

25 TEXAS ADMINISTRATIVE CODE

§289.253

Radiation Safety Requirements for Well Logging Service Operations and Tracer Studies

Texas Regulations for Control of Radiation

(revisions effective March 29, 2006
are shown as shaded text)

	<u>Page</u>
§289.253(a) Purpose.....	253-1
§289.253(b) Scope.....	253-1
§289.253(c) Definitions	253-1
§289.253(d) Prohibitions	253-3
§289.253(e) Limits on Levels of Radiation	253-4
§289.253(f) Storage Precautions.....	253-4
§289.253(g) Transport Precautions	253-5
§289.253(h) Radiation Survey Instruments.....	253-5
§289.253(i) Leak Testing of Sealed Sources.....	253-6
§289.253(j) Quarterly Inventory.....	253-6
§289.253(k) Utilization Records	253-6
§289.253(l) Design and Performance Criteria for Sealed Sources Used in Well Logging Operations	253-7
§289.253(m) Labeling	253-8
§289.253(n) Inspection and Maintenance	253-8
§289.253(o) Training Requirements	253-9
§289.253(p) Operating, Safety, and Emergency Procedures	253-10
§289.253(q) Personnel Monitoring	253-10
§289.253(r) Radiation Safety Officer	253-11
§289.253(s) Security	253-12
§289.253(t) Handling Tools	253-12
§289.253(u) Tracer Studies	253-12
§289.253(v) Particle Accelerators	253-13
§289.253(w) Radioactive Markers	253-13
§289.253(x) Uranium Sinker Bars	253-13
§289.253(y) Energy Compensation Source.....	253-13
§289.253(z) Tritium Neutron Generator Target Source.....	253-14

25 TAC §289.253

Radiation Safety Requirements for Well Logging Service Operations and Tracer Studies (Continued)

	<u>Page</u>
§289.253(aa) Radiation Surveys	253-14
§289.253(bb) Records/Documents for Inspection by the Agency	253-14
§289.253(cc) Notification of Incidents and Lost Sources; Abandonment Procedures for Irretrievable Sources	253-15
§289.253(dd) Appendices.....	253-18
§289.253(dd)(1) Subjects to be Included in Training Courses for Well Logging Service Operations and/or Tracer Studies	253-18
§289.253(dd)(2) Additional Training for Individuals Performing Tracer Studies	253-19
§289.253(dd)(3) Example of a Plaque for Identifying Wells Containing Sealed Sources of Radioactive Material Abandoned Downhole.....	253-20
§289.253(dd)(4) Operating, Safety, and Emergency Procedures	253-21
§289.253(dd)(5) Time Requirements for Record Keeping	253-22

25 TEXAS ADMINISTRATIVE CODE

§289.253. Radiation Safety Requirements for Well Logging Service Operations and Tracer Studies.

(a) Purpose. This section establishes radiation safety requirements for persons using sources of radiation for well logging service operations, including radioactive markers, mineral exploration and tracer studies.

(b) Scope. This section applies to all persons who use sources of radiation for well logging service operations, radioactive markers, mineral exploration and tracer studies. In addition to the requirements of this section, persons are subject to the requirements of §289.201 of this title (relating to General Provisions for Radioactive Material), §289.202 of this title (relating to Standards for Protection Against Radiation from Radioactive Material), §289.203 of this title (relating to Notices, Instructions, and Reports to Workers; Inspections), §289.204 of this title (relating to Fees for Certificates of Registration, Radioactive Material Licenses, Emergency Planning and Implementation, and Other Regulatory Services), §289.205 of this title (relating to Hearing and Enforcement Procedures), §289.226 of this title (relating to Registration of Radiation Machine Use and Services), §289.229 of this title (relating to Radiation Safety Requirements for Accelerators, Therapeutic Radiation Machines, and Simulators), §289.231 of this title (relating to General Provisions and Standards for Protection Against Machine-Produced Radiation), §289.252 of this title (relating to Licensing of Radioactive Material), and §289.257 of this title (relating to Packaging and Transportation of Radioactive Material).

(c) Definitions. The following words and terms when used in this section shall have the following meaning unless the context clearly indicates otherwise.

(1) Energy compensation source (ECS) -- A small sealed source with an activity not exceeding 100 microcurie (μCi) (3.7 megabecquerel (MBq)), used within a logging tool or other tool components, to provide a reference standard to maintain the tool's calibration when in use.

(2) Field station (additional authorized use/storage location) -- A facility where sources of radiation may be stored or used and from which equipment is dispatched to temporary job sites.

(3) Injection tool -- A device used for subsurface or downhole controlled injection of radioactive tracer material.

(4) Logging assistant (equipment operator) -- Any individual who, under the personal supervision of a logging supervisor, handles sealed sources or tracers that are not in logging tools or shipping containers or who performs surveys required by subsection (aa) of this section.

(5) Logging supervisor (field engineer) -- The individual who provides personal supervision of the use of sources of radiation at temporary job sites.

(6) Logging tool -- A device used subsurface to perform well logging.

(7) Mineral logging -- Any logging performed for the purpose of mineral exploration other than oil or gas.

(8) Personal supervision -- Guidance and instruction by the supervisor, who is physically present at the job site and in such proximity that visual contact can be maintained and immediate assistance given as required.

(9) Radiation safety officer -- An individual named by the licensee or registrant and listed on the license or certificate of registration who has a knowledge of, responsibility for, and authority to enforce appropriate radiation protection rules, standards, and practices on behalf of the licensee and/or registrant; and who meets the requirements of subsection (r) of this section.

(10) Radioactive marker -- Radioactive material placed subsurface or upon a structure intended for subsurface use for the purpose of depth determination or direction orientation.

(11) Residential location -- Any area where structures in which people lodge or live are located, and the grounds on which these structures are located including, but not limited to, houses, apartments, condominiums, and garages.

(12) Screenout -- A situation in which radioactive tracer material is reversed out of an oil or gas well (well returns).

(13) Service company -- Any contracted or subcontracted company that is present at the temporary job site, specifically, that company to which the licensee's equipment is connected and that is exposed to radioactive material.

(14) Source holder -- A housing or assembly into which a radioactive source is placed for the purpose of facilitating the handling and use of the source.

(15) Storage container -- A container designed to provide radiation safety and security when sources of radiation are being stored.

(16) Temporary job site -- A location where well logging or tracer studies are performed other than the specific location(s) listed on a license or certificate of registration.

(17) Tracer study -- The release of a substance tagged with radioactive material for the purpose of tracing the movement or position of the tagged substance in the wellbore, at the wellhead, or adjacent formation.

(18) Transport container -- A container that meets the requirements of the United States Department of Transportation (DOT) and is designed to provide radiation safety and security when sources of radiation are being transported.

(19) Tritium neutron generator target source -- A tritium source used within a neutron generator tube to produce neutrons for use in well logging applications.

(20) Uranium sinker bar -- A weight containing depleted uranium used to aid in the descent of a logging tool down toward the bottom of a wellbore.

(21) Wellbore -- A drilled hole in which wireline service operations are performed.

(22) Well logging -- All operations involving the lowering and raising of measuring devices or logging tools (that may or may not contain sources of radiation) into wellbores or cavities for the purpose of obtaining information about the well and/or adjacent formations.

(23) Wireline -- An armored steel cable, containing one or more electrical conductors, used to lower and raise logging tools in the wellbore.

(24) Wireline service operation -- Any mechanical or electronic service that is performed in the wellbore using devices that are lowered into the well on a wireline for purposes of evaluation.

(d) Prohibitions.

(1) No licensee shall perform well logging service operations with a sealed source(s) in any well or wellbore unless, prior to commencement of the operation, the licensee has a written agreement with the well operator, well owner, drilling contractor, or land owner that specifies who will be responsible for ensuring the following requirements are met:

(A) a reasonable effort at recovery will be made in the event a sealed source is lost or lodged downhole;

(B) a person shall not attempt to recover a sealed source in a manner that, in the licensee's opinion, could result in a source rupture;

(C) in the event the environment, any equipment, or personnel are contaminated with radioactive material, decontamination to levels specified in §289.202(f), (n), and (eee) of this title shall be performed; and

(D) the requirements of subsection (cc)(4) of this section shall be met in the event a decision is made to abandon the sealed source downhole.

(2) No licensee shall perform tracer study operations with a substance tagged with radioactive material in any well or wellbore unless, prior to commencement of the operation, the licensee has a written agreement with the well operator, well owner, drilling contractor or land owner, and the service company to which the licensee's equipment is connected, as applicable, that specifies who will be responsible for ensuring the following requirements are met:

(A) in the event the service company's personnel or equipment are contaminated with radioactive material, they shall be decontaminated in accordance with §289.202(n) or (ddd) of this title before release from the job site or release for unrestricted use, respectively;

(B) in the event the well head or job site is contaminated with radioactive material, it shall be decontaminated in accordance with §289.202(ddd) of this title; and

(C) in the event radioactive material is to be reversed from the well or the well screens out, the licensee shall have established procedures and equipment or facilities to do the following:

(i) reverse material into a preconstructed steel or lined pit that is specifically established in the event of a screen out; or

(ii) reverse material into suitable transport container(s) in the event of a screen out.

(3) The licensee shall maintain, in accordance with subsection (dd)(5) of this section, a copy of the written agreement specified in paragraphs (1) or (2) of this subsection.

(e) Limits on levels of radiation. Sources of radiation shall be used, stored, and transported in such a manner that the requirements of §289.202 of this title, §289.231 of this title, and §289.257 of this title, as applicable, are met.

(f) Storage precautions.

(1) Each source of radiation, except accelerators, shall be provided with a storage and/or transport container. Each container shall have a lock (or tamper seal for calibration sources) to prevent unauthorized removal of, or exposure to, the source of radiation.

(2) Each area or room in which sources of radiation are stored shall be posted in accordance with §289.202(aa)(5) or §289.231(x) of this title, as applicable.

(3) Sources of radiation, except accelerators, shall be stored downhole or in a bunker in order to minimize the danger from explosion and/or fire.

(4) Sources of radiation may not be stored in residential locations. This section does not apply to storage of radioactive material in a vehicle in transit for use at temporary job sites, if the licensee complies with subsection (aa)(2) of this section.

(5) Sources of radiation in storage shall be secured to prevent tampering, or removal by unauthorized individuals.

(g) Transport precautions. Transport containers shall be locked and physically secured to the transporting vehicle to prevent shifting during transport, accidental loss, tampering, or unauthorized removal.

(h) Radiation survey instruments.

(1) The licensee or registrant shall maintain a sufficient number of calibrated and operable radiation survey instruments at each location where sources of radiation are stored or used to make physical radiation surveys as required by this section and by §289.202(p) or §289.231(s), of this title, as applicable. Instrumentation shall be capable of measuring 0.1 milliroentgen per hour (mR/hr) (1 microsievert per hour (μ Sv/hr)) through at least 50 mR/hr (500 μ Sv/hr). (Instrumentation capable of measuring 0.1 mR/hr (1 μ Sv/hr) through 50 mR/hr (500 μ Sv/hr) may not be sufficient to determine compliance with DOT requirements.)

(2) A licensee using tracer material shall have available at each additional authorized use/storage location and temporary job site additional calibrated and operable radiation survey instruments sensitive enough to detect the radioactive surface contamination limits specified in §289.202(eee) of this title.

(3) Each radiation survey instrument shall be calibrated:

(A) by a person specifically licensed or registered by the agency, another agreement state or licensing state or the United States Nuclear Regulatory Commission (NRC) to perform such service;

(B) at intervals not to exceed six months and after each survey instrument repair;

(C) for the types of radiation used and at energies appropriate for use;
and

(D) at an accuracy within $\pm 20\%$ of the true radiation level at each calibration point.

(4) The licensee or registrant shall maintain calibration records in accordance with subsection (dd)(5) of this section.

(i) Leak testing of sealed sources.

(1) Testing and record keeping. Sealed sources shall be tested for leakage and contamination in accordance with this section and §289.201(g) of this title. The licensee shall maintain records of leak tests in accordance with subsection (dd)(5) of this section.

(2) Each energy compensation source that is not exempt from testing in accordance with §289.201(g)(2) of this title must be tested at intervals not to exceed three years. In the absence of a certificate from a transferor that a test has been made within the three years before the transfer, the energy compensation source may not be used until tested in accordance with §289.201(g) of this title.

(3) If a sealed source is found to be leaking in accordance with §289.201(g) of this title, the licensee shall check the equipment associated with the leaking source for radioactive contamination and, if contaminated, have it decontaminated or disposed of by persons specifically authorized by the agency, the NRC, an agreement state, or a licensing state, to perform such services.

(j) Quarterly inventory. Each licensee or registrant shall conduct a physical inventory to account for all sources of radiation received or possessed at intervals not to exceed three months. The licensee or registrant shall make and maintain records of inventories in accordance with subsection (dd)(5) of this section and shall include the following:

- (1) the quantities and kinds of sources of radiation;
- (2) the location where sources of radiation are assigned;
- (3) a unique identification of each source of radiation;
- (4) the date of the inventory; and
- (5) the name of the individual conducting the inventory.

(k) Utilization records. Utilization records shall be maintained by each licensee or registrant in accordance with subsection (dd)(5) of this section and shall include the following information for each source of radiation:

- (1) identification of each source of radiation to include:
 - (A) the make and model number and/or serial number (or if absent, a description) of each sealed source used; or
 - (B) the radionuclide and activity of tracer materials and radioactive markers used at a particular well site and the disposition of any unused tracer materials.

(2) the identity of the logging supervisor or individual who is responsible for receiving sources of radiation, to whom assigned; and

(3) the locations where used and dates of use.

(l) Design and performance criteria for sealed sources used in well logging operations.

(1) Each sealed source used in well logging applications shall meet the following minimum criteria.

(A) The sealed source is of doubly encapsulated construction.

(B) The sealed source contains radioactive material with a chemical/physical form as insoluble and nondispersible as practicable.

(C) The sealed source meets one of the following requirements:

(i) for a sealed source manufactured on or before July 14, 1989, the requirements from the United States of America Standards Institute (USASI) N5.10-1968, "Classification of Sealed Radioactive Sources," or the requirements in clause (ii) or (iii) of this subparagraph;

(ii) for a sealed source manufactured after July 14, 1989, the oil-well logging requirements from the American National Standard Institute/Health Physics Society (ANSI/HPS) N43.6-1997, "Sealed Radioactive Sources-Classification;" or

(iii) for a sealed source manufactured after July 14, 1989, the sealed source's prototype has been tested and found to maintain its integrity after each of the following tests:

(I) Temperature. The test source shall be held at -40 degrees Celsius for 20 minutes, 600 degrees Celsius for one hour, and then be subjected to a thermal shock test with a temperature drop from 600 degrees Celsius to 20 degrees Celsius within 15 seconds.

(II) Impact. A 5 kilogram (kg) steel hammer, 2.5 centimeters (cm) in diameter, shall be dropped from a height of 1 meter (m) onto the test source.

(III) Vibration. The test source shall be subjected to a vibration from 25 Hertz (Hz) to 500 Hz with a peak amplitude of five times the acceleration of gravity for 30 minutes.

(IV) Puncture. A 1 gram (gm) hammer and pin, 0.3 cm pin diameter, shall be dropped from a height of 1 m onto the test source.

(V) Pressure. The test source shall be subjected to an external pressure of 24,600 pounds per square inch absolute (1.695×10^7 pascals) without leakage.

(2) The requirements in paragraph (1) of this subsection do not apply to sealed sources that contain radioactive material in gaseous form.

(3) The requirements in this subsection do not apply to energy compensation sources.

(m) Labeling.

(1) Each source, source holder, or logging tool containing radioactive material in other than an exempt quantity, shall bear a durable, legible, and clearly visible marking or label that has, as a minimum, the standard radiation caution symbol with no color requirement, and the wording DANGER (or CAUTION), RADIOACTIVE--DO NOT HANDLE, NOTIFY CIVIL AUTHORITIES (OR NAME OF COMPANY).

(2) The labeling specified in paragraph (1) of this subsection shall be on the smallest component, source, source holder, or logging tool, that is transported as a separate piece of equipment.

(3) Each transport container shall have permanently attached to it a durable, legible, and clearly visible label that has, as a minimum, the standard radiation caution symbol and the wording DANGER (or CAUTION), RADIOACTIVE, NOTIFY CIVIL AUTHORITIES (OR NAME OF COMPANY).

(4) Each transport container shall have attached to it a durable, legible, and clearly visible label(s) that has, as a minimum, the licensee's name, address, and telephone number, the radionuclide, its activity, and assay date.

(n) Inspection and maintenance.

(1) Each licensee or registrant shall conduct, at intervals not to exceed six months, a program of visual inspection and maintenance of source holders (or sealed source, if there is no source holder), logging tools, source handling tools, storage containers, transport containers, and injection tools to assure proper labeling and physical condition. The inspection program may be performed concurrently with routine leak testing of sealed sources. Records of inspection and maintenance shall be made and maintained by the licensee or registrant in accordance with subsection (dd)(5) of this section.

(2) If any inspection conducted in accordance with paragraph (1) of this subsection reveals damage to labeling or components critical to radiation safety, the device shall be removed from service at the time the damage is discovered and until repairs have been made.

(3) Any operation, such as drilling, cutting, or chiseling on a source holder containing a sealed source, shall be performed on the source holder only by persons specifically licensed to do so by the agency, another agreement or licensing state, or the NRC. The provisions of this paragraph do not apply to logging tool recovery (fishing) operations conducted in accordance with the provisions of subsection (cc)(4) of this section.

(4) The repair, opening, or modification of any sealed source shall be performed only by persons specifically licensed to do so by the agency, another agreement or licensing state, or the NRC.

(o) Training requirements.

(1) No licensee or registrant shall permit any individual to act as a logging supervisor until such individual has met the following requirements:

(A) successfully completed an agency-accepted course or a course recognized by another agreement or licensing state, or the NRC, including at least 24 hours of formal training in the subjects outlined in subsection (dd)(1) of this section;

(B) received copies of and instruction in the following:

(i) the requirements contained in this section and the applicable subsections of §§289.201, 289.202, 289.203, and 289.231 of this title or their equivalent;

(ii) the conditions of the appropriate license or certificate of registration; and

(iii) the licensee's or registrant's operating, safety, and emergency procedures;

(C) demonstrated understanding of the requirements in subparagraph (A) and (B) of this paragraph by successfully completing a written examination administered by the licensee or registrant;

(D) completed two months of on-the-job training under the supervision of a logging supervisor; and

(E) demonstrated through a field evaluation, competence in the use of sources of radiation, related handling tools, and the type of radiation survey instruments that will be used in the job assignment.

(2) No licensee or registrant shall permit any individual to act as a logging assistant until such individual has met the following requirements:

(A) received copies of and instruction in the applicable subsections of §§289.201, 289.202, 289.203, and 289.231 of this title or their equivalent, and the licensee's or registrant's operating, safety, and emergency procedures;

(B) demonstrated understanding of the requirements in subparagraph (A) of this paragraph by successfully completing a written examination administered by the licensee or registrant; and

(C) demonstrated competence to use, under the personal supervision of the logging supervisor, the sources of radiation, related handling tools, and radiation survey instruments that will be used in the job assignment.

(3) The licensee or registrant shall provide an annual radiation safety review for logging supervisors and logging assistants.

(4) Each licensee or registrant shall maintain records that document that the requirements of paragraphs (1)-(3) of this subsection are met. Such records shall be maintained in accordance with subsection (dd)(5) of this section.

(p) Operating, safety, and emergency procedures. The licensee or registrant shall maintain written operating, safety, and emergency procedures that include descriptions of and directions in at least the items listed in subsection (dd)(4) of this section.

(q) Personnel monitoring.

(1) In addition to the requirements of §289.202(p)(3) and (q) of this title or §289.231(n) and (s)(3) of this title, as applicable, no licensee or registrant shall permit any individual to act as a logging supervisor or logging assistant unless that individual wears an individual monitoring device that is processed and evaluated by an accredited National Laboratory Accreditation Program (NVLAP) processor, at all times during well logging service operations and/or tracer studies utilizing sources of radiation. Each individual monitoring device shall be assigned to and worn by only one individual. Film badges shall be replaced at least monthly. Other individual monitoring devices shall be replaced at least quarterly. After replacement, each individual monitoring device shall be returned to the supplier for processing within 14 calendar days or as soon as practicable. In circumstances that make it impossible to return each individual monitoring device to the supplier for processing within 14 calendar days, such circumstances shall be documented and available for review by the agency.

(2) When necessary in order to aid in determining the extent of an individual's exposure to concentrations of radioactive material, the agency may require a licensee or registrant to make available to the individual appropriate bioassay services and to furnish a copy of the reports of such services to the agency.

(3) Personnel monitoring records shall be maintained by the licensee or registrant in accordance with subsection (dd)(5) of this section.

(r) Radiation safety officer.

(1) A radiation safety officer (RSO) shall be designated for every license and certificate of registration issued by the agency.

(2) The RSO's documented qualifications shall include:

(A) possession of a high school diploma or a certificate of high school equivalency based on the GED test;

(B) completion of the training and testing requirements of subsection (o)(1) of this section; and

(C) two years of experience as a logging supervisor to include knowledge of well logging service operations and tracer studies.

(3) The duties of the RSO include, but are not limited to, the following:

(A) establishing and overseeing operating, safety, and emergency, and as low as reasonably achievable (ALARA) procedures, and to review them regularly to ensure that the procedures are current and conform with this chapter;

(B) overseeing and approving all phases of the training program for well logging service operations and/or tracer studies personnel so that appropriate and effective radiation protection practices are taught;

(C) ensuring that required radiation surveys and leak tests are performed and documented in accordance with this chapter, including any corrective measures when levels of radiation exceed established limits;

(D) ensuring that personnel monitoring is used properly by occupationally-exposed personnel, that records are kept of the monitoring results, and that timely notifications are made as required by §289.203 of this title;

(E) investigating and reporting to the agency each known or suspected case of radiation exposure to an individual or radiation level detected in excess of limits established by this chapter and each theft or loss of source(s) of radiation, to determine the cause, and to take steps to prevent its recurrence;

(F) having a thorough knowledge of management policies and administrative procedures of the licensee or registrant;

(G) assuming control and having the authority to institute corrective actions including shutdown of operations when necessary in emergency situations or unsafe conditions;

(H) maintaining records as required by this chapter (see subsection (dd)(5) of this section);

(I) ensuring the proper storing, labeling, transport, and use of sources of radiation, storage, and/or transport containers;

(J) ensuring that inventories are performed in accordance with subsection (j) of this section;

(K) ensuring that personnel are complying with this chapter, the conditions of the license or the registration, and the operating, safety, and emergency procedures of the licensee or registrant; and

(L) serving as the primary contact with the agency.

(s) Security.

(1) A logging supervisor must be physically present at a temporary jobsite whenever radioactive material is being handled or is not stored and locked in a vehicle or storage place. The logging supervisor may leave the jobsite in order to obtain assistance if a sealed source becomes lodged in a well.

(2) During well logging, except when sealed sources are below ground or in shipping or storage containers, the logging supervisor or other individual designated by the logging supervisor shall maintain direct surveillance of the operation to prevent unauthorized entry into a restricted area, as defined in §289.201(b) of this title, or §289.231(c) of this title, as applicable.

(t) Handling tools. The licensee shall provide and require the use of tools that will assure remote handling of sealed sources other than low activity calibration sources.

(u) Tracer studies.

(1) Appropriate protective clothing and equipment shall be used by all personnel handling radioactive tracer material. Precautions shall be taken to avoid ingestion or inhalation of radioactive material and to avoid contamination of field stations, temporary job sites, vehicles, associated equipment, and clothing.

(2) No licensee shall permit the injection of radioactive material into usable quality groundwater (3,000 parts per million (ppm) total dissolved solids or less) without prior written authorization from the agency.

(3) A licensee may discard well-logging screenouts (well returns) containing residual radioactive materials into Class II disposal wells authorized by the Texas Railroad Commission (RRC) for such residuals, provided that the following requirements are met:

(A) the total radioactive concentration of all isotopes involved in the screenout is 1000 picocuries per gram (pCi/g) or less, and the physical half-life of the radioactive material is 120 days or less;

(B) the well is licensed by the RRC to accept non-hazardous oil and gas waste; and

(C) the licensee maintains an agreement with the owner or operator to control access to the Class II disposal well until the radioactivity has decayed to unrestricted release levels.

(4) The well operator shall contact the licensee when a decision is made to reverse the radioactive tracer material out of a well. The licensee shall be on site and present at the well when radioactive tracer material is reversed out of a well.

(v) Particle accelerators. No licensee or registrant shall permit above-ground testing of particle accelerators that results in the production of radiation except in areas or facilities controlled or shielded to meet the requirements of §289.202(f) or (n) of this title, or §289.231(m) or (o) of this title, as applicable.

(w) Radioactive markers. The licensee may use radioactive markers in wells only if the individual markers contain quantities of radioactive material not exceeding the quantities specified in §289.251(m)(2) of this title. The use of markers is subject only to the provisions of this subsection and subsection (j) of this section.

(x) Uranium sinker bars. The licensee may use a depleted uranium sinker bar in well logging service operations only if it is legibly impressed with the wording "DANGER (or CAUTION), RADIOACTIVE-DEPLETED URANIUM, NOTIFY CIVIL AUTHORITIES (OR NAME OF COMPANY) IF FOUND."

(y) Energy compensation source.

(1) The licensee may use an energy compensation source that is contained within a logging tool or other tool components.

(2) For well logging applications with a surface casing for protecting fresh water aquifers, use of the ECS is only subject to the requirements of subsections (i), (j), and (k) of this section.

(3) For well logging applications without a surface casing for protecting fresh water aquifers, use of the ECS is only subject to the requirements of subsections (d), (i), (j), (k), (bb)(4) and (cc) of this section.

(z) Tritium neutron generator target source.

(1) Use of a tritium neutron generator target source, containing quantities not exceeding 30 curies (Ci) (1,110 MBq) and in a well with a surface casing to protect fresh water aquifers, is subject to the requirements of this section, except subsections (d), (l), and (cc) of this section.

(2) Use of a tritium neutron generator target source, containing quantities exceeding 30 Ci (1,110 MBq) or in a well without a surface casing to protect fresh water aquifers, is subject to the requirements of this section, except subsection (l) of this section.

(aa) Radiation surveys.

(1) Radiation surveys (and calculations for neutron sources) shall be made and recorded for each area where radioactive materials are stored.

(2) Radiation surveys (and calculations for neutron sources) of the radiation levels in occupied positions and on the exterior of each vehicle used to transport radioactive materials shall be made and recorded. Such surveys (and calculations for neutron sources) shall include all sources of radiation transported in the vehicle.

(3) If the sealed source assembly is removed from the logging tool before departing the job site, a survey of the tool to verify that the logging tool is free of contamination shall be made and recorded.

(4) If the encapsulation of the sealed source has been damaged by an operation or is likely to have been damaged by an operation, the licensee shall immediately conduct a radiation survey and make a record of that survey, including a contamination survey, during and after the operation.

(5) Radiation surveys shall be made and recorded at the job site and/or well head for each tracer operation except for those utilizing hydrogen-3, carbon-14, sulfur-35, or krypton-85. These surveys shall include measurements of radiation levels before and after the operation.

(6) Records required in accordance with paragraphs (1)-(5) of this subsection shall also include the dates, the identification of individual(s) making the survey, the unique identification of survey instrument(s) used, radiation measurements in milliroentgen per hour (mR/hr), calculations in millirem per hour (mrem/hr) (microsievert per hour (µSv/hr)), and an exact description of the location of the survey. Each licensee or registrant shall make and maintain records of these surveys in accordance with subsection (dd)(5) of this section.

(bb) Records/documents for inspection by the agency.

(1) Each licensee or registrant shall maintain the records/documents specified in subsection (dd)(5) of this section for inspection by the agency.

(2) Each licensee or registrant maintaining additional authorized use/storage locations from which well logging service operations are conducted shall have copies of the records/documents specified in subsection (dd)(5)(B)-(E) and (G)-(O) of this section that are specific to the site available at each site for inspection by the agency.

(3) Records/documents required in accordance with paragraph (2) of this subsection shall be maintained in accordance with subsection (dd)(5) of this section.

(4) Each licensee or registrant conducting well logging service operations at a temporary job site shall have copies of the records/documents specified in subsection (dd)(5)(B), (C), (I), (K), (L), and (N) of this section available at that site for inspection by the agency.

(5) Records/documents required by paragraph (4) of this subsection shall be maintained at the temporary job site for the period of operation at that site for inspection by the agency.

(cc) Notification of incidents and lost sources; abandonment procedures for irretrievable sources.

(1) Notification of incidents and sources lost in other than downhole well logging operations shall be made in accordance with appropriate provisions of §289.202 of this title, or §289.231 of this title, as applicable.

(2) Whenever a sealed source or a device containing radioactive material has been ruptured or is likely to have been ruptured, the licensee shall notify the agency immediately by telephone and submit written notification within 30 days. The written notification shall designate the following:

- (A) the well or other location;
- (B) a description of the magnitude and extent of the escape of radioactive material;
- (C) an assessment of the consequences of the rupture; and
- (D) an explanation of the efforts planned or being taken to mitigate these consequences.

(3) Whenever a sealed source is separated from the logging tool and is lost downhole, the licensee shall notify the agency immediately by telephone prior to beginning source recovery operations.

(4) Whenever a sealed source or device containing radioactive material is lost downhole, the licensee shall do the following:

(A) consult with the well operator, well owner, drilling contractor, or land owner regarding methods to retrieve the source or device that may reduce the likelihood that the source or device will be damaged or ruptured during the logging tool recovery (fishing) operations;

(B) monitor with a radiation survey instrument (or logging tool adjusted to detect gamma emissions from source(s) lost downhole), at the surface for the presence of radioactive contamination during logging tool recovery (fishing) operations; and

(C) notify the agency immediately by telephone and submit written notification within 30 days if radioactive contamination is detected at the surface or if the source appears to be damaged.

(5) When efforts to recover the radioactive source are not successful, the licensee shall do the following:

(A) notify the agency by telephone of the circumstances that resulted in the inability to retrieve the source and obtain agency approval to implement abandonment procedures, or that the licensee implemented abandonment before receiving agency approval because the licensee believed there was an immediate threat to public health and safety; and

(B) advise the well operator of the **RRC** requirements regarding abandonment and an appropriate method of abandonment, that shall include the following:

(i) the immobilization and sealing in place of the radioactive source with a cement plug;

(ii) a means to prevent inadvertent intrusion on the source, such as the setting of a whipstock or other deflection device, unless the source is not accessible to any subsequent drilling operations; and

(iii) the mounting of a permanent identification plaque, containing information required by paragraph (6) of this subsection, at the surface of the well;

(C) notify the agency by telephone giving the circumstances of the loss; and

(D) file a written report with the agency within 30 days of the abandonment, providing the following information:

(i) date of occurrence;

(ii) a description of the radioactive source involved, including radionuclide, activity, chemical and physical form, and serial number;

(iii) surface location and identification of well;

(iv) results of efforts to immobilize and seal the source in place;

(v) depth of the radioactive source;

(vi) depth of the top of the cement plug;

(vii) depth of the well; and

(viii) information contained on the permanent identification plaque.

(6) Whenever a sealed source containing radioactive material is abandoned downhole, the licensee shall provide a permanent plaque (an example of a suggested plaque is shown in subsection (dd)(3) of this section) for posting on the well or wellbore. This plaque shall meet the following requirements:

(A) be constructed of long-lasting material such as stainless steel, brass, bronze, or monel. The size of the plaque should be convenient for use on active or inactive wells; for example, a 7-inch (17 cm) square. Letter size of the word "CAUTION" should be approximately twice the letter size of the rest of the information; for example, 1/2 inch (1.27 cm) and 1/4 inch (0.63 cm) letter size, respectively; and

(B) contain the following engraved information on its face:

(i) the word "CAUTION;"

(ii) the radiation symbol (color not required);

(iii) the date of abandonment;

(iv) the name of the well operator or well owner;

(v) the well name and well identification number(s) or other designation;

(vi) radionuclide(s) and activity(ies) of the source(s);

(vii) the source depth and the plug back depth (depth to the top of the plug); and

(viii) an appropriate warning, depending on the specific circumstances of each abandonment, such as the following:

(I) "Do not drill below plug back depth;"

(II) "Do not enlarge casing;" or

(III) "Do not re-enter hole before contacting **Radiation Control, Department of State Health Services.**"

(7) The licensee shall immediately notify the agency by telephone and confirming letter if the licensee knows or has reason to believe that radioactive material has been lost in or to an underground potable water source. Such notice shall designate well location and describe the magnitude and extent of loss of radioactive material, consequences of such loss and efforts taken or planned to mitigate these consequences.

(8) In the event of an uncontrolled release of radioactive tracer material to the environment, the licensee shall notify the agency by telephone within 24 hours and submit written notification within 30 days.

(dd) Appendices.

(1) Subjects to be included in training courses for well logging service operations and/or tracer studies are as follows:

(A) fundamentals of radiation safety that include:

(i) characteristics of radiation;

(ii) units of radiation dose (rem) and activity;

(iii) significance of radiation dose specifying radiation protection standards and biological effects of radiation;

(iv) levels of radiation from sources of radiation;

(v) methods of controlling radiation dose specifying time, distance, and shielding;

(vi) radiation safety practices, specifying prevention of contamination and methods of decontamination; and

(vii) discussion of ingestion, inhalation pathways.

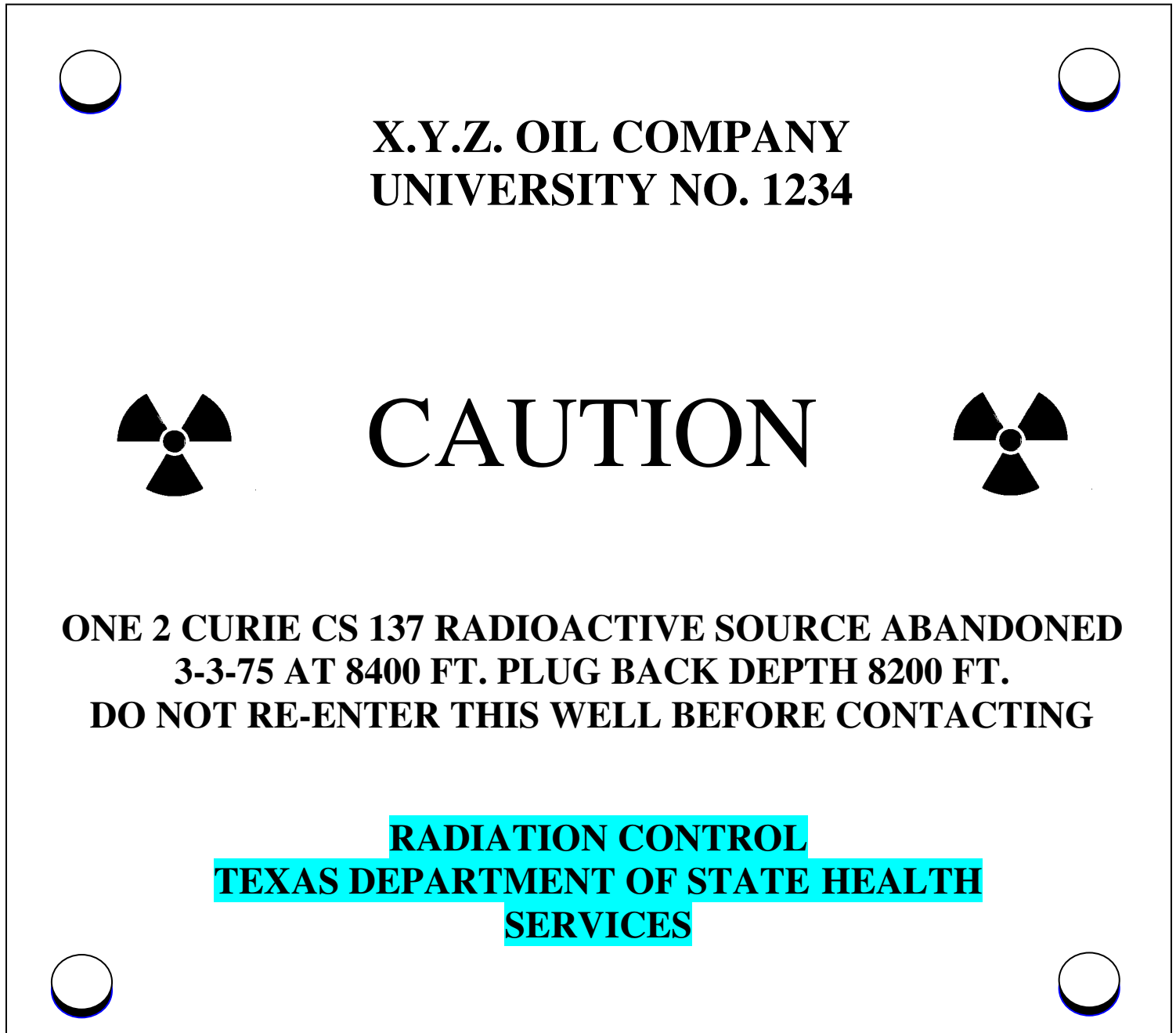
(B) radiation detection instrumentation to be used that includes:

- calibration, and limitations;
 - (i) use of radiation survey instruments specifying operation,
 - (ii) survey techniques; and
 - (iii) use of individual monitoring devices;
- (C) equipment to be used that specifies;
 - (i) handling equipment and remote handling tools;
 - (ii) sources of radiation;
 - (iii) storage control, disposal, and transport of equipment and sources of radiation;
 - (iv) operation and control of equipment; and
 - (v) maintenance of equipment.
- (D) pertinent federal and state requirements;
- (E) the licensee's or registrant's written operating, safety, and emergency procedures;
- (F) the licensee's or registrant's record keeping procedures; and
- (G) case histories and potential consequences of accidents in well logging service operations and tracer studies.

(2) In addition to the subjects for training courses required in paragraph (1) of this subsection, individuals performing tracer studies must also complete training in the following subjects:

- (A) sources of contamination;
- (B) contamination detection and control;
- (C) decontamination techniques and limits;
- (D) survey techniques for tracer materials; and
- (E) packaging requirements for transportation of radioactive materials, especially residual materials from tracer studies.

(3) The following is an example of a plaque for identifying wells containing sealed sources of radioactive material abandoned downhole:



(4) The licensee's or registrant's operating, safety, and emergency procedures shall include descriptions of and instructions in at least the following:

(A) the handling and use of sources of radiation in wells without surface casing for protecting fresh water aquifers, if appropriate;

(B) the handling and use of sources of radiation to be employed so that no individual is likely to be exposed to radiation doses in excess of the limits established in §289.202 of this title, or §289.231 of this title, as applicable. Every reasonable effort shall be made to keep radiation exposures and releases of radioactive material in soils and effluents to unrestricted areas as low as is reasonably achievable;

(C) methods and occasions for conducting radiation surveys;

(D) methods and occasions for locking and securing sources of radiation;

(E) personnel monitoring, including bioassays, and the use of individual monitoring devices;

(F) removal of radioactive material from storage, transportation of radioactive material to field locations and temporary job sites, including packaging of sources of radiation in the vehicles, placarding of vehicles, securing sources of radiation during transportation, and return to storage;

(G) minimizing exposure of individuals during routine use and in the event of an accident;

(H) procedures for notifying proper personnel in the event of an accident or well excursion;

(I) maintenance of records;

(J) use, inspection, and maintenance of source holders, logging tools, source handling tools, storage containers, transport containers, and injection tools;

(K) procedures to be followed in the event a sealed source is lost or lodged downhole;

(L) procedures to be used for picking up, receiving, handling, and opening packages containing radioactive material;

(M) procedures to be used for surveys of temporary job sites and equipment, and decontamination of vehicles, associated equipment, and clothing following tracer studies;

- (N) storage and disposal of radioactive waste;
 - (O) procedures for laundering contaminated clothing, if applicable;
 - (P) licensee's or registrant's management structure;
 - (Q) posting of radiation areas and labeling radioactive material containers;
 - (R) procedures to be followed in the event of an uncontrolled release of radioactive tracer material to the environment; and
 - (S) actions to be taken if a sealed source is ruptured, including actions to prevent the spread of contamination and minimize inhalation and ingestion of radioactive material, and actions to obtain suitable radiation survey instruments as required by subsection (h) of this section.
- (5) The following records/documents shall be maintained by the licensee or registrant for inspection by the agency.

THIS PORTION OF THE PAGE LEFT INTENTIONALLY BLANK

	<i>Name of Record/Document</i>	<i>Rule Cross-Reference</i>	<i>Time Interval for Keeping Record/Document</i>
(A)	Agreement with well operator, owner, drilling contractor, or land owner	(d)	5 years following completion of the well logging service operation or tracer study
(B)	Survey instrument calibration	(h)	3 years
(C)	Leak test	(i)	3 years
(D)	Quarterly inventory	(j)	3 years
(E)	Utilization record	(k)	3 years
(F)	Certification document	(l)	3 years
(G)	Inspection and maintenance	(n)	3 years
(H)	Training and Testing	(o)	3 years after employee terminates employment with the licensee or registrant
(I)	Current operating, safety, and emergency procedures	(p)	Until termination of license or certificate of registration
(J)	Personnel monitoring	(q)	Until disposal is authorized by the agency
(K)	Radiation surveys	(aa)	3 years after completion of the survey
(L)	Current License or Certificate of Registration	(bb)	Until termination of license or certificate of registration
(M)	Receipt, transfer, and disposal	§289.201(d)	Until disposal is authorized by the agency
(N)	Shipping papers for transportation	§289.257(e)	3 years
(O)	Current 25 TAC §289.253 of this title and other applicable sections as listed in the license or certificate of registration	(bb)	Until termination of license or certificate of registration