

Chapter 246-244 WAC

RADIATION PROTECTION—WIRELINER SERVICES

WAC

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WAC 246-244-001 Purpose. This chapter establishes radiation safety requirements for persons using sources of radiation for wireline service operations including mineral logging, radioactive markers, and/or subsurface tracers studies. The requirements of this chapter are in addition to, and not in substitution for, requirements of chapters 246-220, 246-221, 246-222, 246-232, and 246-235 WAC.

[Statutory Authority: RCW 70.98.050 and 70.98.080. 91-15-112 (Order 184), § 246-244-001, filed 7/24/91, effective 8/24/91. Statutory Authority: RCW 43.70.040. 91-02-049 (Order 121), recodified as § 246-244-001, filed 12/27/90, effective 1/31/91. Statutory Authority: RCW 70.98.080. 87-01-031 (Order 2450), § 402-38-010, filed 12/11/86.]

WAC 246-244-010 Scope. The regulations in this chapter apply to all licensees who use sources of radiation for wireline service operations, including mineral logging, radioactive markers, uranium sinker bars, or subsurface tracer studies.

[Statutory Authority: RCW 43.70.040. 91-02-049 (Order 121), recodified as § 246-244-010, filed 12/27/90, effective 1/31/91. Statutory Authority: RCW 70.98.080. 87-01-031 (Order 2450), § 402-38-025, filed 12/11/86.]

WAC 246-244-020 Definitions. As used in this chapter, the following definitions apply:

(1) "Casing" means a metal pipe or tube used as a lining for oil or gas wells to prevent collapse of the well-bore.

(2) "Energy compensation source" (ECS) means a small sealed source, with an activity not exceeding 3.7 MBq (100 microcuries), used within a logging tool, or other tool components, to provide a reference standard to maintain the tool's calibration when in use.

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

(4) "Fresh water aquifer" means a geological formation that is capable of yielding a significant amount of fresh water to a well or spring.

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

(6) "Irretrievable well-logging source" means any sealed source containing licensed 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.

(7) "Logging assistant" means an individual who assists the logging supervisor in performing the well-logging operations.

(8) "Logging supervisor" means an individual who provides personal supervision of the use of licensed material at the temporary job site and who is responsible to the licensee for assuring compliance with requirements of the department's regulations and the conditions of the license.

(9) "Logging tool" means a device used subsurface to perform well-logging.

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

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

(12) "Radioactive marker" means licensed material used for the purpose of depth determination or direction orientation. This term includes radioactive collar markers and radioactive iron nails.

(13) "Sealed source" means any licensed material that is encased in a capsule designed to prevent leakage or escape of the radioactive material.

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

(15) "Subsurface tracer study" means, for the purpose of this chapter, the release of unsealed licensed material or a substance labeled with licensed material in a single well or multiple wells for the purpose of tracing the movement or position of the material or substance in the well-bore or adjacent formation(s) (this term does not include the use of licensed material in field flooding studies).

(16) "Surface casing" means a pipe or tube used as a lining in a well to isolate the fresh water zone from the well.

(17) "Temporary job site" means any location to which radioactive materials have been dispatched or taken to perform wireline service operations or subsurface tracer studies.

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

(19) "Uranium sinker bar" means a weight containing depleted uranium used for the purpose of providing additional force to pull a logging tool down toward the bottom of a well.

(20) "Well-bore" means any drilled hole in which wireline service operations and/or subsurface tracer studies are performed.

(21) "Well-logging" means the lowering and raising of measuring devices or tools which contain sources of radiation into well-bores or cavities (salt domes, etc.) for the purpose of obtaining information about the well and/or adjacent formations which may be used in oil, gas, mineral or geological explorations.

(22) "Well-logging operation" means any activity involving licensed material performed in a well, including well-logging, mineral logging, subsurface tracer studies, use of radioactive markers, radioactive iron nails, uranium sinker bars, and radioactive sands, and transportation or storage of same.

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

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

[Statutory Authority: RCW 70.98.050, 03-12-062, § 246-244-020, filed 6/2/03, effective 7/3/03. Statutory Authority: RCW 43.70.040, 91-02-049 (Order 121), recodified as § 246-244-020, filed 12/27/90, effective 1/31/91. Statutory Authority: RCW 70.98.080, 87-01-031 (Order 2450), § 402-38-030, filed 12/11/86.]

WAC 246-244-030 Agreement with well owner or operator. (1) A licensee may perform well logging with a sealed source only after the licensee has a written agreement with the employing well owner or operator. This written agreement must identify who will meet the following requirements:

(a) If a sealed source becomes lodged in the well, a reasonable effort will be made to recover it.

(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) The radiation monitoring required in WAC 246-244-210 will be performed.

(d) If the environment, any equipment, or personnel are contaminated with licensed material, they must be decontaminated before release from the site or release for unrestricted use.

(e) If the sealed source is classified as irretrievable after reasonable efforts at recovery have been expended, the following requirements must be implemented within thirty days:

(i) Each irretrievable well-logging source must be immobilized and sealed in place with a cement plug;

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

(iii) A permanent identification plaque, constructed of long lasting material such as stainless steel, brass, bronze, or monel, must be mounted at the surface of the well, unless the mounting of the plaque is not practical. The size of the plaque must be at least 17 cm (7 inches) square and 3 mm (1/8-inch) thick. The plaque must contain—

(A) The word "CAUTION";

(B) The radiation symbol (the color requirement in WAC 246-221-120(1) need not be met);

(C) The date the source was abandoned;

(D) The name of the well owner or well operator, as appropriate;

(E) The well name and well identification number(s) or other designation;

(F) An identification of the sealed source(s) by radionuclide and quantity;

(G) The depth of the source and depth to the top of the plug; and

(H) An appropriate warning, such as, "DO NOT REENTER THIS WELL."

(2) The licensee shall retain a copy of the written agreement for three years after the completion of the well-logging operation.

(3) A licensee may apply, under WAC 246-220-050, for department approval, on a case-by-case basis, of proposed procedures to abandon an irretrievable well-logging source in a manner not otherwise authorized in subsection (1)(e) of this section.

(4) A written agreement between the licensee and the well owner or operator is not required if the licensee and the well owner or operator are part of the same corporate structure or otherwise similarly affiliated. However, the licensee shall still otherwise meet the requirements in subsection (1) of this section.

[Statutory Authority: RCW 70.98.050, 03-12-062, § 246-244-030, filed 6/2/03, effective 7/3/03. Statutory Authority: RCW 70.98.050 and 70.98.080, 91-15-112 (Order 184), § 246-244-030, filed 7/24/91, effective 8/24/91. Statutory Authority: RCW 43.70.040, 91-02-049 (Order 121), recodified as § 246-244-030, filed 12/27/90, effective 1/31/91. Statutory Authority: RCW 70.98.080, 87-01-031 (Order 2450), § 402-38-040, filed 12/11/86.]

WAC 246-244-040 Limits on levels of radiation. Sources of radiation shall be used, stored, and transported in such a manner that the transportation requirements of chapter 246-231 WAC and the dose limitation requirements of chapter 246-221 WAC are met.

[Statutory Authority: RCW 70.98.050, 99-15-105, § 246-244-040, filed 7/21/99, effective 8/21/99. Statutory Authority: RCW 70.98.050 and 70.98.080, 91-15-112 (Order 184), § 246-244-040, filed 7/24/91, effective 8/24/91. Statutory Authority: RCW 43.70.040, 91-02-049 (Order 121), recodified as § 246-244-040, filed 12/27/90, effective 1/31/91. Statutory Authority: RCW 70.98.080, 87-01-031 (Order 2450), § 402-38-060, filed 12/11/86.]

WAC 246-244-050 Storage precautions. (1) Each source of radiation, except accelerators, shall be provided with a storage and/or transport container. Such containers shall be utilized. The container shall be provided with a lock (or tamper seal, for calibration sources) to prevent unauthorized

ized removal of, or exposure to, the source(s) of radiation. Such locks shall be used each time the source of radiation is placed in the storage/transport container.

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

[Statutory Authority: RCW 43.70.040. 91-02-049 (Order 121), recodified as § 246-244-050, filed 12/27/90, effective 1/31/91. Statutory Authority: RCW 70.98.080. 87-01-031 (Order 2450), § 402-38-080, filed 12/11/86.]

WAC 246-244-060 Transport precautions. (1) Transport containers shall be physically secured to the transporting vehicle to prevent accidental loss, tampering, or unauthorized removal.

(2) Transport of radioactive material shall be in accordance with applicable provisions of the United States Department of Transportation, as required by chapter 246-231 WAC.

[Statutory Authority: RCW 70.98.050. 99-15-105, § 246-244-060, filed 7/21/99, effective 8/21/99. Statutory Authority: RCW 70.98.050 and 70.98.080. 91-15-112 (Order 184), § 246-244-060, filed 7/24/91, effective 8/24/91. Statutory Authority: RCW 43.70.040. 91-02-049 (Order 121), recodified as § 246-244-060, filed 12/27/90, effective 1/31/91. Statutory Authority: RCW 70.98.080. 87-01-031 (Order 2450), § 402-38-100, filed 12/11/86.]

WAC 246-244-070 Radiation survey instruments. (1) The licensee or registrant shall maintain and use sufficient calibrated and operable radiation survey instruments at each field station and temporary job site to make physical radiation surveys as required. Instrumentation shall be capable of measuring 0.001 mSv (0.1 millirem) per hour through at least 0.5 mSv (50 millirem) per hour.

(2) Each radiation survey instrument shall be calibrated:

(a) At intervals not to exceed six months and after each instrument servicing;

(b) At energies and radiation levels appropriate for use;

(c) At two points located approximately one-third and two-thirds at full scale on each scale (for logarithmic scale, at midrange of each decade, and at two points of at least one decade); and

(d) Such that accuracy within ± 20 percent of the true radiation levels can be demonstrated on each scale.

(3) Each licensee shall have available additional calibrated and operable radiation detection instruments capable of detecting radiation and contamination levels that could be encountered during well-logging operations or during the event of an accident, e.g., an alpha meter in case of Am-241 source rupture, a contamination meter and probe, and a high level meter capable of detecting radiation levels up to at least one roentgen per hour. The licensee may own such instruments or may make prior arrangements to obtain them expeditiously from a second party as necessary.

(4) Calibration records shall be maintained for a period of at least three years for inspection by the department.

[Statutory Authority: RCW 70.98.050. 01-05-110, § 246-244-070, filed 2/21/01, effective 3/24/01. Statutory Authority: RCW 43.70.040. 91-02-049 (Order 121), recodified as § 246-244-070, filed 12/27/90, effective 1/31/91. Statutory Authority: RCW 70.98.080. 87-01-031 (Order 2450), § 402-38-120, filed 12/11/86.]

WAC 246-244-080 Leak testing of sealed sources. (1) Testing and recordkeeping requirements. Each licensee who

uses a sealed source shall have the source tested for leakage periodically. The licensee shall keep a record of leak test results in units of becquerels (or microcuries) and retain the record for inspection by the department for three years after the leak test is performed.

(2) Method of testing. The wipe of a sealed source must be performed using a leak test kit or method approved by the department, an agreement state, a licensing state, or the United States Nuclear Regulatory Commission. The wipe sample must be taken from the nearest accessible point to the sealed source where contamination might accumulate. The wipe sample must be analyzed for radioactive contamination. The analysis must be capable of detecting the presence of 185 Bq (0.005 microcurie) of radioactive material on the test sample and must be performed by a person approved by the department, an agreement state, a licensing state, or the United States Nuclear Regulatory Commission to perform the analysis.

(3) Test frequency.

(a) Each sealed source (except an energy compensation source (ECS)) must be tested at intervals not to exceed six months. In the absence of a certificate from a transferor that a test has been made within the six months before the transfer, the sealed source may not be used until tested.

(b) Each ECS that is not exempt from testing in accordance with subsection (5) of this section 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 ECS may not be used until tested.

(4) Removal of leaking source from service.

(a) If the test conducted under subsections (1) and (2) of this section reveals the presence of 185 Bq (0.005 microcurie) or more of removable radioactive material, the licensee shall remove the sealed source from service immediately and have it decontaminated, repaired, or disposed by a department, an agreement state, a licensing state, or a United States Nuclear Regulatory Commission licensee that is authorized to perform these functions. The licensee shall check the equipment associated with the leaking source for radioactive contamination and, if contaminated, have it decontaminated or disposed of by a department, an agreement state, a licensing state, or a United States Nuclear Regulatory Commission licensee that is authorized to perform these functions.

(b) The licensee shall submit a report to the department within five days of receiving the test results. The report must describe the equipment involved in the leak, the test results, any contamination that resulted from the leaking source, and the corrective actions taken up to the time the report is made.

(5) Exemptions from testing requirements. The following sealed sources are exempt from the periodic leak test requirements set out in subsections (1) through (4) of this section:

(a) Hydrogen-3 (tritium) sources;

(b) Sources containing licensed material with a half-life of thirty days or less;

(c) Sealed sources containing licensed material in gaseous form;

(d) Sources of beta- or gamma-emitting radioactive material with an activity of 3.7 MBq (100 microcuries) or less; and

(e) Sources of alpha- or neutron-emitting radioactive material with an activity of 0.37 MBq (10 microcuries) or less.

[Statutory Authority: RCW 70.98.050. 03-12-062, § 246-244-080, filed 6/2/03, effective 7/3/03. Statutory Authority: RCW 70.98.050 and 70.98.080. 91-15-112 (Order 184), § 246-244-080, filed 7/24/91, effective 8/24/91. Statutory Authority: RCW 43.70.040. 91-02-049 (Order 121), recodified as § 246-244-080, filed 12/27/90, effective 1/31/91. Statutory Authority: RCW 70.98.080. 87-01-031 (Order 2450), § 402-38-140, filed 12/11/86.]

WAC 246-244-090 Inventories. (1) Each licensee shall conduct a physical inventory at intervals not to exceed three months to account for all sources of radiation received and possessed. Records of such inventories shall be maintained for at least two years from the date of the inventory for inspection by the department and shall include the quantities, kinds, and serial numbers of sources of radiation, the location where such sources of radiation are assigned and/or stored, the date of the inventory, and the name of the individual conducting the inventory.

(2) Spotmarkers containing radioactive material shall be inventoried prior to arrival at a field site and prior to departure. Records of such inventories shall include the quantity and kinds of radioactive material, serial numbers where appropriate, the date and name of the person performing the inventory, and shall be maintained for inspection by the department.

[Statutory Authority: RCW 43.70.040. 91-02-049 (Order 121), recodified as § 246-244-090, filed 12/27/90, effective 1/31/91. Statutory Authority: RCW 70.98.080. 87-01-031 (Order 2450), § 402-38-160, filed 12/11/86.]

WAC 246-244-100 Utilization logs/records. Each licensee shall maintain current records, which shall be kept available for inspection by the department for two years from the date of recorded event, showing the following information for each source of radiation:

- (1) Make, model, and serial number of each source of radiation used;
- (2) The identity of the well-logging supervisor and logging assistants to whom assigned;
- (3) The locations where used and dates of use; and
- (4) In the case of tracer materials and/or radioactive markers, the utilization records shall also indicate the radionuclide and quantity of activity used in a particular well.

[Statutory Authority: RCW 43.70.040. 91-02-049 (Order 121), recodified as § 246-244-100, filed 12/27/90, effective 1/31/91. Statutory Authority: RCW 70.98.080. 87-01-031 (Order 2450), § 402-38-180, filed 12/11/86.]

WAC 246-244-110 Design, performance, and certification criteria for sealed sources used in downhole operations. (1) 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 department, to meet the following minimum criteria:

- (a) Be of doubly encapsulated construction;
- (b) Contain radioactive material whose chemical and physical forms are as insoluble and nondispersible, respectively, as practical; and
- (c) Comply with subsection (2), (3), or (4) of this section.

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(2) For a sealed source manufactured on or before July 14, 1989, a licensee may use the sealed source for use in well-logging applications if it meets the requirements of USASI N5.10-1968, "Classification of Sealed Radioactive Sources," or the requirements in subsection (3) or (4) of this section.

(3) For a sealed source manufactured after July 14, 1989, a licensee may use the sealed source for use in well-logging applications if it meets the oil-well logging requirements of ANSI/HPS N43.6-1997, "Sealed Radioactive Sources—Classification."

(4) For a sealed source manufactured after July 14, 1989, a licensee may use the sealed source for use in well-logging applications, if—

The sealed source's prototype has been tested and found to maintain its integrity after each of the following tests:

(a) Temperature. The test source must be held at -40°C for twenty minutes, 600°C for one hour, and then be subject to a thermal shock test with a temperature drop from 600°C to 20°C within fifteen seconds.

(b) Impact test. A 5 kg steel hammer, 2.5 cm in diameter, must be dropped from a height of 1 m onto the test source.

(c) Vibration test. The test source must be subject to a vibration from 25 Hz to 500 Hz at 5 g amplitude for thirty minutes.

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

(e) Pressure test. The test source must be subject to an external pressure of 1.695E7 pascals (24,600 pounds per square inch absolute).

(5) Except those containing radioactive material in gaseous form, in the absence of a certificate from a transferor certifying that an individual sealed source meets the requirements of subsection (1) of this section, the sealed source shall not be put into use until these determinations and testings have been performed and acceptable documented results obtained.

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

(7) The requirements in this section do not apply to energy compensation sources (ECS). ECSs must be registered with the commission under Section 10 CFR 32.210 or with an agreement state.

[Statutory Authority: RCW 70.98.050. 03-12-062, § 246-244-110, filed 6/2/03, effective 7/3/03. Statutory Authority: RCW 43.70.040. 91-02-049 (Order 121), recodified as § 246-244-110, filed 12/27/90, effective 1/31/91. Statutory Authority: RCW 70.98.080. 87-01-031 (Order 2450), § 402-38-200, filed 12/11/86.]

WAC 246-244-115 Energy compensation sources and tritium neutron generator target sources. (1) The licensee may use an energy compensation source (ECS) which is contained within a logging tool, or other tool components, only if the ECS contains quantities of licensed material not exceeding 3.7 MBq (100 microcuries).

(a) For well-logging applications with a surface casing for protecting fresh water aquifers, use of the ECS is only

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subject to the requirements of WAC 246-244-080, 246-244-090 and 246-244-100.

(b) For well-logging applications without a surface casing for protecting fresh water aquifers, use of the ECS is only subject to the requirements of WAC 246-244-030, 246-244-080, 246-244-090, 246-244-100 and 246-244-240.

(2) Use of a tritium neutron generator target source, containing quantities not exceeding 1,110 MBq (30 curies) and in a well with a surface casing to protect fresh water aquifers, is subject to the requirements of this chapter except WAC 246-244-030, 246-244-110, and 246-244-240.

(3) Use of a tritium neutron generator target source, containing quantities exceeding 1,110 MBq (30 curies) or in a well without a surface casing to protect fresh water aquifers, is subject to the requirements of this chapter except WAC 246-244-110.

[Statutory Authority: RCW 70.98.050. 03-12-062, § 246-244-115, filed 6/2/03, effective 7/3/03.]

WAC 246-244-120 Labeling. (1) Each source, source holder, and logging tool containing radioactive material shall bear a durable, legible, and clearly visible marking or label which has, at a minimum, the standard radiation caution symbol, with or without the conventional color requirement, and the following wording: "DANGER (or CAUTION) RADIOACTIVE MATERIAL." This labeling shall be on the smallest component transported as a separate piece of equipment.

(2) Each transport container shall have permanently attached to it a durable, legible, and clearly visible label which has, at a minimum, the standard radiation caution symbol and colors and the following wording: "DANGER (or CAUTION) RADIOACTIVE MATERIAL, NOTIFY CIVIL AUTHORITIES IF FOUND."

(3) The licensee may not use a uranium sinker bar in well-logging operations after December 31, 1987, unless it is clearly and legibly impressed with the words "CAUTION-RADIOACTIVE DEPLETED URANIUM" and "NOTIFY CIVIL AUTHORITIES IF FOUND."

[Statutory Authority: RCW 43.70.040. 91-02-049 (Order 121), recodified as § 246-244-120, filed 12/27/90, effective 1/31/91. Statutory Authority: RCW 70.98.080. 87-01-031 (Order 2450), § 402-38-220, filed 12/11/86.]

WAC 246-244-130 Inspection and maintenance. (1) Each licensee shall conduct a program of visual inspection and maintenance of source holders, logging tools, source handling tools, storage containers, transport containers, injection tools, and sinker bars to ensure that the required labeling is legible and that visual physical damage is absent. The licensee shall perform the visual inspection and maintenance at least every three months. Such inspection and maintenance shall follow the manufacturers recommendations for the equipment involved. Licensees shall maintain records of inspections and maintenance for three years for inspection by the department.

(2) Each licensee shall maintain appropriate copies of manufacturer's operating and maintenance instructions at those locations where such inspection and maintenance is performed.

(3) Each licensee shall inspect the source holders, logging tools, and source handling tools for obvious defects

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before the equipment is used each day to ensure that the equipment is in good working condition.

(4) If any inspection conducted pursuant to this section reveals damage to the labeling or to components critical for radiation safety, the licensee shall remove the item from service until authorized repairs are made.

(5) Removal of a sealed source from a source holder, and maintenance on sealed sources, holders, or pressure housings in which sealed sources are placed, or on other equipment containing a sealed source may not be performed unless a written instruction for the particular operation in question has been approved by the department as part of the license application.

(6) If a sealed source is stuck in a source holder or logging tool, the licensee may not perform any operations such as drilling, cutting, or chiseling on the source holder or logging tool, unless it is specifically licensed by the department to perform this operation.

(7) The repair, opening, or modification of any sealed source must be performed only by persons specifically licensed to do so by the department, the United States Nuclear Regulatory Commission, an agreement state, or a licensing state.

[Statutory Authority: RCW 43.70.040. 91-02-049 (Order 121), recodified as § 246-244-130, filed 12/27/90, effective 1/31/91. Statutory Authority: RCW 70.98.080. 87-01-031 (Order 2450), § 402-38-240, filed 12/11/86.]

WAC 246-244-140 Training requirements. (1) The licensee may not permit an individual to act as a logging supervisor until that person:

(a) Has completed at least forty hours of formal training in a course recognized by the department, the United States Nuclear Regulatory Commission, an agreement state, or a licensing state covering the subjects outlined in subsection (5) of this section;

(b) Has received copies of and instruction in:

(i) Washington state regulations contained in this chapter and in the applicable chapters 246-220, 246-221, and 246-222 WAC or their equivalent;

(ii) The license under which the logging supervisor will perform well-logging operations; and

(iii) The licensee's operating, recordkeeping, and emergency procedures.

(c) Has completed three months of on-the-job training and demonstrated competence in the use of licensed materials, remote handling tools, and radiation survey instruments by a field evaluation; and

(d) Has demonstrated understanding of the requirements in (a) and (b) of this subsection by successfully completing a closed book written test.

(2) The licensee may not permit an individual to act as a logging assistant until that person:

(a) Has received copies of and instruction in the licensee's operating and emergency procedures;

(b) Has demonstrated understanding of the materials listed in subsection (1)(a) and (b) of this section by successfully completing a closed book written test; and

(c) Has received instructions in the use, under the personal supervision of the logging supervisor, of tracer material, sealed sources, remote handling tools, and radiation survey instruments, as appropriate.

(3) Each licensee shall provide for documented refresher training of logging supervisors and logging assistants at intervals not to exceed twelve months.

(4) Each licensee shall maintain a record of each logging supervisor's and logging assistant's training, including copies and dates of written tests for a minimum of three years following the termination of employment.

(5) Each licensee shall include the following subjects in the formal training required by this chapter:

(a) **Fundamentals of radiation safety:**

- (i) Characteristics of radiation;
- (ii) Units of radiation dose and quantity of radioactivity;
- (iii) Hazards of exposure to radiation;
- (iv) Levels of radiation from licensed material;
- (v) Methods of controlling radiation dose:

- (A) Working time;
- (B) Working distances;
- (C) Shielding;

(D) Radiation safety practices, including prevention and contamination and methods of decontamination;

(b) **Radiation detection instrumentation to be used:**

- (i) Use of radiation survey instruments:
 - (A) Operation;
 - (B) Calibration;
 - (C) Limitations;
- (ii) Survey techniques;
- (iii) Use of personnel monitoring equipment;

(c) **Equipment to be used:**

- (i) Handling equipment and remote handling tools;
- (ii) Licensed materials;
- (iii) Storage, control, and disposal of equipment and licensed material;

(iv) Operation and control of equipment and licensed materials;

(v) Maintenance of equipment;

(d) Requirements of pertinent state and federal regulations;

(e) Case histories and potential consequences of accidents in well-logging operations.

[Statutory Authority: RCW 70.98.050 and 70.98.080. 91-15-112 (Order 184), § 246-244-140, filed 7/24/91, effective 8/24/91. Statutory Authority: RCW 43.70.040. 91-02-049 (Order 121), recodified as § 246-244-140, filed 12/27/90, effective 1/31/91. Statutory Authority: RCW 70.98.080. 87-01-031 (Order 2450), § 402-38-260, filed 12/11/86.]

WAC 246-244-150 Operating and emergency procedures. The licensee's operating and emergency procedures shall include instruction in at least the following:

(1) Handling and use of sources of radiation to be employed such that no individual is likely to be exposed to radiation doses in excess of the standards established in chapter 246-221 WAC;

(2) Methods and occasions for conducting radiation surveys;

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

(4) Personnel monitoring and the use and care of personnel monitoring equipment;

(5) Transportation of sources of radiation to temporary job sites and field stations, including the marking, labeling, packaging, and placing of sources of radiation in vehicles,

shipping papers, placarding of vehicles, and physical securing of sources of radiation to transport vehicles during transportation to prevent accidental loss, tampering, or unauthorized removal;

(6) Minimizing personnel exposure, including that from inhalation and ingestion of licensed material, during well-logging operations and in the event of an accident;

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

(8) Maintenance of records;

(9) Inspection and maintenance of source holders, logging tools, source handling tools, storage containers, transport containers, and injection tools;

(10) Procedures to be followed in the event a sealed source is lodged downhole or ruptured;

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

(12) The procedure and the use of tools for remote handling of sealed sources and radioactive tracer material, except low activity calibration sources;

(13) The procedure to use for detecting contamination and for preventing the spread of contamination; and

(14) The procedure to be used to decontaminate the environment, equipment, and/or personnel if any or all are contaminated.

[Statutory Authority: RCW 70.98.050 and 70.98.080. 91-15-112 (Order 184), § 246-244-150, filed 7/24/91, effective 8/24/91. Statutory Authority: RCW 43.70.040. 91-02-049 (Order 121), recodified as § 246-244-150, filed 12/27/90, effective 1/31/91. Statutory Authority: RCW 70.98.080. 87-01-031 (Order 2450), § 402-38-280, filed 12/11/86.]

WAC 246-244-160 Personnel monitoring. (1) The licensee may not permit an individual to act as a logging supervisor or logging assistant unless that person wears, at all times during the handling of licensed radioactive materials, a personnel dosimeter that is processed by an accredited National Voluntary Laboratory Accreditation Program (NVLAP) processor. Each personnel dosimeter must be assigned to and worn by only one individual. The film badge must be exchanged and analyzed at least monthly and other personnel dosimeters exchanged and analyzed at least every three months. The licensee shall have each personnel dosimeter processed in a timely fashion.

(2) The licensee shall provide appropriate bioassay services to individuals using licensed materials for subsurface tracer studies.

(3) The licensee shall keep reports received from the accredited NVLAP personnel dosimeter processor and from the bioassay service laboratory for inspection until the department authorizes disposition or terminates the license.

(4) Personnel monitoring devices and equipment shall monitor for beta, gamma, and neutron radiation as appropriate.

(5) Each licensee shall adhere to the requirements of the department's Regulatory Guide 8.20 *Bioassay Program Criteria for I-125 and I-131*.

[Statutory Authority: RCW 70.98.050. 03-12-062, § 246-244-160, filed 6/2/03, effective 7/3/03. Statutory Authority: RCW 70.98.050 and 70.98.080. 91-15-112 (Order 184), § 246-244-160, filed 7/24/91, effective 8/24/91. Statutory Authority: RCW 43.70.040. 91-02-049 (Order 121), recodified as § 246-244-160, filed 12/27/90, effective 1/31/91. Statutory

Authority: RCW 70.98.080. 87-01-031 (Order 2450), § 402-38-300, filed 12/11/86.]

WAC 246-244-170 Radioactive contamination control. (1) During efforts to recover a sealed source lodged in the well, the licensee shall continuously monitor, with an appropriate radiation detection instrument, the circulating fluids from the well to check for contamination resulting from damage to the sealed source.

(2) If the licensee detects evidence that the sealed source has ruptured or licensed materials have caused contamination, it shall initiate required emergency procedures.

(3) If contamination results from the use of licensed material in well-logging operations, the licensee shall decontaminate all work areas, equipment, and unrestricted areas to levels deemed appropriate by the department.

[Statutory Authority: RCW 43.70.040. 91-02-049 (Order 121), recodified as § 246-244-170, filed 12/27/90, effective 1/31/91. Statutory Authority: RCW 70.98.080. 87-01-031 (Order 2450), § 402-38-320, filed 12/11/86.]

WAC 246-244-180 Security. During each logging or tracer application, the logging supervisor or other designated employee shall maintain direct surveillance of the operation to protect against unauthorized and/or unnecessary entry into the restricted area (as defined in WAC 246-220-010).

[Statutory Authority: RCW 70.98.050 and 70.98.080. 91-15-112 (Order 184), § 246-244-180, filed 7/24/91, effective 8/24/91. Statutory Authority: RCW 43.70.040. 91-02-049 (Order 121), recodified as § 246-244-180, filed 12/27/90, effective 1/31/91. Statutory Authority: RCW 70.98.080. 87-01-031 (Order 2450), § 402-38-340, filed 12/11/86.]

WAC 246-244-190 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.

[Statutory Authority: RCW 43.70.040. 91-02-049 (Order 121), recodified as § 246-244-190, filed 12/27/90, effective 1/31/91. Statutory Authority: RCW 70.98.080. 87-01-031 (Order 2450), § 402-38-360, filed 12/11/86.]

WAC 246-244-200 Subsurface tracer studies. (1) Protective gloves and other appropriate protective clothing and equipment shall be used by all personnel handling radioactive tracer material. Adequate precautions shall be taken to avoid ingestion or inhalation of radioactive material, and to avoid contamination of field site stations and temporary job sites.

(2) No licensee shall cause the injection or administration of radioactive material into fresh water aquifers without prior written authorization from the department and any other appropriate state agency.

[Statutory Authority: RCW 43.70.040. 91-02-049 (Order 121), recodified as § 246-244-200, filed 12/27/90, effective 1/31/91. Statutory Authority: RCW 70.98.080. 87-01-031 (Order 2450), § 402-38-380, filed 12/11/86.]

WAC 246-244-210 Radiation surveys. (1) Radiation surveys shall be made and recorded for each area where radioactive materials are stored at intervals not to exceed six months. In those cases where neutron sources are involved, calculations for dose rate may be substituted for direct measurement.

(2) 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 sur-

veys shall include each and every source of radiation or combination of sources to be transported in the vehicle. In those cases where neutron sources are involved, calculations for dose rate may be substituted for direct measurement.

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

(4) 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, or Sulfur-35. Such surveys shall include measurements of radiation levels immediately before and after each operation.

(5) If the licensee suspects that, as a result of operations involving a sealed source, the encapsulation of the sealed source could have been damaged by the operation, it shall conduct a radiation survey, including a contamination survey, during and after the operation.

(6) The licensee shall make a radiation survey at the temporary job site for each subsurface tracer study. The survey must include measurement of radiation levels before and after the operation, and measurement of contamination levels after the subsurface tracer study.

(7) Records of surveys required pursuant to this section shall include the dates, the identification of individuals making the survey, the identification of survey instruments used including make, model, serial number and calibration date, and an exact description of the location of the survey with diagram. Records of these surveys shall be maintained for inspection by the department for at least two years after completion of the survey.

[Statutory Authority: RCW 43.70.040. 91-02-049 (Order 121), recodified as § 246-244-210, filed 12/27/90, effective 1/31/91. Statutory Authority: RCW 70.98.080. 87-01-031 (Order 2450), § 402-38-400, filed 12/11/86.]

WAC 246-244-220 Documents and records required at field stations. Each licensee shall maintain for inspection by the department the following documents and records for the specific devices and sources at the field station:

- (1) Appropriate license or equivalent documents;
- (2) Operating and emergency procedures;
- (3) Applicable regulations;
- (4) Records of the latest survey instrument calibrations required pursuant to WAC 246-244-070;
- (5) Records of the latest leak test results required pursuant to WAC 246-244-080;
- (6) Records of inventories required pursuant to WAC 246-244-090;
- (7) Utilization records required pursuant to WAC 246-244-100;
- (8) Records of inspection and maintenance required pursuant to WAC 246-244-130;
- (9) Survey records required pursuant to WAC 246-244-210; and
- (10) Training records required pursuant to WAC 246-244-140.

[Statutory Authority: RCW 70.98.050 and 70.98.080. 91-15-112 (Order 184), § 246-244-220, filed 7/24/91, effective 8/24/91. Statutory Authority: RCW 43.70.040. 91-02-049 (Order 121), recodified as § 246-244-220, filed

12/27/90, effective 1/31/91. Statutory Authority: RCW 70.98.080. 87-01-031 (Order 2450), § 402-38-420, filed 12/11/86.]

WAC 246-244-230 Documents and records required at temporary job sites. Each licensee conducting operations at a temporary job site shall have the following documents and records available at all times at that site for inspection by the department:

- (1) Current operating and emergency procedure(s);
- (2) Survey records required pursuant to WAC 246-244-210 for the period of operation at the site;
- (3) Actual current calibration certificates (or photocopies) for the radiation survey instruments used at the site;
- (4) When operating in the state of Washington under reciprocity, a copy of the appropriate license, and the Washington state rules and regulations for radiation protection;
- (5) Records of current leak tests for all sealed sources which require such tests at the job site;
- (6) Use logs required pursuant to WAC 246-244-100;
- (7) Current United States Department of Transportation shipping papers and transport container certifications for the material transported; and
- (8) Records of spotmarker inventories made prior to arrival required pursuant to WAC 246-244-090.

[Statutory Authority: RCW 70.98.050 and 70.98.080. 91-15-112 (Order 184), § 246-244-230, filed 7/24/91, effective 8/24/91. Statutory Authority: RCW 43.70.040. 91-02-049 (Order 121), recodified as § 246-244-230, filed 12/27/90, effective 1/31/91. Statutory Authority: RCW 70.98.080. 87-01-031 (Order 2450), § 402-38-440, filed 12/11/86.]

WAC 246-244-240 Notification of incidents, abandonment, and lost sources. (1) Notification of incidents and sources lost in other than downhole logging operations shall be made in accordance with appropriate provisions of chapter 246-221 WAC.

(2) The licensee shall immediately notify the state of Washington division of radiation protection by telephone (206-682-5327) and subsequently within five days by confirmatory letter if:

- (a) Licensed material has been lost in or near a fresh water aquifer; or
- (b) A sealed source has been ruptured. This notice must designate the well or other location and describe the magnitude and extent of licensed materials, assess the consequences of the loss or rupture, and explain efforts planned or being taken to mitigate these consequences.

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

- (a) Monitor the surface for the presence of radioactive contamination with an appropriate radiation survey instrument (not the logging tool itself) during logging tool recovery operations; and
- (b) Notify the department immediately by telephone (206-682-5327) if radioactive contamination is detected at the surface or if the source appears to be damaged.

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

- (a) Notify the department by telephone (206-682-5327) of the circumstances that resulted in the inability to retrieve the source and—
 - (i) Obtain department approval to implement abandonment procedures; or

(ii) That the licensee implemented abandonment before receiving department approval because the licensee believed there was an immediate threat to public health and safety; and

(b) Advise the well operator or owner, as appropriate, of the regulations of the state of Washington regarding abandonment, and an appropriate method of abandonment. The licensee shall ensure that such abandonment procedures are implemented within thirty days after the sealed source has been classified as irretrievable or request an extension of time if unable to complete the abandonment procedures; and

(c) File a written report with the department within thirty days of the abandonment, including a copy to each appropriate state or federal agency that issued permits or otherwise approved of the drilling operation, setting forth the following information:

- (i) Date and time of occurrence and a brief description of attempts to recover the source;
- (ii) A description of the radioactive source(s) involved, including radionuclide, quantity, make, model and serial number, and chemical and physical form;
- (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 in meters or feet;
- (vi) Depth to the top of cement plug in meters or feet;
- (vii) Depth of the well in meters or feet;
- (viii) The immediate threat to public health and safety justification for implementing abandonment if prior departmental approval was not obtained in accordance with subsection (4)(a)(ii) of this section;
- (ix) Any other information, such as a warning statement, contained on the permanent identification plaque; and
- (x) State and federal agencies receiving a copy of this report.

[Statutory Authority: RCW 70.98.050. 03-12-062, § 246-244-240, filed 6/2/03, effective 7/3/03; 98-13-037, § 246-244-240, filed 6/8/98, effective 7/9/98. Statutory Authority: RCW 70.98.050 and 70.98.080. 91-15-112 (Order 184), § 246-244-240, filed 7/24/91, effective 8/24/91. Statutory Authority: RCW 43.70.040. 91-02-049 (Order 121), recodified as § 246-244-240, filed 12/27/90, effective 1/31/91. Statutory Authority: RCW 70.98.080. 87-01-031 (Order 2450), § 402-38-500, filed 12/11/86.]