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 October 23, 2024, are shown as shaded text)

		Page
§289.253(a)	Purpose	253-1
§289.253(b)	Scope	253-1
§289.253(c)	Definitions	253-2
§289.253(d)	Specific Licenses for Well Logging	253-4
§289.253(e)	Prohibitions	253-5
§289.253(f)	Limits on Levels of Radiation	253-6
§289.253(g)	Storage Precautions	253-6
§289.253(h)	Transport Precautions	253-6
§289.253(i)	Radiation Survey Instruments	253-6
§289.253(j)	Leak Testing of Sealed Sources	253-7
§289.253(k)	Quarterly Inventory	253-7
§289.253(l)	Utilization Records	253-8
§289.253(m)	Design and Performance Criteria for Sealed Sources Used in Well Logging Operations	253-8
§289.253(n)	Labeling	253-9
§289.253(o)	Inspection and Maintenance	253-10
§289.253(p)	Training Requirements	253-10
§289.253(q)	Operating, Safety, and Emergency Procedures	253-11
§289.253(r)	Personnel Monitoring	253-12
§289.253(s)	Radiation Safety Officer	253-12
§289.253(t)	Security	253-13
§289.253(u)	Handling Tools	253-14
§289.253(v)	Tracer Studies	253-14
§289.253(w)	Particle Accelerators	253-14
§289.253(x)	Radioactive Markers	253-14
§289.253(y)	Uranium Sinker Bars	253-14
§289.253(z)	Energy Compensation Source	253-14

25 TAC §289.253

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

		Page
§289.253(aa)	Tritium Neutron Generator Target Source	253-15
§289.253(bb)	Radiation Surveys.....	253-15
§289.253(cc)	Records/Documents for Inspection by the Department	253-16
§289.253(dd)	Notification of Incidents and Lost Sources; Abandonment Procedures for Irretrievable Sources	253-18
§289.253(ee)	Appendices	253-19
§289.253(ee)(1)	Subjects to be Included in Training Courses for Well Logging Service Operations and Tracer Studies.....	253-19
§289.253(ee)(2)	Additional Training for Individuals Performing Tracer Studies.....	253-20
§289.253(ee)(3)	Example of a Plaque for Identifying Wells Containing Sealed Sources of Radioactive Material Abandoned Downhole	253-21
§289.253(ee)(4)	Operating, Safety, and Emergency Procedures	253-21
§289.253(ee)(5)	Time Requirements for Record Keeping	253-22

TITLE 25 HEALTH SERVICES
PART 1 DEPARTMENT OF STATE HEALTH SERVICES
CHAPTER 289 RADIATION CONTROL
SUBCHAPTER F LICENSE REGULATIONS

§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.

(1) This section applies to all persons who use sources of radiation for well logging service operations, radioactive markers, mineral exploration, and tracer studies.

(2) In addition to the requirements of this section, persons are subject to the requirements of:

(A) §289.201 of this chapter (relating to General Provisions for Radioactive Material);

(B) §289.202 of this chapter (relating to Standards for Protection Against Radiation from Radioactive Materials);

(C) §289.203 of this chapter (relating to Notices, Instructions, and Reports to Workers; Inspections);

(D) §289.204 of this chapter (relating to Fees for Certificates of Registration, Radioactive Material Licenses, Emergency Planning and Implementation, and Other Regulatory Services);

(E) §289.205 of this chapter (relating to Hearing and Enforcement Procedures);

(F) §289.226 of this chapter (relating to Registration of Radiation Machine Use and Services);

(G) §289.229 of this chapter (relating to Radiation Safety Requirements for Accelerators, Therapeutic Radiation Machines, Simulators, and Electronic Brachytherapy Devices);

(H) §289.231 of this chapter (relating to General Provisions and Standards for Protection Against Machine-Produced Radiation);

(I) §289.252 of this subchapter (relating to Licensing of Radioactive Material); and

(J) §289.257 of this subchapter (relating to Packaging and Transportation of Radioactive Material).

(c) Definitions. The following words and terms when used in this section 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 microcuries (μCi) (3.7 megabecquerel (MBq)), used within a logging tool or other tool component, 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 (bb) 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 having knowledge of, responsibility for, and authority to enforce appropriate radiation protection rules, standards, and practices on behalf of the licensee or registrant, and who meets the requirements of subsection (s) 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 a structure or structures are located, in which people live, and the grounds on which these structures are located, including 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, a company whose equipment is connected to licensee's equipment and 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 used to secure and store radioactive sources.

(16) Temporary job site--A location where well logging or tracer studies are performed other than the specific locations 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 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) Specific licenses for well logging.

(1) The applicant must satisfy the general requirements specified in this subsection and in §289.252(e) of this subchapter.

(2) The applicant must develop a program for training logging supervisors and logging assistants and submit to the department a description of this program which specifies:

(A) initial training;

(B) on-the-job training;

(C) annual safety reviews provided by the licensee;

(D) how the applicant will demonstrate the logging supervisor's knowledge and understanding of and ability to comply with the department's regulations and licensing requirements and the applicant's operating and emergency procedures; and

(E) how the applicant will demonstrate the logging assistant's knowledge and understanding of and ability to comply with the applicant's operating and emergency procedures.

(3) The applicant must submit to the department written operating and emergency procedures as described in subsection (ee)(4) of this section.

(4) The applicant must establish and submit to the department its program for annual inspections of the job performance of each logging supervisor to ensure the department's regulations, license requirements, and the applicant's operating and emergency procedures are followed. Inspection records must be retained for three years after each annual internal inspection.

(5) The applicant must submit a description of its overall organizational structure as it applies to the radiation safety responsibilities in well logging, including specified delegations of authority and responsibility.

(6) If an applicant wants to perform leak testing of sealed sources, the applicant must identify the manufacturers and the model numbers of the leak test kits used. If the applicant wants to analyze its own wipe samples, the applicant must establish procedures to follow and submit a description of these procedures to the department. The description must include the:

(A) instruments used;

(B) methods of performing the analysis; and

(C) pertinent experience of the person who will analyze the wipe samples.

(e) Prohibitions.

(1) Licensees must not perform well logging service operations with a sealed source in any well or wellbore unless, before 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:

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

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

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

(D) the requirements of subsection (dd)(4) of this section are met if a decision is made to abandon the sealed source downhole.

(2) Licensees must not perform tracer study operations with a substance tagged with radioactive material in any well or wellbore unless, before 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, specifying who is responsible for ensuring:

(A) in the event the service company's personnel or equipment are contaminated with radioactive material, they will be decontaminated as specified in §289.202(n) or (ddd) of this chapter 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 will be decontaminated as specified in §289.202(ddd) of this chapter; and

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

(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 a suitable transport container or containers in the event of a screen out.

(3) The licensee must maintain, as specified in subsection (ee)(5) of this section, a copy of the written agreement specified in paragraph (1) or (2) of this subsection.

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

(g) Storage precautions.

(1) Each source of radiation, except accelerators, must be provided with a storage or transport container. Each container must 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 must be posted as specified in §289.202(aa)(5) or §289.231(x) of this chapter, as applicable.

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

(4) Sources of radiation may not be stored in residential locations unless specifically authorized by the department.

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

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

(i) Radiation survey instruments.

(1) The licensee or registrant must maintain a sufficient number of calibrated and operable radiation survey instruments capable of detecting beta and gamma radiation 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 chapter, as applicable. Instrumentation must be capable of measuring 0.1 milliroentgen per hour (mR/hr) (1 microsievert per hour (μSv/hr)) through at least 50 mR/hr (500 μSv/hr). (Instrumentation capable of measuring 0.1 mR/hr (1 μSv/hr) through 50 mR/hr (500 μSv/hr) may not be sufficient to determine compliance with DOT requirements.)

(2) A licensee using tracer material must 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 chapter.

(3) Each radiation survey instrument required under paragraph (1) of this subsection must be calibrated:

(A) by a person specifically licensed or registered by the department, another agreement 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 plus or minus 20 percent of the true radiation level at each calibration point.

(4) The licensee or registrant must maintain calibration records as specified in subsection (ee)(5) of this section.

(j) Leak testing of sealed sources.

(1) Testing and record keeping. Sealed sources must be tested for leakage and contamination as specified in this section and §289.201(g) of this chapter. The licensee must maintain records of leak tests as specified in subsection (ee)(5) of this section.

(2) Each energy compensation source that is not exempt from testing as specified in §289.201(g)(2) of this chapter 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 must not be used until tested as specified in §289.201(g) of this chapter.

(3) If a sealed source is found to be leaking as specified in §289.201(g) of this chapter, the licensee must 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 department, the NRC, or an agreement state, to perform such services.

(k) Quarterly inventory. Each licensee or registrant must 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 must make and maintain records of inventories as specified in subsection (ee)(5) of this section and must

include:

(1) the quantities and kinds of sources of radiation;

(2) the location where sources of radiation are assigned;

(3) the unique identification of each source of radiation;

(4) the date of the inventory; and

(5) the name of the individual conducting the inventory.

(l) Utilization records. For each source of radiation, utilization records must be maintained by each licensee or registrant as specified in subsection (ee)(5) of this section and must include:

(1) identification of each source of radiation, including:

(A) the make and model number 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.

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

(1) Each sealed source used in well logging applications must 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 non-dispersible 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 Standards 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 must be held at negative 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, must be dropped from a height of 1 meter (m) onto the test source.

(III) Vibration. The test source must 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 (g) hammer and pin, 0.3 cm pin diameter, must be dropped from a height of 1 m onto the test source.

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

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

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

(n) Labeling.

(1) Each source, source holder, or logging tool containing radioactive material in other than an exempt quantity must bear a durable, legible, and clearly visible marking or label, including, 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 must be on the smallest component, source, source holder, or logging tool that is transported as a separate piece of equipment.

(3) Each transport container must have permanently attached a durable, legible, and clearly visible label having, 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 must have attached a durable, legible, and clearly visible label having, at a minimum, the licensee's name, address, and telephone number, the radionuclide, its activity, and assay date.

(o) Inspection and maintenance.

(1) Each licensee or registrant must 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 must be made and maintained by the licensee or registrant as specified in subsection (ee)(5) of this section.

(2) If any inspection conducted as specified in paragraph (1) of this subsection reveals damage to labeling or components critical to radiation safety, the device must 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, must be performed on the source holder only by persons specifically licensed to do so by the department, another agreement state, or the NRC. The provisions of this paragraph do not apply to logging tool recovery (fishing) operations conducted as specified in the provisions of subsection (dd)(4) of this section.

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

(p) Training requirements.

(1) Licensees or registrants must not permit any individual to act as a logging supervisor until such individual has:

(A) completed a course including at least 24 hours of formal training in the subjects outlined in subsection (ee)(1) of this section;

(B) received copies of and instruction in:

(i) the requirements contained in this section and the applicable

subsections of §§289.201, 289.202, 289.203, and 289.231 of this chapter 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 subparagraphs (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) Licensees or registrants must not permit any individual to act as a logging assistant until such individual has:

(A) received copies of and instruction in the applicable subsections of §§289.201, 289.202, 289.203, and 289.231 of this chapter 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 used in the job assignment.

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

(4) Each licensee or registrant must maintain records documenting the requirements of paragraphs (1) - (3) of this subsection are met. Such records must be maintained as specified in subsection (ee)(5) of this section.

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

(r) Personnel monitoring.

(1) In addition to the requirements of §289.202(p)(4) and (q) of this chapter or §289.231(n) and (s)(3) of this chapter, as applicable, no licensee or registrant may permit any individual to act as a logging supervisor or logging assistant unless that individual wears an individual monitoring device at all times during well logging service operations or tracer studies utilizing sources of radiation. Each individual monitoring device must be assigned to and worn by only one individual. Film badges must be replaced at least monthly. Other individual monitoring devices requiring replacement must be replaced at least quarterly. After replacement, each individual monitoring device requiring processing must be returned to the supplier for processing within 14 calendar days or as soon as practicable. All individual monitoring devices must be evaluated at least quarterly or promptly after replacement, whichever is more frequent. Circumstances preventing meeting these time limits must be documented, and those records must be available for review by the department.

(2) When necessary to aid in determining the extent of an individual's intake of radioactive material, the department 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 department.

(3) Personnel monitoring records must be maintained by the licensee or registrant as specified in subsection (ee)(5) of this section.

(s) Radiation safety officer.

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

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

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

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

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

(3) The duties of the RSO include:

(A) establishing and overseeing operating, safety, emergency, and as low as reasonably achievable (ALARA) procedures, and reviewing them regularly to ensure 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 tracer studies personnel so that appropriate and effective radiation protection practices are taught;

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

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

(E) investigating and reporting to the department each known or suspected case of radiation exposure to an individual or radiation level detected over the limits established by this chapter and each theft or loss of each source of radiation, determining the cause, and taking 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 (ee)(5) of this section);

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

(J) ensuring inventories are performed as specified in subsection (k) of this section;

(K) ensuring 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 department.

(t) Security.

(1) A logging supervisor must be physically present at a temporary job site whenever radioactive material is being handled or is not stored and locked in a vehicle or storage place. The logging supervisor may leave the job site 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 must maintain direct surveillance of the operation to prevent unauthorized entry into a restricted area, as defined in §289.201(b) of this chapter, or §289.231(c) of this chapter, as applicable.

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

(v) Tracer studies.

(1) Appropriate protective clothing and equipment must be used by all personnel handling radioactive tracer material. Precautions must 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) Licensees may not 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 department.

(3) The well operator must contact the licensee when a decision is made to reverse the radioactive tracer material out of a well. The licensee must be onsite and present at the well when radioactive tracer material is reversed out of a well.

(w) Particle accelerators. Licensees or registrants must not 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 chapter, or §289.231(m) or (o) of this chapter, as applicable.

(x) 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(l)(2) of this subchapter (relating to Exemptions, General Licenses, and General License Acknowledgements). The use of markers is subject only to the provisions of this subsection and subsection (k) of this section.

(y) 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."

(z) Energy compensation source (ECS).

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

(2) For well logging applications with a surface casing for protecting freshwater aquifers, use of the ECS is only subject to the requirements of

subsections (j), (k), and (l) of this section.

(3) For well logging applications without a surface casing for protecting freshwater aquifers, use of the ECS is only subject to the requirements of subsections (e), (j), (k), (l), (dd), and (ee)(4)(A) of this section.

(aa) Tritium neutron generator target source.

(1) Use of a tritium neutron generator target source, containing quantities not exceeding 30 curies (Ci) (1,110 gigabecquerels (GBq)) and in a well with a surface casing to protect freshwater aquifers, is subject to the requirements of this section, except subsections (e), (m), and (dd) of this section.

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

(bb) Radiation surveys.

(1) Radiation surveys (and calculations for neutron sources) must 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 must be made and recorded. Such surveys (and calculations for neutron sources) must 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 must 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 must immediately conduct a radiation survey and make a record of that survey, including a contamination survey, during and after the operation.

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

(6) Records required as specified in paragraphs (1) - (5) of this subsection must include the dates, the identification of personnel making the survey, the unique identification of survey instruments used, radiation measurements in milliroentgen per hour (mR/hr), calculations in millirem per hour (mrem/hr) or microsievert per hour (μSv/hr), and an exact description of the location of the

survey. Each licensee or registrant must make and maintain records of these surveys as specified in subsection (ee)(5) of this section.

(cc) Records/documents for inspection by the department.

(1) Each licensee or registrant must maintain the records/documents specified in subsection (ee)(5) of this section.

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

(3) Records/documents required as specified in paragraph (2) of this subsection must be maintained as specified in subsection (ee)(5) of this section.

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

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

(dd) 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 must be made as specified in appropriate provisions of §289.202 of this chapter, or §289.231 of this chapter, 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 must notify the department immediately by telephone and submit written notification within 30 days. The written notification must designate:

(A) the well or other location;

(B) the magnitude and extent of the escape of radioactive material;

(C) the consequences of the rupture; and

(D) 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 must notify the department immediately by telephone before beginning source recovery operations.

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

(A) consult with the well operator, well owner, drilling contractor, or landowner 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) continuously monitor the circulating fluids from the well, if any, during logging tool recovery (fishing) operations to check for contamination resulting from damage to the sealed source with an appropriate radiation detection instrument or a logging tool with a radiation detector; and

(C) notify the department 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 must:

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

(B) advise the well operator of the Railroad Commission of Texas requirements regarding abandonment and an appropriate method of abandonment, that includes:

(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 department by telephone, giving the circumstances of the loss; and

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

(i) the date of occurrence;

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

(iii) the surface location and identification of the well;

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

(v) the depth of the radioactive source;

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

(vii) the depth of the well; and

(viii) the information contained on the permanent identification plaque.

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

(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 or other designation;

(vi) radionuclides and activities of the sources;

(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:

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

(II) "Do not enlarge casing;" or

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

(7) The licensee must immediately notify the department 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 must 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 must notify the department by telephone within 24 hours and submit written notification within 30 days.

(ee) Appendices.

(1) Subjects to be included in training courses for well logging service operations and 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 and inhalation pathways;

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

(i) use of radiation survey instruments specifying operation, calibration, and limitations;

(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:

Figure: 25 TAC §289.253(ee)(3)

(4) The licensee's or registrant's operating, safety, and emergency procedures must include descriptions of and instructions in:

(A) the handling and use of sources of radiation in wells without surface casing for protecting freshwater 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 over the limits established in §289.202 of this chapter, or §289.231 of this chapter, as applicable. Every reasonable effort must 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) removing radioactive material from storage, transporting 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 returning to storage;

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

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

(I) maintaining records;

(J) using, inspecting, and maintaining source holders, logging tools, source handling tools, storage containers, transport containers, and injection tools;

(K) actions to be taken if a sealed source is lost or lodged downhole;

(L) picking up, receiving, handling, and opening packages containing radioactive material;

(M) surveying temporary job sites and equipment, and decontamination of vehicles, associated equipment, and clothing following tracer studies;

(N) storing and disposing of radioactive waste;

(O) laundering contaminated clothing, if applicable;

(P) the licensee's or registrant's management structure;

(Q) posting of radiation areas and labeling radioactive material containers;

(R) actions to be taken if there is an uncontrolled release of radioactive tracer material to the environment; and

(S) actions to be taken if a sealed source is ruptured, including actions preventing the spread of contamination and minimizing inhalation and ingestion of radioactive material, and actions to obtain suitable radiation survey instruments as required by subsection (i) of this section.

(5) The following records/documents must be maintained by the licensee or registrant for inspection by the department.

Figure: 25 TAC §289.253(ee)(5)

Figure: 25 TAC §289.253(ee)(3)

X.Y.Z. OIL COMPANY
UNIVERSITY NO. 1234

CAUTION

ONE 2 CURIE CS 137 RADIOACTIVE SOURCE ABANDONED
3-3-75 AT 8400 FT. PLUG BACK DEPTH 8200 FT.
DO NOT RE-ENTER THIS WELL BEFORE CONTACTING

RADIATION CONTROL
TEXAS DEPARTMENT OF STATE HEALTH
SERVICES

Figure: 25 TAC §289.253(ee)(5)

	Name of Record/Document	*Rule Cross-Reference (this section unless otherwise noted)*	*Time Interval for Keeping Record/Document*
(A)	Inspection records	(d)(4)	3 years after each annual internal inspection
(B)	Agreement with well operator, owner, drilling contractor, or land owner	(e)	5 years following completion of the well logging service operation or tracer study
(C)	Survey instrument calibration	(i)	3 years
(D)	Leak test	(j)	3 years
(E)	Quarterly inventory	(k)	3 years
(F)	Utilization record	(l)	3 years
(G)	Certification document	(m)	3 years
(H)	Inspection and maintenance	(o)	3 years
(I)	Training and Testing	(p)	3 years after employee terminates employment with the licensee or registrant
(J)	Current operating, safety, and emergency procedures	(q)	Until termination of license or certificate of registration
(K)	Personnel monitoring	(r)	Until disposal is authorized by the department
(L)	Radiation surveys	(bb)	3 years after completion of the survey
(M)	Current License or Certificate of Registration	(cc)	Until termination of license or certificate of registration
(N)	Receipt and Transfer	§289.201(d)	Until disposal of the records is authorized by the department
(O)	Disposal	§289.201(d)	Until termination of license
(P)	Shipping papers for transportation	§289.257(e)	3 years
(Q)	Current 25 TAC §289.253 of this title and other applicable sections as listed in the license or certificate of registration	(cc)	Until termination of license or certificate of registration