department terminates the license.
(5) Each licensee shall maintain records of the calibrations of alarm ratemeters for three years after the record is made.

(6) Each licensee shall maintain records of estimates of exposures as a result of off-scale personal direct reading dosimeters, or lost or damaged personnel dosimeters until the Department terminates the license.

(dd) Records of radiation surveys.
(1) Each licensee shall maintain records of the survey of a radiographic exposure device and source guide tube after the last exposure of the work day, after any source exchange, and whenever a device is placed in a storage area.
(2) The licensee shall retain the records required by paragraph (1) of this subdivision for three years after the record is made.

(ee) Form of records. Each record required by this Part shall be legible throughout the specified retention period. The record may be the original or a reproduced copy, or a microform provided that the copy or microform is authenticated by authorized personnel and that the microform is capable of reproducing a clear copy throughout the required retention period. The record may also be stored in electronic media with the capability for producing legible, accurate, and complete records during the required retention period. Records, such as letters, drawings, and specifications, shall include all pertinent information, such as stamps, initials, and signatures. The licensee shall maintain adequate safeguards against tampering with and loss of records.

(ff) Location of records. All records required by this Part shall be maintained for inspection at the address listed on the license. However, if this address is not located within New York State the licensee shall, at the request of the Department, bring such records as pertain to use of radiation sources in New York State, to such location within the state as the Department may direct for the purpose of inspection.

(gg) Documents required at temporary jobsites. Each licensee conducting operations at a temporary jobsite shall maintain copies of the following documents and records at the temporary jobsite until the radiographic operation is completed:
(1) operating and emergency procedures required by subdivision (m) of this section;
(2) evidence of latest calibration of the radiation survey instruments in use at the site required by subdivision (u) of this section;
(3) the latest survey records, required by subdivision (dd) of this section;
(4) the shipping papers for the transportation of radioactive materials; and
(5) a copy of the license authorizing use of licensed materials;
(6) a copy of this Part;
(7) evidence of the latest calibrations fo alarm ratemeteres and operabiltiy checks of pocket dosimeters and/or electronic personal dosimeters.

(hh) Notification of incidents.
(1) In addition to the reporting requirements specified in section 16.15 of this Part, each licensee shall provide a written report to the Department of the occurrence of any of the following incidents involving radiographic equipment:
(i) unintentional disconnection of the source assembly from the control cable;
(ii) inability to retract the source assembly to its full shielded position and secure it in this position;
(iii) failure of any component (critical to safe operation of the device) to properly perform its intended function.
(2) The licensee shall include the following information in each report submitted under paragraph (1) of this subdivision, and in each report of overexposure submitted under section 16.15(c) of this Part which involve failure of safety components of radiography equipment:
(i) a description of the equipment problem;
(ii) cause of each incident, if known;
(iii) manufacturer and model number of equipment involved in the incident;
(iv) place, time and date of the incident;
(v) actions taken to establish normal operations;
(vi) corrective actions taken or planned to prevent recurrence; and
(vii) qualifications of personnel involved in the incident.

Attachment B

A New License Condition XX is Added to Read as Follows:

Additional requirements for industrial radiography.

(a) Definitions. As used in this License Condition the following terms have these defined meanings:

"Associated equipment"-equipment used in conjunction with a radiographic exposure device to make radiographic exposures that drives, guides or comes in contact with the source, (i.e. guide tube, control tube, control (drive) cable, removable source stop, "J" tube and collimator when it is used as an exposure head).

“Certifying entity” -an independent certifying organization recognized by the Department, United States Nuclear Regulatory Commission or another Agreement State, with a certification program meeting the requirements in subdivision (l) of this section.

"Collimator"-a radiation shield that is placed on the end of the guide tube or directly onto a radiographic exposure device to restrict the size, shape, and direction of the primary radiation beam when the sealed source is cranked into position to make a radiographic exposure.

“Control (drive) cable” -the cable that is connected to the source assembly and used to drive the source to and from the exposure location.

"Control drive mechanism” -a device that enables the source assembly to be moved to and from the exposure device.

"Control tube"-protective sheath for guiding the control cable. The control tube connects the control drive mechanism to the radiographic exposure device.

"Exposure head"-a device that locates the gamma radiography sealed source at the working position. As used in this Part, exposure head is synonymous with source stop.

"Field examination"-a demonstration of practical application of the safety rules and principles in industrial radiography, including the use of all appropriate equipment and procedures. As used in this Part, field examination is synonymous with practical examination.

“Guide tube (projection sheath)” - a flexible or rigid tube (i.e., ``J" tube) for guiding the source assembly and the attached control cable from the exposure device to the exposure head. The guide tube may also include the connections necessary for attachment to the exposure device and to the exposure head.

“Hands-on experience” -experience in all of those areas considered to be directly involved in the radiography process.

“Independent certifying organization” -an independent organization that meets all of the criteria of Appendix A to this part.

“Industrial radiography” -an examination of the structure of materials by nondestructive methods, utilizing ionizing radiation to make radiographic images.

"Periodic training"-a periodic review conducted or provided by the licensee for its employees on radiation safety aspects of radiography. The review may include, as appropriate, the results of internal inspections, new procedures or equipment, new or revised regulations, accidents or errors that have been observed, and opportunities for employees to ask safety questions. As used in this Part, periodic training is synonymous with annual refresher training.

"Permanent radiographic installation"-an enclosed shielded room, cell, or vault, not located at a temporary jobsite, in which radiography is performed.

“Practical examination” – a demonstration through practical application of the safety rules and principles in industrial radiography including use of all approprate equipment and procedures.

"Projection sheath (guide tube)"-a flexible or rigid tube (i.e., "J" tube) for guiding the source assembly and the attached control cable from the exposure device to the exposure head or working position.

"Radiographer"-any individual who has successfully completed the training and testing requirements specified in this section for radiographers, and who performs or who, in attendance at the site where sealed source are being used, personally supervises industrial radiographic operations and who is responsible to the licensee for assuring compliance with the requirements of the Department's regulations and conditions of the license.

"Radiographer certification" -written approval received from a certifying entity stating that an individual has satisfactorily met certain established radiation safety, testing, and experience criteria.

"Radiographer's assistant"-any individual who has successfully completed the training and testing requirements specified in this section for a radiographer's assistant, and who must use radiographic exposure devices, sealed sources or related handling tools, or radiation survey instruments under the personal supervision of a radiographer.

"Radiographic exposure device"-(also known as a camera or projector) any instrument containing a sealed source fastened or contained therein, in which the sealed source or shielding thereof may be moved, or otherwise changed, from a shielded to unshielded position for purposes of making radiographic exposure.

"Radiographic operations" -all activities associated with the presence of radioactive sources in a radiographic exposure device during use of the device or transport (except when being transported by a common or contract transport), to include surveys to confirm the adequacy of boundaries, setting up equipment and any activity inside restricted area boundaries.

"S-tube" -a tube through which the radioactive source travels when inside a radiographic exposure device.

"Sealed source"-any radioactive material that is encased in a capsule designed to prevent leakage or escape of the radioactive material.

"Shielded position"-the location within the radiographic exposure device or source changer where the sealed source is secured and restricted from movement. (In this position the radiation exposure will be at a minimum. This position incorporates maximum shielding for the radioactive source.)

"Source assembly"-consists of the sealed source and a connector that attaches the source to the control cable. It may also include a stop ball used to secure the source in the shielded position.

"Source changer"-a device designed and used for replacement of sealed sources in radiographic exposure devices, including those also used for transporting and storage of sealed sources.

"Storage area"-any location, facility, or vehicle which is used to store or to secure a radiographic exposure device, a storage container, or a sealed source when it is not in use; and which is locked or has a physical barrier to prevent accidental exposure, tampering with, or unauthorized removal of the device, container, or source.

"Storage container"-a device in which sealed sources are secured and stored.

"Temporary jobsite" -a place where licensed materials are present for the purpose of performing radiography, other than any permanent radiographic installation.

(b) Equipment. Equipment used in industrial radiographic operations shall meet the following minimum criteria:
(1) Each radiographic exposure device, source assembly or sealed source, and all associated equipment shall meet the requirements specified in American National Standard N432-1980 "Radiological Safety for the Design and Construction of Apparatus for Gamma Radiography", NBS Handbook 136, US Department of Commerce.[3]
(2) In addition to the requirements specified in paragraph (1) of this subdivision, the following requirements apply to radiographic exposure devices, source changers, source assemblies and sealed sources.
(i) Each radiographic exposure device shall have attached to it by the user, a durable, legible, clearly visible label bearing the:
(a) chemical symbol and mass number of the radionuclide in the device;
(b) activity and the date on which this activity was last measured;
(c) model number and serial number of the sealed source;
(d) manufacturer of the sealed source; and
(e) licensee's name, address, and telephone number.

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[3] See section 16.200.

(ii) Radiographic exposure devices intended for use as Type B transport containers shall meet applicable requirements of Title 10 Code of Federal Regulations, Part 71, January 1, 2007[4], excluding Sections 71.2, 71.6, 71.13(c) and (d), 71.14(b), 71.19, 71.101(c)(2)(d)(&(e), 71.107,71.109,71.111, 71.113, 71.115, 71.117, 71.119, 71.121, 71.123, and 71.125.

(iii) Modification of any exposure devices and associated equipment is prohibited.
(3) In addition to the requirements specified in paragraphs (1) and (2) of this subdivision, the following requirements apply to radiographic exposure devices, source assemblies, and associated equipment that allow the source to be moved out of the device for routine operation.
(i) The coupling between the source assembly and the control cable shall be designed in such a manner that the source assembly will not become disconnected if cranked outside the guide tube. The coupling shall be such that it cannot be unintentionally disconnected under normal and reasonably foreseeable abnormal conditions.
(ii) The device shall automatically secure the source assembly when it is cranked back into the fully shielded position within the device. This securing system may only be released by means of a deliberate operation on the exposure device.
(iii) The outlet fittings, lock box, and drive cable fittings on each radiographic exposure device shall be equipped with safety plugs or covers which shall be installed during storage and transportation to protect the source assembly from water, mud, sand or other foreign matter.
(iv) Each sealed source or source assembly shall have attached to it or engraved on it, a durable, legible, visible label with the words: "DANGER-RADIOACTIVE. " The label shall not interfere with the safe operation of the exposure device or associated equipment.
(v) Guide tubes shall be used when moving the source out of the device.
(vi) The guide shall have passed the crushing tests for the control tube as specified in ANSI N432 - 1980 and a kinking resistance test that closely approximates the kinking forces likely to be encountered during use.
(vii) An exposure head or similar device designed to prevent the source assembly from passing out of the end of the guide tube shall be attached to the outermost end of the guide tube during radiographic operations.
(viii) The guide tube exposure head connection shall be able to withstand the tensile test for control units specified in ANSI N432 - 1980.
(ix) Source changers shall provide a system for assuring that the source will not be accidentally withdrawn from the changer when connecting or disconnecting the drive cable to or from a source assembly.
(4) All associated equipment acquired after January 10, 1996 shall be labeled to identify that the components have met the requirements of this section.

(c) Limits on external radiation levels from storage containers and source changers.
The maximum exposure rate limits for storage containers and source changers are 200 millirem (2 millisieverts) per hour at any exterior surface, and 10 millirem (0.1 millisieverts) per hour at 1 meter from any exterior surface with the sealed source in the shielded position.

(d) Locking and relocation of radiographic exposure devices, storage containers, and source changers.
(1) Locked radiographic exposure devices and storage containers shall be physically secured to prevent tampering.
(i) Each radiographic exposure device shall have a lock or outer locked container designed to prevent unauthorized or accidental removal of the sealed source from its shielded position. The exposure device or its container shall be kept locked, (and if a keyed lock, with the key removed at all times), when not under the direct surveillance of a radiographer or a radiographer's assistant or as otherwise may be authorized in subdivision (p) of this section. In addition, during radiographic operations the sealed source assembly shall be manually secured in the shielded position each time the source is returned to that position
(ii) Each sealed source storage container and source changer shall have a lock or outer locked container designed to prevent unauthorized or accidental removal of the sealed source from its shielded position. Storage containers and source changers shall be kept locked when containing sealed sources except when under the direct surveillance of a radiographer or a radiographer's assistant.
(2) Radiographic exposure devices, source changers, and storage containers, prior to being moved from one location to another, shall be disassembled, safety plugs or covers applied, locked and physically secured to prevent accidental loss, tampering or removal of licensed material; and shall be surveyed to assure that the sealed source is in the shielded position before being moved.

(e) Radiation survey instruments.
(1) The licensee shall keep sufficient calibrated and operable radiation survey instruments at each location where radioactive material is present to make the radiation surveys required by this Part. Instrumentation required by this section shall have a range such that 2 millirems (0.02 millisieverts) per hour through 1 rem (0.01 Sievert) per hour can be measured. Survey instruments shall be checked for operability prior to use. This may be accomplished by evaluating the instrument response to

[4] See section 16.200.

the previously measured fields at the projection sheath port or the control cable sheath port on a radiographic exposure device.
(2) The licensee shall have each radiation survey instrument required under paragraph (1) of this subdivision calibrated:
(i) at intervals not to exceed six months and after instrument servicing, except for battery changes;
(ii) for linear scale instruments, at two points located approximately 1/3 and 2/3 of full- scale on each scale; for logarithmic scale instruments, at midrange of each decade, and at two points of at least one decade; and for digital instruments, at appropriate points; and
(iii) so that an accuracy within plus or minus 20 percent of the calibration standard can be demonstrated on each scale.
(3) The licensee shall maintain records of the results of the instrument calibrations in accordance with subdivision (u) of this section

(f) Leak testing and replacement of sealed sources.
(1) The replacement of any sealed source fastened to or contained in a radiographic exposure device, leak testing of any sealed source, and the opening, repair, or modification of any sealed source shall be performed only by persons specifically authorized by an Agreement State or the United States Nuclear Regulatory Commission to do so.
(2) Testing and recordkeeping requirements.
(i) Each licensee who uses a sealed source shall have the source tested for leakage at intervals not to exceed six months.
(ii) The licensee shall maintain records of the leak tests in accordance with subdivision (v) of this section.
(iii) In the absence of a certificate from the transferor that a test has been made within the six months before the transfer, the sealed source may not be used until tested.
(3) Method of testing. The wipe of a sealed source shall be performed using a leak test kit or method approved by an Agreement State or the United States Nuclear Regulatory Commission, and shall be analyzed by a person or company so approved. The wipe sample shall be taken from the nearest accessible point to the sealed source where contamination might accumulate.
(4) Any test conducted pursuant to paragraphs (2) and (3) of this subdivision which reveals the presence of 0.005 microcuries (185 Bq) or more of removable radioactive material shall be considered evidence that the sealed source is leaking. The licensee shall immediately withdraw the equipment involved from use and shall cause it to be decontaminated and repaired or to be disposed of, in accordance with this Part. A report shall also be filed, within five days of the test, with the Department.
(5) Each exposure device using depleted uranium (DU) shielding and an "S" tube configuration shall be tested for depleted uranium contamination at intervals not to exceed 6 months. The wipe of a sealed source shall be performed using a leak test kit or method approved by an Agreement State or the United States Nuclear Regulatory Commission, and shall be analyzed by a person or company so approved Should such testing reveal the presence of 0.005 microcuries (185 Bq) or more of DU contamination, the exposure device shall be removed from use and the until an evaluation of the wear on the S-tube has been made. Should the evaluation reveal that the S-tube is worn through, the device may not be used again. DU shielded devices do not have to be tested for DU contamination while in storage and not in use. Before using or transferring such a device however, the device must be tested for DU contamination if the interval of storage exceeded 12 months.

(g) Quarterly inventory.
(1) Each radiography licensee shall conduct a quarterly physical inventory to account for all sealed sources and for all devices containing depleted uranium, received and possessed under a license.
(2) The licensee shall maintain records of the quarterly inventory in accordance with subdivision (w) of this section.

(h) Inspection and maintenance of radiographic exposure devices, storage containers, associated equipment, and source changers.
(1) The licensee shall visually check for obvious defects in radiographic exposure devices, storage containers, associated equipment, and source changers prior to use each day the equipment is used, and ensure that the equipment is in good working condition and that required labeling is present. If defects are found, the equipment shall be removed from service until repaired, and a record shall be made in accordance with subdivision (y) of this section.
(2) Each licensee shall have a program for inspection and routine maintenance of radiographic exposure devices, source changers, associated equipment and storage containers prior to the first use and at intervals not to exceed three months thereafter to ensure the proper functioning of components important to safety. Replacement components shall meet design specifications. If equipment problems are found, the equipment shall be removed from service until repaired. Records of such inspection, maintenance, removal from service and repair shall be made in accordance with subdivision (y) of this section.
(3) Each licensee shall have a program for inspection and maintenance necessary to maintain the Type B packaging used to transport radioactive materials. The inspection and maintenance program shall include procedures to assure that Type B packages are shipped and maintained in accordance with the certificate of compliance or other approval. Records of such inspection, maintenance, removal from service and repair shall be made in accordance with subdivision (y) of this section.

(i) Permanent radiographic installations.
(1) Permanent radiographic installations shall have high radiation area entrance controls of the types described in subdivision 16.12(d) of this Part , and shall also meet the following special requirements.
(2) Each entrance that is used for personnel access to the high radiation area in a permanent radiographic installation to which this section applies shall have both visible and audible warning signals to warn of the presence of radiation. The visible signal shall be actuated by radiation whenever the source is exposed. The audible signal shall be actuated when an attempt is made to enter the installation while the source is exposed.
(3) The alarm system shall be tested for proper operation with a radiation source each day before the installation is used for radiographic operations, and at intervals not to exceed three months. The test shall include a check of both the visible and audible signals. Entrance control devices that reduce the radiation level upon entry (designated in subdivsion (d) of this section) shall be tested monthly. If an entrance control device or an alarm is operating improperly, it shall be immediately labeled as defective and repaired within 7 calendar days. The facility may continue to be used during this 7-day period, provided the licensee implements the continuous surveillance requirements of subdivison (p) and uses an alarming ratemeter. Test records for entrance controls and audible and visual alarm shall be maintained in accordance with subdivison (z).

(j) Labels, storage, and transportation precautions.
(1) Labels.
(i) The licensee may not use a source changer or container to store licensed material unless the source changer or the container has securely attached to it a durable, legible, and clearly visible label. The label shall contain the radiation symbol specified in section 16.12 of this Part that has a minimum diameter of 1 inch (25mm) and the wording "CAUTION (OR DANGER) RADIOACTIVE MATERIAL-DO NOT HANDLE, NOTIFY CIVIL AUTHORITIES (OR NAME OF COMPANY)".
(ii) The licensee may not transport licensed material unless the material is packaged, labeled, marked, and accompanied with appropriate shipping papers in accordance with the requirements of section 16.17 of this Part.
(2) Security precautions during storage and transportation.
(i) Locked radiographic exposure devices and storage containers shall be physically secured to prevent tampering or removal by unauthorized personnel. The licensee shall store licensed material in a manner which will minimize danger from explosion or fire.
(ii) The licensee shall lock and physically secure the transport package containing licensed material in the transporting vehicle to prevent accidental loss, tampering, or unauthorized removal of the licensed material from the vehicle.

(k) Radiation Safety Officer. The Radiation Safety Officer (RSO) shall ensure that radiation safety activities are being performed in accordance with approved procedures and regulatory requirements in the daily operation of the licensee's program.
(1) The RSO's qualification shall include:
(i) completion of the training and testing requirements of paragraph (l)(1) of this section; and
(ii) two years of hands-on experience as a qualified radiographer in industrial radiographic operations, and
(iii) formal training in the establishment and maintenance of a radiation protection program., or
(iii) The Department will consider alternatives when the individual has appropriate training and/or experience in the field of ionizing radiation, and in addition, has adequate formal training with respect to the establishment and maintenance of a radiation safety protection program.

(2) The specific duties of the RSO include, but are not limited to, the following:
(i) to establish and oversee operating, emergency, and ALARA procedures, and to review them regularly to ensure that the procedures are current and conform with these regulations and to the license conditions;
(ii) to oversee and approve all phases of the training program for radiographic personnel so that appropriate and effective radiation protection practices are taught;
(iii) to ensure that required radiation surveys and leak tests are performed and documented in accordance with these regulations, including any corrective measures when levels of radiation exceed established limits;
(iv) to ensure that personnel monitoring devices are calibrated and used properly by occupationally exposed personnel, that records are kept of the monitoring results, and that timely notifications are made as required by section 16.15 of this Part ; and
(v) to ensure that operations are conducted safely and to assume control and have the authority to institute corrective actions, including stopping of operations, when necessary in emergency situations or unsafe conditions.

(l) Training.
(1) The licensee shall not permit any individual to act as radiographer until such individual:
(i) has been instructed in the subjects outlined in paragraph (6) of this subdivision;
(ii) has received a minimum of 2 months of on-the-job training;

(iii) is certified through a radiographer certification program by a certifying entity in accordance with the criteria specified in subparagraph (vii) of this paragraph;
(iv) has received copies of, and instruction in, regulations contained in this Part; in the license under which the radiographer will perform radiography, and the licensee's operating and emergency procedures;
(v) has demonstrated competence to use the licensee's radiographic exposure devices, sealed sources, related handling tools, and survey instruments; nd
(vi) has demonstrated understanding of the instructions in this paragraph by successful completion of a written test and a field examination on the subjects covered in paragraph (6) of this subdivision.
(vii) All certification programs shall:
(*a*). Require applicants for certification to (a) receive training in the topics set forth in subdivision (l) of this section or equivalent requirements of the United States Nuclear Regulatory Commission or another Agreement State, and (b) satisfactorily complete a written examination covering these topics;
(*b*) Require applicants for certification to provide documentation that demonstrates that the applicant has: (a) received training in the topics set forth in subdivision (l) of this section or equivalent requirements of the United States Nuclear Regulatory Commission or another Agreement State; (b) satisfactorily completed a minimum period of on-the-job training; and (c) has received verification by an Agreement State or a NRC licensee that the applicant has demonstrated the capability of independently working as a radiographer;
(*c*) Include procedures to ensure that all examination questions are protected from disclosure;
(*d*) Include procedures for denying an application, revoking, suspending, and reinstating a certificate;
(*e*) Provide a certification period of not less than 3 years nor more than 5 years;
(*f*) Include procedures for renewing certifications and, if the procedures allow renewals without examination, require evidence of recent full-time employment and annual refresher training.
(*g*) Provide a timely response to inquiries, by telephone or letter, from members of the public, about an individual's certification status.
(*h*) Requirements for Written Examinations. All examinations shall be:
(*1*) Designed to test an individual's knowledge and understanding of the topics listed in subdivision (l) of this section or equivalent requirements of the United States Nuclear Regulatory Commission or another Agreement State;
(*2*) Written in a multiple-choice format;
(*3*) Have test items drawn from a question bank containing psychometrically valid questions based on the material in subdivision (l) of this section or equivalent requirements of the United States Nuclear Regulatory Commission or another Agreement State.
(2) The licensee shall not permit any individual to act as a radiographer's assistant until such individual:
(i) has received copies of and instruction in regulations contained in this Part, in the license under which the assistant radiographer will work, and the licensee's operating and emergency procedures;
(ii) has demonstrated competence to use, under the personal supervision of the radiographer, the radiographic exposure devices, sealed sources, associated equipment, related handling tools, and radiation survey instruments that the assistant will use; and
(iii) has demonstrated understanding of the instructions in this paragraph by successfully completing a written or oral test and has demonstrated competence in the use of hardware described in this paragraph by successful completion of a practical examination on the use of such hardware.
(3) The licensee shall provide periodic training for radiographers and radiographer's assistants at least once during each calendar year.
(4) The licensee shall conduct a semi-annual inspection program of the job performance of each radiographer and radiographer's assistant to ensure that these regulations, license requirements, and the applicant's operating and emergency procedures are followed. The inspection program shall:
(i) include observation of the performance of each radiographer and radiographer's assistant during an actual radiographic operation at intervals not to exceed six months; and
(ii) provide that, if a radiographer or a radiographer's assistant has not participated in a radiographic operation for more than six months since the last inspection, the radiographer shall demonstrate knowledge in the training requirements in ths subdivision and the radiographer’s assistant shall re-demonstrate knowledge of the training requirements in this subdivision by a practical examination before these individuals can next participate in a radiographic operation.
(5) The licensee shall maintain records of the above training; to include written, oral, and practical examinations, periodic training, and semi-annual inspections of job performance in accordance with subdivision (aa) of this section.
(6) The licensee shall include the following subjects in the training required in subparagraph (1)(i) of this subdivision:
(i) fundamentals of radiation safety including:
(a) characteristics of gamma radiation;
(b) units of radiation dose and quantity of radioactivity;
(c) hazards of exposure to radiation;
(d) levels of radiation from licensed material; and
(e) methods of controlling radiation dose (time, distance, and shielding);

(ii) radiation detection instruments including:
(a) use, operation, calibration, and limitations of radiation survey instruments;
(b) survey techniques; and
(c) use of personnel monitoring equipment;
(iii) equipment to be used including:
(a) operation and control of radiographic exposure equipment, remote handling equipment, and storage containers, including pictures or models of source assemblies (pigtails);
(b) storage, control, and disposal of licensed material; and
(c) inspection and maintenance of equipment;
(iv) the requirements of this Part and of pertinent Federal regulations; and
(v) case histories of accidents in radiography.

(m) Operating and emergency procedures.
(1) Operating and emergency procedures shall include instructions in at least the following:
(i) the handling and use of licensed sealed sources and radiographic exposure devices to be employed, such that no person is likely to be exposed to radiation doses in excess of the limits established in this Part;
(ii) methods and occasions for conducting radiation surveys;
(iii) methods for controlling access to radiographic areas;
(iv) methods and occasions for locking and securing radiographic exposure devices, storage containers and sealed sources;
(v) personnel monitoring and the use of personnel monitoring equipment;
(vi) transporting sealed sources to field locations, including packing of radiographic exposure devices and storage containers in the vehicles, placarding of vehicles when needed, and control of the sealed sources during transportation;
(vii) the inspection, maintenance, and operability checks of radiographic exposure devices, survey instruments, transport containers, and storage containers;
(viii) steps that shall be taken immediately by radiography personnel in the event a pocket dosimeter is found to be off-scale, or an alarming ratemeter alarms unexpectedly;
(ix) the procedure(s) for identifying and reporting equipment malfunction, as required by section 16.15(b)(2)(iii) of this Part (rule).
(x) the procedure for notifying proper persons in the event of an accident;
(xi) minimizing exposure of persons in the event of an accident;
(xii) source recovery procedure if licensee will perform source recovery; and
(xiii) maintenance of records.
(2) The licensee shall maintain copies of current operating and emergency procedures in accordance with subdivision (bb) of this section.

(n) Personnel monitoring.
(1) The licensee shall not permit any individual to act as a radiographer or a radiographer's assistant unless, at all times during radiographic operations, each such individual wears a direct reading dosimeter, an alarm ratemeter, and a personnel dosimeter that is processed and evaluated by an accredited National Voluntary Laboratory Accreditation Program (NVLAP) processor. At permanent radiography facilities where other appropriate alarming or warning devices are in routine use, the wearing of an alarm ratemeter is not required. Direct reading dosimeters shall have a range from zero to 200 millirems (2 millisieverts) and shall be recharged at the start of each shift. In cases where the exposure will be greater than 200 millirems (2 millisieverts) an exemption shall be applied for to use a direct reading dosimeter with a higher endpoint. Electronic personal dosimeters may only be used in place of pocket ion-chamber dosimeters. Each personnel dosimeter shall be assigned to and worn by only one individual. Personnel monitoring devices shall be replaced at least monthly. After replacement, each personnel monitoring device sshall be processed as soon as possible.
(2) Direct reading dosimeters such as pocket ion-chamber dosimeters or electronic personal dosimeters shall be read and the exposures recorded at the beginning and end of each shift, and records shall be maintained in accordance with subdivision (cc) of this section.
(3) Pocket ion-chamber dosimeters or electronic personal dosimeters shall be checked at periods not to exceed 12 months for correct response to radiation, and records shall be maintained in accordance with subdivision (cc) of this section. Acceptable dosimeters shall read within plus or minus 20 percent of the true radiation exposure.
(4) If an individual's pocket dosimeter is found to be off scale, or electronic personal dosimeter reads greater than 200 millirems (2 millisieverts), and the possibility of radiation exposure cannot be ruled out as the cause, his/her personnel monitoring device shall be immediately sent for processing. In addition, the individual shall not work with licensed material until a determination of his/her radiation exposure has been made. This determination shall be made by the RSO or his/her designee. The results of this determination shall be included in the records maintained in accordance with subdivision (cc) of this section.
(5) If a personnel monitoring device is lost or damaged, the worker shall cease work immediately until a replacement unit is provided and the exposure is calculated for the time period from issuance to loss or damage. The results of the calculated

exposure shall be included in the records maintained in accordance with subdivision (cc) of this section.(6) Reports received from the NVLAP accredited personnel dosimeter processor shall be retained in accordance with subdivision (cc) of this section.
(7) Each alarm ratemeter shall:
(i) be checked to ensure that the alarm functions properly (sounds) prior to use at the start of each shift;
(ii) be set to give an alarm signal at a preset dose rate of 500 mrem/hr (5 mSv/hr); with an accuracy of plus or minus 20 percent of the true radiation dose rate;
(iii) require special means to change the preset alarm function;
(iv) have the alarm function turned "on" at all times during radiographic operations; and
(v) be calibrated at periods not to exceed 12 months for correct response to radiation. The licensee shall maintain records of alarm ratemeter calibrations in accordance with subdivision (cc) of this section.

(o) Radiation surveys.
The licensee shall:
(1) Maintain at least one calibrated and operable radiation survey instrument that meets the requirements of subdivision (e) of this section at each location of its radiographic operations whenever radiographic operations are being performed, including a source exchange; and at the storage area, as defined in subdivision (a) of this section, whenever a radiographic exposure device, a storage container, or source is being placed in storage.
(2) Conduct a survey of the radiographic exposure device (camera) and guide tube with a radiation survey instrument after each exposure to determine that the sealed source has been returned to its shielded position.
(3) Conduct a survey of the source guide tube to determine that the source has been returned to its shielded position prior to exchanging films, repositioning the collimator, or dismantling equipment.
(4) Conduct a survey with a radiation survey instrument any time the source is exchanged and whenever a radiographic exposure device is placed in a storage area, as defined in subdivision (a) of this section to determine that the sealed source is in its shielded position.
(5) Maintain records in accordance with subdivision (dd) of this section.

(p) Security. During each radiographic operation the radiographer or radiographer's assistant shall maintain a continuous direct visual surveillance of the operation to protect against unauthorized entry into a high radiation area, as defined in this Part, except at permanent radiographic installations where all entryways to the high radiation area are locked to protect against unauthorized or accidental entry and the requirements of subdivison (I) of this section are met.

(q) Posting. Notwithstanding any provisions in section 16.12(b)(2) of this Part, areas in which radiography is being performed shall be conspicuously posted as required by section 16.12(b)(1) of this Part.

(r) Supervision of radiographers' assistants. Whenever a radiographer's assistant uses radiographic exposure devices, associated equipment, sealed sources or related source handling tools, or conducts radiation surveys required by paragraph (o)(2) of this section to determine that the sealed source has returned to the shielded position after an exposure, the assistant shall be under the personal supervision of a radiographer. The personal supervision shall include:
(1) the radiographer's personal presence at the site where the sealed sources are being used;
(2) the ability of the radiographer to give immediate assistance if required; and
(3) the radiographer's direct observation of the assistant's performance of the operations referred to in this section.

(s) Requirements for radiographic operations conducted outside of a permanent radiographic installation. (1) Whenever radiography will be performed outside of a permanent radiographic installation the radiographer shall be accompanied by another qualified radiographer, or an individual with at least the qualifications of a radiographer's assistant. That individual shall observe the operations and shall be capable of providing immediate assistance to prevent unauthorized entry. Radiography shall not be performed if only one qualified individual is present.
(2) All radiographic operations conducted at the location of use authorized on the license shall be conducted in a permanent radiographic installation, unless specifically authorized by the Department.

(t) Records of receipt and transfer of sealed sources.
(1) Each licensee shall maintain records showing the receipts and transfers of sealed sources, and devices using depleted uranium shielding.
(2) These records shall include the date, the name of the individual making the record, the radionuclide, number of curies (becquerels) or mass of depleted uranium, and make, model, and serial number of each sealed source and device, as appropriate.
(3) The licensee shall retain the records required by paragraph (1) of this subdivision for three years after the record is made.

(u) Records of radiation survey instruments.
(1) Each licensee shall maintain records of the calibrations of it's radiation survey instruments.
(2) The licensee shall retain the records required by paragraph (1) of this subdivision for three years after the record is made.

(v) Records of leak testing and replacement of sealed sources.
(1) Each licensee shall maintain records of leak test results in units of microcuries (becquerels) per test sample..
(2) The licensee shall retain the records required by paragraph (1) of this subdivision for three years after the record is made.

(w) Records of quarterly inventory.
(1) Each licensee shall maintain records of the quarterly inventory of sealed sources and devices containing depleted uranium.
(2) The record shall include the model number, serial number and manufacturer of each source/device, the radionuclide and the quantity in each source/device, the location of each, the name of the individual conducting the inventory, and the date of the inventory.
(3) The licensee shall retain the records required by paragraph (1) of this subdivision for three years after the record is made.

(x) Utilization logs.
(1) Each licensee shall maintain current utilization logs at the address specified in the license, showing for each sealed source the following information:
(i) a description, including the make, model number, and serial number of the radiographic exposure device or storage container in which the sealed source is located;
(ii) the identity and signature of the radiographer to whom assigned; and
(iii) the plant or site where used and dates of use, including the dates removed and returned to storage.
(2) The licensee shall retain the logs required by paragraph (1) of this subdivision for three years after the log is made.

(y) Records of inspection and maintenance of radiographic exposure devices, transport and storage containers, associated equipment, source changers and survey instruments.
(1) Each licensee shall maintain records of inspection and maintenance of radiographic exposure devices, transport and storage containers, associated equipment, source changers and survey instruments.
(2) The record shall include the date of check, name of inspector, equipment involved, any defects found, and repairs made.
(3) The licensee shall retain the records required by paragraph (1) of this subdivision for three years after the record is made.

(z) Records of permanent radiographic installations.
(1) Each licensee shall maintain records of alarm system and entrance control device tests.
(2) The licensee shall retain the records required by paragraph (1) of this subdivision for three years after the record is made.

(aa) Records of training and certification.
(1) Each licensee shall maintain records of training and certification of each radiographer and each radiographer's assistant, to include copies of written tests,dates of oral tests, and practical examinations. The record shall also include radiographer certification documents and verification of certification status.
(2) Each licensee shall maintain records of annual refresher training and semi-annual inspections of job performance for each radiographer and each radiographer's assistant. The records shall list the topics discussed, the dates of the reviews, and names of the instructor and attendees. For inspections of job performance, the records shall also include a list showing the items checked and any non-compliances observed by the RSO.

(3) The licensee shall retain the records required by paragraphs (1) and (2) of this subdivision for three years after the record is made

(bb) Copies of operating and emergency procedures.
(1) Each licensee shall maintain a copy of current operating and emergency procedures.
(2) The licensee shall retain the records until the Department terminates the license.
(3) If procedures are superseded, the licensee shall retain the superseded material for three years after each change.

(cc) Records of personnel monitoring.
(1) Each licensee shall maintain records of daily exposures recorded from direct reading dosimeters, and of yearly checks for correct dosimeter response to radiation within plus or minus 20 percent of true radiation exposure.
(2) The licensee shall retain the records required by paragraph (1) of this subdivision for three years after the record is made.
(3) Each licensee shall maintain records of personnel dosimeter results received from the accredited NVLAP processor.
(4) The licensee shall retain the records required by paragraph (3) until the Department terminates the license.

(5) Each licensee shall maintain records of the calibrations of alarm ratemeters for three years after the record is made.
(6) Each licensee shall maintain records of estimates of exposures as a result of off-scale personal direct reading dosimeters, or lost or damaged personnel dosimeters until the Department terminates the license.

(dd) Records of radiation surveys.
(1) Each licensee shall maintain records of the survey of a radiographic exposure device and source guide tube after the last exposure of the work day, after any source exchange, and whenever a device is placed in a storage area.
(2) The licensee shall retain the records required by paragraph (1) of this subdivision for three years after the record is made.

(ee) Form of records. Each record required by this Part shall be legible throughout the specified retention period. The record may be the original or a reproduced copy, or a microform provided that the copy or microform is authenticated by authorized personnel and that the microform is capable of reproducing a clear copy throughout the required retention period. The record may also be stored in electronic media with the capability for producing legible, accurate, and complete records during the required retention period. Records, such as letters, drawings, and specifications, shall include all pertinent information, such as stamps, initials, and signatures. The licensee shall maintain adequate safeguards against tampering with and loss of records.

(ff) Location of records. All records required by this Part shall be maintained for inspection at the address listed on the license. However, if this address is not located within New York State the licensee shall, at the request of the Department, bring such records as pertain to use of radiation sources in New York State, to such location within the state as the Department may direct for the purpose of inspection.

(gg) Documents required at temporary jobsites. Each licensee conducting operations at a temporary jobsite shall maintain copies of the following documents and records at the temporary jobsite until the radiographic operation is completed:
(1) operating and emergency procedures required by subdivision (m) of this section;
(2) evidence of latest calibration of the radiation survey instruments in use at the site required by subdivision (u) of this section;
(3) the latest survey records, required by subdivision (dd) of this section;
(4) the shipping papers for the transportation of radioactive materials; and
(5) a copy of the license authorizing use of licensed materials;
(6) a copy of this Part;
(7) evidence of the latest calibrations fo alarm ratemeteres and operabiltiy checks of pocket dosimeters and/or electronic personal dosimeters.

(hh) Notification of incidents.
(1) In addition to the reporting requirements specified in section 16.15 of this Part, each licensee shall provide a written report to the Department of the occurrence of any of the following incidents involving radiographic equipment:
(i) unintentional disconnection of the source assembly from the control cable;
(ii) inability to retract the source assembly to its full shielded position and secure it in this position;
(iii) failure of any component (critical to safe operation of the device) to properly perform its intended function.
(2) The licensee shall include the following information in each report submitted under paragraph (1) of this subdivision, and in each report of overexposure submitted under section 16.15(c) of this Part which involve failure of safety components of radiography equipment:
(i) a description of the equipment problem;
(ii) cause of each incident, if known;
(iii) manufacturer and model number of equipment involved in the incident;
(iv) place, time and date of the incident;
(v) actions taken to establish normal operations;
(vi) corrective actions taken or planned to prevent recurrence; and
(vii) qualifications of personnel involved in the incident.