ALABAMA STATE BOARD OF HEALTH
BUREAU OF ENVIRONMENTAL AND HEALTH SERVICE STANDARDS
DIVISION OF RADIATION CONTROL
ADMINISTRATIVE CODE

CHAPTER 420-3-26
RADIATION CONTROL

420-3-26-.12 Radiation Safety Requirements For Wireline Service Operations And Subsurface Tracer Studies.

(1) **Purpose.** This Rule establishes radiation safety requirements for persons using sources of radiation for wireline service operations including mineral logging, radioactive markers, uranium sinker bars, subsurface tracer studies, and fishing operations. The requirements of this Rule are in addition to, and not in substitution for, the requirements of Rules 420-3-26-.01, 420-3-26-.02, 420-3-26-.03, 420-3-26-.10, and 420-3-26-.13 of these rules.

(2) **Scope.** This Rule applies to all licensees or registrants who use sources of radiation for wireline service operations including mineral logging, radioactive markers, uranium sinker bars, or subsurface tracer studies. This Rule also applies during fishing operations that are performed to recover lost or lodged radioactive sources or devices from a well. This Rule does not apply to the use of radioactive material in tracer studies involving multiple wells, such as field flood studies, or to the use of sealed sources auxiliary to well-logging but not lowered into wells.

(3) **Definitions.** As used in this Rule, the following definitions apply:

(a) “Energy compensated source (ECS)” means a small sealed source with an activity not exceeding 100 microcuries (3.7 megabecquerels), used within a logging tool or other tool components, to provide a reference standard to maintain the tool’s calibration when in use.

(b) "Field station" means a facility where radioactive sources may be stored or used and from which equipment is dispatched to temporary job sites.

(c) "Fishing or fishing operations" means those activities associated with the recovery from downhole of a well devices or sources containing radioactive materials which has become lodged and/or disconnected from the equipment normally connecting the source or device with the surface.

(d) “Fresh water aquifer”, for the purpose of this rule, means a geological formation that is capable of yielding fresh water to a well or spring.

(e) "Injection tool" means a device used for controlled subsurface injection of radioactive tracer material.

(f) “Irretrievable well-1ogging source” means any sealed source containing radioactive material that is pulled off or not connected to the wireline that suspends the source in the well and for which all reasonable effort at recovery has been expended.

(g) “Logging assistant” means any individual who, under the personal supervision of a logging supervisor, handles sources of radiation including sealed sources or tracers that are not in logging tools or shipping containers or who performs surveys required by this rule.

(h) "Logging supervisor" means the individual who provides personal supervision of the utilization of sources of radiation at a temporary job site, and who is responsible to the licensee or registrant for assuring compliance with the requirements of the Agency rules and the conditions of the license or registration.

(i) "Logging tool" means a device used subsurface to perform well-1ogging.

(j) "Mineral logging" means any logging performed for the purpose of mineral exploration other than oil or gas.

(k) "Personal supervision" means guidance and instruction by the logging supervisor who is physically present at a temporary job site and watching the performance of the operation in such proximity that contact can be maintained and immediate assistance given as required.

(l) “Radiation monitor badge” means an individual personnel dosimeter used to measure the radiation dose to the individual’s whole body and is processed and evaluated by a dosimetry processor meeting the requirements of 420-3-26-.03(17)(c)1. and 2.

(m) "Radioactive marker" means radioactive material placed subsurface or on a structure intended for subsurface use for the purpose of depth determination or direction orientation.

(n) “Safety review” means a periodic review provided by the licensee or registrant for its employees on radiation safety aspects of well-1ogging. The review may include, as appropriate, the results of internal inspections, new procedures or equipment, accidents of errors that have been

observed, and opportunities for employees to ask safety questions.

(o) "Source holder" means a housing or assembly into which a radioactive source is placed for the purpose of facilitating the handling and use of the source in well-logging operations.

(p) "Subsurface tracer study" means the release of unsealed radioactive material or a substance tagged with radioactive material for the purpose of tracing the movement or position of the radioactive material or tagged substance in the well-bore or adjacent formation.

(q) "Surface casing for protecting fresh water aquifers" means a pipe or tube used as a lining in a well to isolate fresh water aquifers from the well.

(r) "Temporary job site" means a location to which radioactive materials have been dispatched to perform wire-line service operations or subsurface tracer studies.

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

(t) "Uranium sinker bar" means a weight containing depleted uranium used to pull a logging tool down toward the bottom of the well.

(u) "Well-bore" means a drilled hole in which wireline service operations and subsurface tracer studies are performed.

(v) "Well-logging" means the lowering and raising of measuring devices or tools which may contain sources of radiation into well-bores or cavities for the purpose of obtaining information about the well and/or adjacent formations.

(w) "Wireline" means a cable containing one or more electrical conductors which is used to lower and raise logging tools in the well-bore.

(x) "Wireline service operation" means any evaluation or mechanical service which is performed in the well-bore using devices on a wireline.

(4) **Prohibition.** No licensee shall perform wireline service operations with a sealed source(s) unless, prior to commencement of the operation, the licensee has a written agreement with the well operator, well owner, drilling contractor, or land owner. The licensee shall retain a copy of the written agreement for

three years after the well logging operation has been completed. The written agreement must identify who will meet the following requirements:

(a) In the event a sealed source is lodged downhole, a reasonable effort at recovery will be made;

(b) A person may not attempt to recover a sealed source in a manner which, in the licensee's opinion, could result in its rupture;

(c) In the event a decision is made to abandon the sealed source downhole, the requirements of 420-3-26-.12(25)(c) shall be met and implemented within 30 days;

(d) The radiation monitoring required in 420-3-26-.12(25)(b) will be performed;

(e) If the environment, any equipment to be used by non-1icensed individuals, or personnel are contaminated with licensed radioactive material, they must be decontaminated before release from the site or released for unrestricted use; and

(f) Persons performing fishing operations will have had at least twelve months experience in tool recovery operations. Note, this experience does not necessarily have to be with radioactive devices or sources and the fishing company will release all recovered radioactive material to the logging supervisor as soon as practicable. Equipment Control

(5) **Limits on Levels of Radiation.** Sources of radiation shall be used, stored, and transported in such a manner that the transportation requirements of Rule 420-3-26-.02 and the dose limitation requirements of Rule 420-3-26-.03 of these rules are met.

(6) **Storage Precautions.**

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

(b) Sources of radiation shall be stored in a manner which will minimize danger from explosion and/or fire.

(7) **Transport Precautions.** Transport containers shall be physically secured to the transporting vehicle to prevent accidental loss, tampering, or unauthorized removal.

(8) **Radiation Survey Instruments.**

(a) The licensee or registrant shall maintain sufficient calibrated and operable radiation survey instruments at each field station and temporary job site to make physical radiation surveys as required by this Rule and by 420-3-26-.03(17) of these rules. Instrumentation shall be capable of measuring 0.1 milliroentgen per hour through at least 50 milliroentgens per hour.

(b) Each radiation survey instrument shall be calibrated:

1. At intervals not to exceed 6 months and after each instrument servicing;

2. At energies and radiation levels appropriate for use;

3. For linear scale instruments, at two points located approximately 1/3 and 2/3 of full-scale on each scale; for logarithmic scale instruments, at midrange of each decade, and at two points of a least one decade; and for digital instruments, at appropriate points; and

4. So that accuracy within plus or minus 20 percent of the true radiation level can be demonstrated on each scale.

(c) Calibration records shall be maintained for a period of 3 years for inspection by the Agency.

(d) The licensee shall have available additional calibrated and operable radiation detection instruments sensitive enough to detect the low radiation and contamination levels that could be encountered if a sealed source ruptured. The licensee may own the instruments or may have a procedure to obtain them in a timely manner from a second party.

(9) **Leak Testing of Sealed Sources.**

(a) **Requirements.** Each licensee using sealed sources of radioactive material shall have the sources tested for leakage. Records of leak test results shall be kept in units of microcuries and maintained for inspection by the Agency for 3 years after the leak test is performed.

(b) **Method of Testing.** Tests for leakage shall be performed only by persons specifically authorized to perform such tests by the Agency, the U. S. Nuclear Regulatory Commission, or an Agreement State. The test sample shall be taken from the nearest accessible point to the sealed source where contamination might accumulate. The test sample shall be analyzed for radioactive contamination, and the analysis shall be capable of detecting the presence of 0.005 microcuries of radioactive material on the test sample.

(c) **Interval of Testing.** Each sealed source of radioactive material, except energy compensated sources (ECS) shall be tested at intervals not to exceed 6 months. Each ECS not exempted by paragraph (e) of this section shall be tested at intervals not to exceed 3 years. In the absence of a certificate from a transferor indicating that a test has been made within 6 months prior to the transfer, the sealed source shall not be put into use until tested. If for any reason, it is suspected that a sealed source may be leaking, it shall be removed from service immediately and tested for leakage as soon as practical.

(d) **Leaking or Contaminated Sources.** If the test reveals the presence of 0.005 microcuries or more of leakage or contamination, the licensee shall immediately withdraw the source from use and shall cause it to be decontaminated, repaired, or disposed of in accordance with these rules. The licensee shall check the equipment associated with the leaking or contaminated source for radiation contamination and, if contaminated, have it decontaminated or disposed of by a person specifically licensed to perform such activity. A report describing the equipment involved, the test results, and the corrective action taken shall be filed with the Agency.

(e) **Exemptions.** The following sources are exempted from the periodic leak test requirements of this section:

1. Hydrogen-3 (tritium) sources;

2. Sources of radioactive material with a half-1ife of 30 days or less;

3. Sealed sources of radioactive material in gaseous form;

4. Sources of beta- and/or gamma-emitting radioactive material with an activity of 100 microcuries or less; and

5. Sources of alpha-emitting radioactive material with an activity of 10 microcuries or less.

(10) **Quarterly Inventory.** Each licensee or registrant shall conduct a quarterly physical inventory to account for all sources of radiation. Records of inventories shall be maintained for 3 years from the date of the inventory for inspection by the Agency and shall include the quantities and kinds of sources of radiation, the location where sources of radiation are assigned, the date of the inventory, and the name of the individual conducting the inventory.

(11) **Utilization Records.** Each licensee or registrant shall maintain current records, which shall be kept available for

inspection by the Agency for 3 years from the date of the recorded event, showing the following information for each source of radiation:

(a) Make, model number, and a serial number or a description of each source of radiation used;

(b) The identity of the logging supervisor or field unit to whom assigned;

(c) Locations where used and dates of use; and

(d) In the case of tracer materials and radioactive markers, the utilization record shall indicate the radionuclide and activity used in a particular well and the disposition of any unused tracer materials.

(12) **Design, Performance, and Certification Criteria for Sealed Sources Used in Downhole Operations.**

(a) Each sealed source, except those containing radioactive material in gaseous form, used in downhole operations shall be certified by the manufacturer, or other testing organization acceptable to the Agency, to meet the following minimum criteria:

1. Be of doubly encapsulated construction;

2. Contain radioactive material whose chemical and physical forms are as insoluble and non-dispersible as practical, and

3. Has been prototype tested in accordance with the requirements of the U.S. Nuclear Regulatory Commission as provided in 10CFR39.41(a)(3)[27].

(b) For sealed sources, except those containing radioactive material in gaseous form, acquired after December 31, 1984, in the absence of a certificate from a transferor certifying that an individual sealed source meets the requirements of (a) above, the sealed source shall not be put into use until such determinations and testing have been performed.

(c) Each sealed source, except those containing radioactive material in gaseous form, used in downhole operations after December 31, 1983 shall be certified by the manufacturer, or other testing organization acceptable to the Agency, as meeting the sealed source performance requirements for oil well-1ogging as contained in the American National Standard N542," Sealed Radioactive Sources Classification" in effect on December 31, 1983.

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[27] See footnote 4. in 420-3-26-.2.

(d) Certification documents shall be maintained for inspection by the Agency for a period of 2 years after source disposal. If the source is abandoned downhole, the certification documents shall be maintained until the Agency authorizes disposition.

(e) The requirements in paragraphs (a), (b), (c) and (d) of this section do not apply to sealed sources that contain radioactive material in gaseous form.

(f) The requirements in paragraphs (a), (b), (c) of this section do not apply to energy compensation sources.

(13) **Labeling**

(a) Each source, source holder, or logging tool containing radioactive material shall bear a durable, legible, and clearly visible marking or label, which has, as a minimum, the standard radiation caution symbol, without the conventional color requirement, and the following wording:

DANGER[28] RADIOACTIVE

This labeling shall be on the smallest component transported as a separate piece of equipment.

(b) Each storage container shall have permanently attached to it a durable, legible, and clearly visible label which has, as a minimum, the standard radiation caution symbol and the following wording:

DANGER[26] NOTIFY CIVIL AUTHORITIES (OR NAME OF COMPANY)

(14) **Inspection and Maintenance.**

(a) Each licensee or registrant shall visually check source holders, logging tools, and source handling tools for defects before first use to ensure that the equipment is in good working condition and that the required labeling is present. If defects are found, the equipment must be removed from service until repaired, and a record must be made listing: the date of the check, name of inspector, equipment involved, defects found, and repairs made. These records must be retained for 3 years after the defect is found.

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[28] Or CAUTION

(b) Each licensee or registrant shall conduct, at intervals not to exceed 6 months, a program of inspection and maintenance of source holders, logging tools, source handling tools, storage containers, transport containers, and injection tools to assure proper label and physical conditions. Records of inspection and maintenance shall be maintained for a period of 3 years for inspection by the Agency.

(c) If any inspection conducted pursuant to (a) or (b) above reveals damage to labeling or components critical to radiation safety, the device shall be removed from service until repairs have been made.

(d) If a sealed source is stuck in the source holder, the licensee shall not perform any operation, such as drilling, cutting, or chiseling, on the source holder unless the licensee is specifically approved by the Agency, the U. S. Nuclear Regulatory Commission or an Agreement State to perform this operation.

(e) The repair, opening, or modification of any sealed source shall be performed only by persons specifically authorized to do so by the Agency, the U. S. Nuclear Regulatory Commission, or an Agreement State.

(14A) **Use of a Sealed Source in a Well Without a Surface Casing.** A licensee may use a sealed source in a well without a surface casing for protecting fresh water aquifers only if the licensee follows a procedure for reducing the probability of the source becoming lodged in the well. The procedure must be approved for each well by the Agency.

Requirements for Personnel Safety

(15) **Training Requirements.**

(a) No licensee or registrant shall permit any individual to act as a logging supervisor as defined in this Rule until such individual has:

1. Successfully completed, in a course recognized by the Agency, the U. S. Nuclear Regulatory Commission, or an Agreement State consisting of at least 24 hours of formal training in the subjects outlined in Appendix A of this Rule.

2. Received copies of and instruction in the rules contained in this part and the applicable sections of Rules 420-3-26-.01, 420-3-26-.03, and 420-3-26-.10, or their equivalent, conditions of appropriate license or

certificate of registration, and the licensee's or registrant's operating and emergency procedures.

3. Demonstrated understanding of the requirements in 1. and 2. by successfully completing a written examination administered by the licensee or registrant;

4. Completed two months of on-the-job training under the supervision of a logging supervisor; and

5. Demonstrated through a field evaluation, competence to use sources of radiation, related handling tools, and radiation survey instruments which will be used on the job.

(b) No licensee or registrant shall permit any individual to act as a logging assistant until such individual has:

1. Received copies of and instruction in the rules contained in this part and the applicable sections of Rules 420-3-26-.01, 420-3-26-.03, and 420-3-26-.10, or their equivalent, conditions of appropriate license or certificate of registration, and the licensee's or registrant's operating and emergency procedures; and

2. Demonstrated competence to use, under the personal supervision of the logging supervisor, the sources of radiation, related handling tools, and radiation survey instruments which will be used on the job.

(c) The licensee shall provide an annual radiation safety review for all logging supervisors and logging assistants.

(d) The licensee or registrant shall maintain records documenting the training and reviews required by (a), (b) and (c) for inspection by the Agency for 3 years following termination of employment.

16. **Operating and Emergency Procedures.** The licensee's or registrant's operating and emergency procedures shall include instructions in at least the following:

(a) Handling and use of sources of radiation including the use of sealed sources in wells without surface casing for protecting fresh water aquifers, if appropriate;

(b) Methods and occasions for conducting radiation surveys, including surveys for detecting contamination;

(c) Methods and occasions for locking and securing sources of radiation;

(d) Personnel monitoring and the use of personnel monitoring equipment;

(e) Transportation to temporary job sites and field stations, including the packaging and placing of sources of radiation in vehicles, placarding of vehicles, and securing sources of radiation during transportation to prevent accidental loss, tampering or unauthorized removal;

(f) Minimizing exposure of individuals in the event of an accident, including exposures from inhalation and ingestion of radioactive material;

(g) Procedure for notifying proper personnel in the event of an accident;

(h) Maintenance of records;

(i) Inspection and maintenance of sealed sources, source holders, logging tools, source handling tools, storage containers, transport containers, injection tools and uranium sinker bars;

(j) Procedure to be followed in the event a sealed source is lodged downhole;

(k) Procedures to be used for picking up, receiving, and opening packages containing radioactive material;

(l) The monitoring of any well discharge line for contamination by the logging supervisor;

(m) Actions to be taken in the event of a ruptured sealed source to prevent the spread of contamination and to minimize the inhalation and/or ingestion of radioactive material;

(n) The use of remote handling tools for handling sealed sources, and radioactive tracer material except log-activity calibration sources;

(o) Identifying and reporting to the Agency defects and noncompliance as required by 10 CFR Part 21 of the U. S. Nuclear Regulatory Commission regulations;

(p) For the use of tracers, decontamination of the environment, equipment and personnel; and

(q) Maintenance of records generated by logging personnel at temporary job sites.

(17) **Personnel Monitoring.**

(a) No licensee or registrant shall permit any individual to act as a logging supervisor or to assist in the handling of sources of radiation unless each such individual wears a radiation monitor badge. Each radiation monitor badge shall be assigned to and worn by only one individual.

(b) A licensee shall provide bioassay services to individuals using radioactive materials in tracer studies if required by the license.

(c) Personnel monitoring records and bioassay results shall be maintained for inspection until the Agency authorizes disposition.

Precautionary Procedures in Logging and Subsurface Tracer Operations

(18) **Security.**

(a) During each logging or tracer application, except when radiation sources are below ground or in a shipping or storage container, the logging supervisor or other designated employee shall maintain direct surveillance of the operation to protect against unauthorized and/or unnecessary entry into a restricted area, as defined in Rule 420-3-26-.01 of these Rules.

(b) A logging supervisor must be physically present at a temporary job site whenever radioactive materials are being handled or are not stored and locked in a vehicle or storage place. The logging supervisor may leave the job site in order to obtain assistance if a source becomes lodged downhole.

(19) **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.

(20) **Subsurface Tracer Studies.**

(a) Protective gloves and other 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 and temporary job sites.

(b) No licensee shall cause the injection of radioactive material for subsurface tracer studies without prior authorization from the Alabama Oil and Gas Board.

(21) **Particle Accelerators.** No licensee or registrant shall permit above-ground testing of particle accelerators, designed for use in well-logging which results in the production of

radiation, except in areas or facilities controlled or shielded so that the requirements of 420-3-26-.03(6) and 420-3-26-.03(14) of these rules as applicable, are met.

(21A) **Radioactive Markers.** A licensee may use radioactive markers in wells only if the individual markers contain quantities of radioactive material not exceeding the quantities specified in Schedule B of Rule 420-3-26-.02. The use of radioactive markers is subject to requirements of 420-3-26-.12(10) of these rules.

(21B) **Uranium Sinker Bars.** A licensee may use a uranium sinker bar in well-1ogging only if it is legibly impressed with the words "CAUTION - RADIOACTIVE - DEPLETED URANIUM" and "NOTIFY CIVIL AUTHORITIES (or COMPANY NAME) IF FOUND."

(21C) **Energy Compensated Sources.**

(a) A licensee may use an energy compensated source (ECS) which is contained within a logging tool, or other tool component, only if the ECS contains quantities of radioactive material not exceeding 100 microcuries.

(b) For well-1ogging applications with a surface casing for protecting fresh water aquifers, the use of ECS is only subject to the requirements of 420-3-26-.12(9), 420-3-26-.12(10) and 420-3-26-.12(11) of these rules.

(c) For well-1ogging applications without a surface casing for protecting fresh water aquifers, the use of ECS is only subject to the requirements of 420-3-26-12(4), 420-3-26-.12(9), 420-3-26-.12(10), 420-3-26-.12(11), 420-3-26-.12(14a) and 420-3-26-.12(25) of these rules.

(21D) **Tritium Neutron Target Sources.**

(a) The use of a tritium neutron target source containing quantities not to exceed 30 curies and in a well with a surface casing to protect fresh water aquifers is subject to the requirements in these rules except 420-3-26-.12(4), 420-3-26-.12(12) and 420-3-26-.12(25) of these rules.

(b) The use of a tritium neutron target source containing quantities exceeding 30 curies or in a well without a surface casing to protect fresh water aquifers is subject to the requirements in these rules except 420-3-26-.12(12) of these rules.

Radiation Surveys and Records

(22) **Radiation Surveys.**

(a) Radiation surveys shall be made and recorded for each area where radioactive materials are stored.

(b) Before transporting radioactive material, radiation surveys shall be made and recorded for the radiation levels in occupied positions and on the exterior of each vehicle used to transport radioactive material. Such surveys shall include each source of radiation or combination of sources to be transported in the vehicle.

(c) After removal of the sealed source from the logging tool and before departing the job site, the logging tool detector shall be energized, or a survey meter used, to assure that the logging tool is free of contamination.

(d) Radiation surveys shall be made and recorded at the job site or well-head for each tracer operation, except those using hydrogen-3, carbon-14, and sulfur-35. These surveys shall include measurements of radiation levels before and after the operation to confirm the absence of contamination.

(e) Records required pursuant to (a) through (d) above, shall include the dates, the identification of individual(s) making the survey, the identification of survey instrument(s) used, and an exact description of the location of the survey. Records of these surveys shall be maintained for inspection by the Agency for 3 years after completion of the survey.

(23) **Documents and Records Required at Field Stations.** Each licensee or registrant shall maintain, for inspection by the Agency, the following documents and records for the specific devices and sources used at the field station:

(a) Appropriate license, certificate of registration, or equivalent document;

(b) Operating and emergency procedures;

(c) Applicable rules;

(d) Records of the latest survey instrument calibrations pursuant to 420-3-26-.12(8);

(e) Records of the latest leak test results pursuant to 420-3-26-.12(9);

(f) Quarterly inventories required pursuant to 420-3-26-.12(10);

(g) Utilization records required pursuant to 420-3-26-.12(11);

(h) Records of inspection and maintenance required pursuant to 420-3-26-.12(14);

(i) Survey records required pursuant to 420-3-26-.12(22);

(j) Training records required pursuant to 420-3-26-.12(15);

(k) Shipping papers of the transportation of radioactive material;

(l) Records of receipt, transfer and disposal of radioactive material at the field station; and

(m) Records of personnel monitoring required pursuant to 420-3-26-.12(17) for personnel employed at the field station.

(24) **Documents and Records Required at Temporary Job Sites.** Each licensee or registrant conducting operations at a temporary job site shall have the following documents and records available at that site for inspection by the Agency:

(a) Operating and emergency procedures;

(b) Survey records required pursuant to 420-3-26-.12(22) for the period of operation at the site;

(c) Evidence of current calibration for the radiation survey instruments in use at the site;

(d) When operating in the State under reciprocity, a copy of the appropriate license, certificate of registration, or equivalent document(s); and

(e) Shipping papers for the transportation of radioactive material.

(25) **Notification of Incidents and Lost Sources; Abandonment Procedures for Irretrievable Sources.**

(a) Notification of incidents and sources lost in other than downhole logging operations shall be made in accordance with appropriate provisions of Rule 420-3-26-.03 of these rules.

(b) Whenever a sealed source or device containing radioactive material is lodged downhole, the licensee shall:

1. Monitor at the surface, including the circulating fluids from the well if any, for the presence of radioactive contamination with a radiation survey instrument or logging tool during logging tool recovery operations;

2. Immediately initiate the emergency procedures required by 420-3-26-.12(16) if there is evidence that a sealed source has ruptured or radioactive contamination is present. Emergency procedures shall include the decontamination of all work areas, equipment and unrestricted areas, as applicable;

3. Notify the Agency immediately by telephone. Such notice shall;

(i) Indicate the well location,

(ii) Identify persons conducting fishing operations and the procedures to be followed to assure that the radioactive material is not likely to be released, and

(iii) The estimated depth of the source.

4. Notify the Agency immediately by telephone and subsequently within 30 days, by confirmatory letter if the licensee knows or has reason to believe that a sealed source has been ruptured. This letter shall identify the well or other location, describe the magnitude and extent of the escape of radioactive material, assess the consequences of the rupture, and explain efforts planned or being taken to mitigate these consequences.

(c) When it becomes apparent that efforts to recover the radioactive source will not be successful, the licensee shall:

1. Develop an appropriate method of abandonment, which shall include:

(i) A method to immobilize and seal with a cement plug each irretrievable well logging source;

(ii) A means to prevent inadvertent intrusion on the source, unless the source is not accessible to any subsequent drilling operations; and

(iii) The mounting of a permanent identification plaque, at the surface of the well, containing the appropriate information required by (d);

2. Advise the well-operator of these rules and those of the Alabama Oil and Gas Board, and the proposed method of abandonment;

3. Notify the Agency by telephone, giving the circumstances of the loss; and

(i) Request approval of the proposed abandonment procedures; or

(ii) State that the licensee implemented abandonment procedures before receiving Agency approval because the licensee believed there was an immediate threat to public health and safety; and

4. File a written report with the Agency within 30 days of the abandonment, setting forth the following information:

(i) Date of occurrence and a brief description of attempts to recover the source,

(ii) A description of the radioactive source involved, including radionuclide, quantity, and chemical and physical form,

(iii) Surface location and identification of well,

(iv) Results of efforts to immobilize and set the source in place,

(v) Depth of the radioactive source,

(vi) Depth of the top of the cement plug,

(vii) Depth of the well,

(viii) Information contained on the permanent identification plaque,

(ix) The immediate threat to public health and safety justification for implementing abandonment if prior Agency approval was not obtained in accordance with 420-3-26-.12(25)(c)3., and

(x) The names of state agencies receiving a copy of this report.

(d) Whenever a sealed source containing radioactive material is abandoned downhole, the licensee shall provide a permanent plaque[29] for posting the well or well-bore. This plaque shall:

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[29] An example of a suggested plaque is shown in Appendix B of this rule 420-3-26-.12.

(i) Be constructed of long-1asting material, such as stainless steel, brass, bronze or monel;

(ii) Be mounted at the surface of the well or well-bore, unless the mounting of the plaque is not practical;

(iii) Have a size of at least 17 cm (7 inches) square and 3 mm (3/8 inches) thick; and

(iv) Contain the following information engraved on its face:

(I) The word "CAUTION",

(II) The radiation symbol without the conventional color requirement,

(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) The sealed source(s) by radionuclide and quantity of activity,

(VII) The source depth and the depth to the top of the plug, and

(VIII) An appropriate warning, depending on the specific circumstances of each abandonment.[30]

(e) The licensee shall immediately notify the Agency by telephone and subsequently by 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 the well location and shall describe the magnitude and extent of loss of radioactive material, assess the consequences of such loss, and explain efforts planned or being taken to mitigate these consequences.

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[30] Appropriate warnings may include: (a) "Do not drill below plug back depth"; (b) "do not enlarge casing"; or (c) "do not re-enter hole", followed by the words, "before contacting the Office of Radiation Control, Alabama Department of Public Health."

420-3-26-.12
APPENDIX A

SUBJECTS TO BE INCLUDED IN TRAINING COURSES FOR LOGGING SUPERVISORS

I. Fundamentals of Radiation Safety

- A. Characteristics of radiation
- B. Units of radiation dose and quantity of radioactivity
- C. Significance of radiation dose
  1. Radiation protection standards
  2. Biological effects of radiation dose
- D. Levels of radiation from sources of radiation
- E. Methods of minimizing radiation dose
  1. Working time
  2. Working distances
  3. Shielding
- F. Radiation Safety Practices
  1. Prevention of contamination
  2. Methods of decontamination

II. Radiation Detection Instrumentation to be Used

- A. Use of radiation survey instruments
  1. Operation
  2. Calibration
  3. Limitations
- B. Survey techniques
- C. Use of personnel monitoring equipment

III. Equipment to be Used

- A. Handling equipment

1. Source handling equipment
2. Remote handling tools

B. Sources of radiation

1. Storage
2. Control
3. Disposal

C. Storage and control of equipment

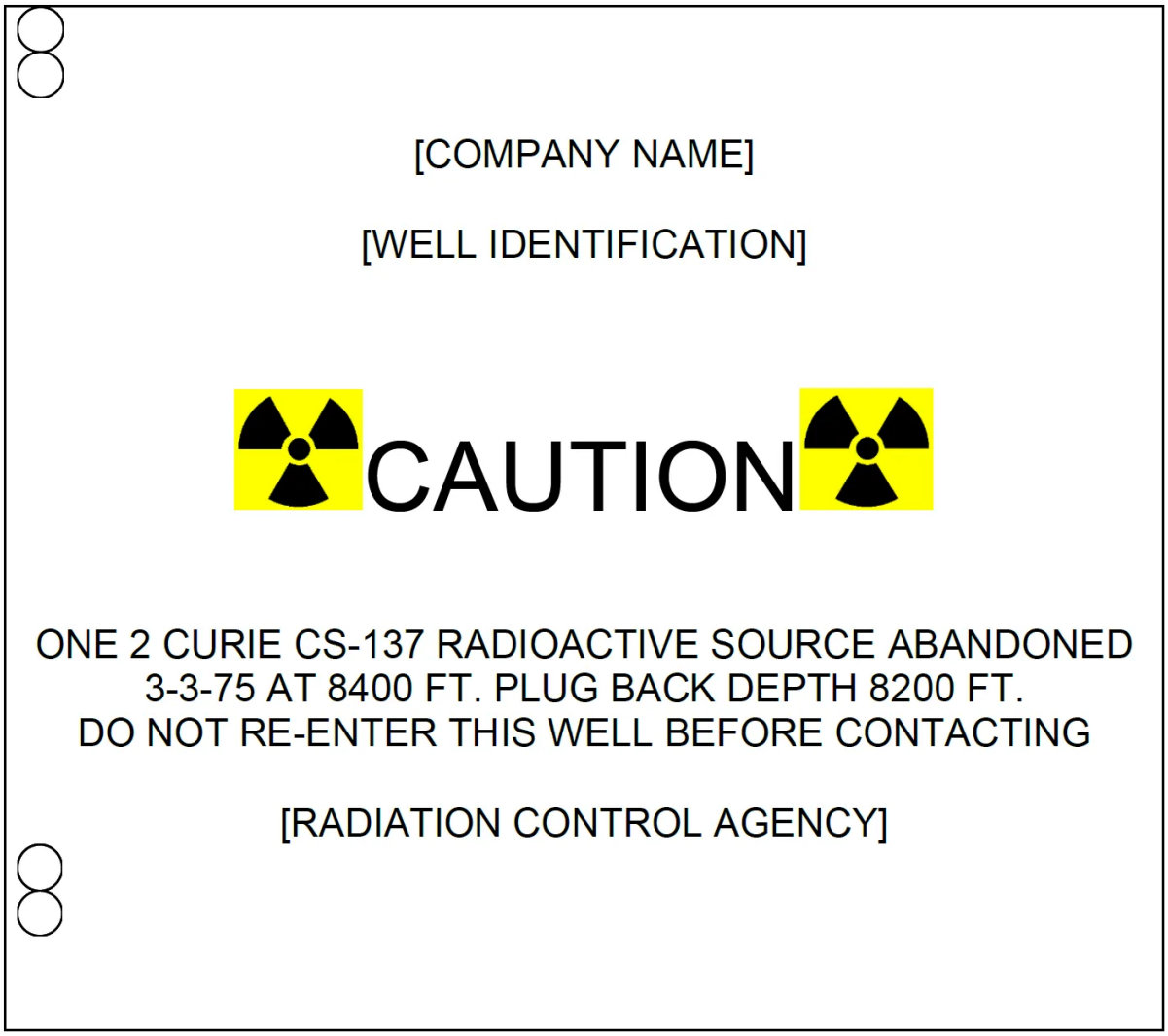
D. Operation and control of equipment

IV. Pertinent State and Federal Regulations

V. Case Histories of Accidents in Well Logging

420-3-26-.12
APPENDIX B

EXAMPLE OF PLAQUE FOR IDENTIFYING WELLS CONTAINING SEALED SOURCES CONTAINING RADIOACTIVE MATERIAL ABANDONED DOWNHOLE



The size of this plaque should be convenient for use on active or inactive wells, e.g., a 7-inch square. Letter size of the word "CAUTION" should be approximately twice the letter size of the rest of the information, e.g., ½-inch and 1/4-inch letter size, respectively.

Author: David Turberville, Office of Radiation Control, Alabama Department of Public Health 30 Appropriate warnings may include: (a) "Do not drill below plug back depth"; (b) "do not enlarge casing"; or (c) "do not re-enter hole", followed by the words, "before contacting the Office of Radiation Control, Alabama Department of Public Health."

Statutory Authority: Code of Ala. 1975, §§22-14-4, 22-14-6, 22-14-7, 22-14-8, 22-14-11.
History: Adopted effective December 31, 1983. Revised and Repromulgated effective January 31, 1990. **Revised:** Effective October 1, 1991. **Amended (Text and Appendices):** Filed May 19, 2006; effective June 23, 2006.