CHAPTER 33-10-10
NOTICES, INSTRUCTIONS, AND REPORTS TO WORKERS - INSPECTIONS

Section
33-10-10-01 Purpose and Scope
33-10-10-02 General Regulatory Provisions and Specific Requirements

33-10-10-01. Purpose and scope. This chapter establishes requirements for notices, instructions, and reports by licensees or registrants to individuals engaged in activities under a license or registration and options available to such individuals in connection with department inspections of licensees or registrants to ascertain compliance with the provisions of North Dakota Century Code chapter 23-20.1, this article, orders, and licenses issued thereunder regarding radiological working conditions. This chapter applies to all persons who receive, possess, use, own, or transfer sources of radiation licensed by or registered with the department pursuant to chapters 33-10-02 and 33-10-03.

History: Amended effective October 1, 1982; June 1, 1986; June 1, 1992.
General Authority: NDCC 23-20.1-04
Law Implemented: NDCC 23-20.1-03, 23-20.1-04

33-10-10-02. General Regulatory Provisions and Specific Requirements.

1. **Posting of notices to workers.**

   a. Each licensee or registrant shall post current copies of the following documents:

      (1) This chapter and chapter 33-10-04.1.

      (2) The license, certificate of registration, conditions, or documents incorporated into the license by reference and amendments thereto.

      (3) The operating procedures applicable to activities under the license or registration.

      (4) Any notice of violation involving radiological working conditions, proposed imposition of civil penalty, or order issued pursuant to

chapter 33-10-01, and any response from the licensee or registrant.

b. If posting of a document specified in paragraph 1, 2, or 3 of subdivision a is not practicable, the licensee or registrant may post a notice which describes the document and states where it may be examined.

c. The department's "Notice to Employees" form (SFN 8414) must be posted by each licensee or registrant as required by this article.

d. Documents, notices, or forms posted pursuant to this subsection must appear in a sufficient number of places to permit individuals engaged in work under the license or registration to observe them on the way to or from any particular work location to which the document applies, must be conspicuous, and must be replaced if defaced or altered.

e. Department documents posted pursuant to paragraph 4 of subdivision a must be posted within five working days after receipt of the documents from the department. The licensee's or registrant's response, if any, must be posted within five working days after dispatch from the licensee or registrant. Such documents must remain posted for a minimum of five working days or until action correcting the violation has been completed, whichever is later.

2. **Instructions to workers.**

a. All individuals who in the course of employment are likely to receive in a year an occupational dose in excess of one millisievert [100 millirem]:

(1) Must be kept informed of the storage, transfer, or use of sources of radiation.

(2) Must be instructed in the health protection problems associated with exposure to radiation or radioactive material to the individual and potential offspring, in precautions or procedures to minimize exposure, and in the purposes and functions of protective devices employed.

(3) Must be instructed in, and required to observe, to the extent within the worker's

control, the applicable provisions of this article and licenses for the protection of personnel from exposures to radiation or radioactive material

(4) Must be instructed of their responsibility to report promptly to the licensee or registrant any condition which may constitute, lead to, or cause a violation of North Dakota Century Code chapter 23-20.1, this article, and licenses or unnecessary exposure to radiation or radioactive material.

(5) Must be instructed in the appropriate response to warnings made in the event of any unusual occurrence or malfunction that may involve exposure to radiation or radioactive material.

(6) Must be advised as to the radiation exposure reports which workers must be furnished pursuant to subsection 3.

b. In determining those individuals subject to the requirements of subdivision a, licensees and registrants must take into consideration assigned activities during normal and abnormal situations involving exposure to radiation or radioactive material which can reasonably be expected to occur during the life of a licensed or registered facility. The extent of these instructions must be commensurate with potential radiological health protection problems present in the workplace.

3. **Notifications and reports to individuals.**

a. Radiation exposure data for an individual and the results of any measurements, analyses, and calculations of radioactive material deposited or retained in the body of an individual must be reported to the individual as specified in this subsection. The information reported must include data and results obtained pursuant to this article, orders, or license conditions, as shown in records maintained by the licensee or registrant pursuant to subsection 7 of section 33-10-04.1-15. Each notification and report must:

(1) Be in writing.

(2) Include appropriate identifying data such as the name of the licensee or registrant, the

name of the individual, and the individual's identification number, preferably social security number.

(3) Include the individual's exposure information.

(4) Contain the following statement:

This report is furnished to you under the provisions of North Dakota ~~State~~ Radiological Health Rules (North Dakota Administrative Code chapter 33-10-10). You should preserve this report for further reference.

b. Each licensee or registrant shall furnish to each worker annually a written report of the worker's dose as shown in records maintained by the licensee or registrant pursuant to subsection 7 of section 33-10-04.1-15.

c. Each licensee or registrant shall furnish a written report of the worker's exposure to sources of radiation at the request of a worker formerly engaged in activities controlled by the licensee or registrant. The report shall include the dose record for each year the worker was required to be monitored pursuant to subsection 2 of section 33-10-04.1-09 or the monitoring requirements in effect prior to March 1, 1994. Such report must be furnished within thirty days from the date of the request, or within thirty days after the dose of the individual has been determined by the licensee or registrant, whichever is later. The report must cover the period of time that the worker's activities involved exposure to sources of radiation and must include the dates and locations of work under the license or registration in which the worker participated during this period.

d. When a licensee or registrant is required pursuant to section 33-10-04.1-16 to report to the department any exposure of an individual to sources of radiation, the licensee or the registrant shall also provide the individual a copy of the report submitted to the department. Such reports must be transmitted at a time not later than the transmittal to the department.

e. At the request of a worker who is terminating employment with the licensee or registrant in work involving exposure to radiation or radioactive

material, during the current year, each licensee or registrant shall provide at termination to each such worker, or to the worker's designee, a written report regarding the radiation dose received by that worker from operations of the licensee or registrant during the current year or fraction thereof. If the most recent individual monitoring results are not available at that time, a written estimate of the dose shall be provided together with a clear indication that this is an estimate.

4. **Presence of representatives of licensees or registrants and workers during inspection.**

a. Each licensee or registrant shall afford to the department at all reasonable times opportunity to inspect materials, machines, activities, facilities, premises, and records pursuant to this article.

b. During an inspection, department inspectors may consult privately with workers as specified in subsection 5. The licensee or registrant may accompany department inspectors during other phases of an inspection.

c. If, at the time of inspection, an individual has been authorized by the workers to represent them during department inspections, the licensee or registrant shall notify the inspectors of such authorization and shall give the workers' representative an opportunity to accompany the inspectors during the inspection of physical working conditions.

d. Each workers' representative must be routinely engaged in work under control of the licensee or registrant and must have received instructions as specified in subsection 2.

e. Different representatives of licensees or registrants and workers may accompany the inspectors during different phases of an inspection if there is no resulting interference with the conduct of the inspection. However, only one workers' representative at a time may accompany the inspectors.

f. With the approval of the licensee or registrant and the workers' representative, an individual who is

not routinely engaged in work under control of the licensee or registrant, for example, a consultant to the licensee or registrant or to the workers' representative, must be afforded the opportunity to accompany department inspectors during the inspection of physical working conditions.

g. Notwithstanding the other provisions of this subsection, department inspectors are authorized to refuse to permit accompaniment by any individual who deliberately interferes with a fair and orderly inspection. With regard to any area containing proprietary information, the workers' representative for that area must be an individual previously authorized by the licensee or registrant to enter that area. With regard to areas containing information classified by an agency of the United States government in the interest of national security, an individual who accompanies an inspector may have access to such information only if authorized to do so.

5. **Consultation with workers during inspections.**

a. Department inspectors may consult privately with workers concerning matters of occupational radiation protection and other matters related to applicable provisions of department rules and licenses to the extent the inspectors deem necessary for the conduct of an effective and thorough inspection.

b. During the course of an inspection any worker may bring privately to the attention of the inspectors, either orally or in writing, any past or present condition which the worker has reason to believe may have contributed to or caused any violation of North Dakota Century Code chapter 23- 20.1, this article, or license condition, or any unnecessary exposure of an individual to radiation from licensed radioactive material or a registered radiation machine under the licensee's or registrant's control. Any such notice, in writing, must comply with the requirements of subdivision a of subsection 6.

c. The provisions of subdivision b must not be interpreted as authorization to disregard instructions pursuant to subsection 2.

6. **Requests by workers for inspections.**

a. Any worker or representative of workers believing that violation of North Dakota Century Code chapter 23-20.1, this article, or license conditions exists or has occurred in work under a license or registration with regard to radiological working conditions in which the worker is engaged, may request an inspection by giving notice of the alleged violation to the department. Any such notice must be in writing, must set forth the specific grounds for the notice, and must be signed by the worker or representative of the workers. A copy must be provided to the licensee or registrant by the department no later than at the time of inspection except that, upon the request of the worker giving such notice, the worker's name and the name of individuals referred to therein may not appear in such copy or on any record published, released, or made available by the department, except for good cause shown.

b. If, upon receipt of such notice, the department determines that the complaint meets the requirements set forth in subdivision a and that there are reasonable grounds to believe that the alleged violation exists or has occurred, an inspection must be made as soon as practicable, to determine if such alleged violation exists or has occurred. Inspections pursuant to this subsection need not be limited to matters referred to in the complaint.

c. No licensee, registrant, or contractor or subcontractor of a licensee or registrant must discharge or in any manner discriminate against any worker because such worker has filed any complaint or instituted or caused to be instituted any proceeding under this article or has testified or is about to testify in any such proceeding or because of the exercise by such worker on behalf of the worker or others of any option afforded by this chapter.

7. **Inspections not warranted - informal review.**

a. (1) If the department determines, with respect to a complaint under subsection 6, that an inspection is not warranted because there are no reasonable grounds to believe that a violation exists or has occurred, the department shall notify the complainant in writing of such determination. The complainant

may obtain review of such determination by submitting a written statement of position with the department which will provide the licensee or registrant with a copy of such statement by certified mail, excluding, at the request of the complainant, the name of the complainant. The licensee or registrant may submit an opposing written statement of position with the department which will provide the complainant with a copy of such statement by certified mail.

(2) Upon the request of the complainant, the department may hold an informal conference in which the complainant and the licensee or registrant may orally present their views. An informal conference may also be held at the request of the licensee or registrant but disclosure of the identity of the complainant will be made only following receipt of written authorization from the complainant. The department shall render an informal opinion after the close of the conference. The complainant shall have the right of petition for a formal administrative hearing as provided for by North Dakota Century Code chapter 28-32 and North Dakota Administrative Code article 33-22, following the decision of such formal conference.

b. If the department determines that an inspection is not warranted because the requirements of subdivision a of subsection 6 have not been met, the department shall notify the complainant in writing of such determination. Such determination must be without prejudice to the filing of a new complaint meeting the requirements of subdivision a of subsection 6.

History: Effective June 1, 1992; amended effective March 1, 1994; May 1, 1998.
General Authority: NDCC 23-20.1-04
Law Implemented: NDCC 23-20.1-03, 23-20.1-04

CHAPTER 33-10-11
FEES FOR ISSUANCE OF LICENSE AND REGISTRATION CERTIFICATES AND INSPECTIONS

33-10-11-01. Purpose. This chapter establishes fees charged for the issuance of licenses and registration certificates by the department. This chapter also establishes fees charged to recover costs associated with nonroutine regulatory inspections and surveys of licensees and registrants ~~based upon a prescribed schedule by licensee or registrant type~~.

History: Effective October 1, 1982; amended effective June 1, 1992.
General Authority: NDCC 23-20.1-04, 23-20.1-04.5
Law Implemented: NDCC 23-20.1-04, 23-20.1-04.5

33-10-11-02. Scope. This chapter applies to a person who is an applicant for, or a holder of, a radioactive material license or a registration certificate issued by the department.

History: Amended effective October 1, 1982
General Authority: NDCC 23-20.1-04, 23-20.1-04.5
Law Implemented: NDCC 23-20.1-04, 23-20.1-03, 23-20.1-04.5

33-10-11-03. Exemptions. No application fees, license fees, amendment fees, renewal fees, or special project fees, shall be required for:

1. A license authorizing the use of source material as shielding only in devices and containers; provided, however, that all other licensed byproduct material, naturally occurring or accelerator-produced radioactive material, source material, or special nuclear material in the device or container will be subject to the fees prescribed in appendices A and B of this chapter.

2. Nonprofit educational institutions are exempt from the fees prescribed in appendix A and B of this chapter. This exemption does not apply to those radioactive material licenses or machine registration certificates which authorize any of the following:

   a. Human use.

   b. Remunerated services to other persons.

   c. Distribution of byproduct material, naturally occurring or accelerator-produced radioactive material, source material, or special nuclear material, or products containing byproduct material, naturally occurring or accelerator-produced radioactive material, source material, or special nuclear material.

   d. Activities performed under a government contract.

3. The department may, upon application by an interested person, or upon its own initiative, grant such exemptions from the requirements of this chapter as it determines are authorized by law and are otherwise in the public interest.

History: Effective October 1, 1982; amended effective June 1, 1986; June 1, 1992; March 1, 1994.
General Authority: NDCC 23-20.1-04, 23-20.1-04.5
Law Implemented: NDCC 23-20.1-03, 23-20.1-04, 23-20.1-04.5

33-10-11-04. Payment of fees. The following fees are nonrefundable:

1. **License and registration fees.** The appropriate licensing or registration fee shall accompany the application for licensure or registration when filed with the department. For new radioactive material licenses, the application fee is equal to the appropriate annual fee.

2. **Amendment fees.** The appropriate amendment fee shall accompany the application for amendment when filed with the department.

3. **Renewal fees.** The appropriate renewal fee shall accompany the renewal application when filed with the department. For radioactive material licenses that are current on their annual fee payments, no renewal fee will be assessed.

4. **Reciprocity fee.** The appropriate reciprocity fee shall accompany the written notification as required in sections 33-10-03-06 and 33-10-02-11.

5. **Special project fees.** Fees for special projects are payable upon notification by the department when the review of the project is completed. Special project means those projects submitted to the department for review and for which specific fees are not prescribed in this chapter. Special project fees will be based upon the current professional staff hourly rate (thirty-three percent of the current nuclear regulatory commission rate listed in 10 CFR 170.20).

6. **Annual fees.** Annual fees are required to be paid by all radioactive material licensees no later than January first of each year the license is active, except that the annual fee due on January first of the year following the issuance of a new license shall be prorated to the number of months the license was in effect the first calendar year (example: for a new license issued in May the annual fee due January first would be seven twelfths [June-December] of the annual fee listed in appendix A).

7. **Inspection and survey fees.** Fees for regulatory inspections and surveys of North Dakota licensees are included in the registration or annual fees for each registration or license type. Nonroutine inspections will require the nonroutine inspection fee to be paid upon notification by the department when the inspection has been completed.

8. **Annual fees for small entities.** An industrial radiography or well logging licensee may qualify as a small entity. If a licensee qualifies as a small entity and provides the department with the proper certification, the maximum annual fee shall be one thousand ~~two~~ three hundred fifty dollars for industrial radiography or one thousand two hundred dollars for well logging. If the annual receipts of a small entity engaged in industrial radiography or well logging are below three hundred fifty thousand dollars, the annual fee is five hundred dollars.

   a. A licensee qualifies as a small entity if it meets the following size standards:

      (1) A small business is a business with annual receipts of three and one-half million dollars or less ~~except private practice physicians for which the standard is annual receipts of one million dollars or less~~.

      (2) A small organization is a not-for-profit organization which is independently owned and operated and has annual receipts of three and one-half million dollars or less.

      (3) Small governmental jurisdictions are governments of cities, counties, towns, townships, villages, school

districts, or special districts with a population of less than fifty thousand.

(4) A small educational institution is one that is:

(a) Supported by a qualifying small governmental jurisdiction; or

(b) One that is not state or publicly supported and has five hundred employees or less.

(5) A licensee who is a subsidiary of a large entity does not qualify as a small entity for purposes of this section.

b. A licensee who seeks to establish status as a small entity for purposes of paying the fees required under this chapter shall file a certification statement with the department. The licensee shall:

(1) Certify, on the business' letterhead, that the business meets the conditions in subdivision a of subsection 8 of this section;

(2) Sign the certification as the chief executive officer of the business or as an official designee; and

(3) Have the certification notarized.

c. A licensee who seeks to qualify as a small entity shall submit the certification with the reduced annual fee payment.

d. For purposes of this chapter, the licensee shall submit a new certification with its annual fee payment each year.

9. **Method of payment.** Fee payments shall be by check, draft, or money order made payable to the North Dakota ~~state~~ department of health ~~and consolidated laboratories~~.

10. **Submittal of application and fee payment.** The application for licensure or registration shall be accompanied by the fee payment and shall be submitted to:

North Dakota ~~State~~ Department of Health
Division of ~~Environmental Engineering~~ Air Quality
1200 Missouri Avenue, Room 304
Box 5520
Bismarck, ND 58506-5520

History: Effective October 1, 1982; amended effective June 1, 1986; June 1, 1992; March 1, 1994; July 1, 1995; May 1, 1998.
General Authority: NDCC 23-20.1-04, 23-20.1-04.5
Law Implemented: NDCC 23-20.1-04, 23-20.1-04.5

33-10-11-05. Failure by applicant or licensee to pay prescribed fees.

1. In any case where the department finds that an applicant or a licensee has failed to pay a prescribed fee required in this chapter, the department will not process any application and may suspend or revoke any license or approval involved or may issue an order with respect to licensed activities as the department determines to be appropriate or necessary in order to carry out the provisions of this chapter and of the North Dakota Century Code.

2. In any case where the department does not receive the prescribed fee by the stated due date, an additional fee shall be levied as stated in category 30 of appendix A.

History: Effective October 1, 1982.
General Authority: NDCC 23-20.1-04, 23-20.1-04.5
Law Implemented: NDCC 23-20.1-04, 23-20.1-04.5

APPENDIX A
SCHEDULE OF FEES FOR RADIOACTIVE MATERIAL LICENSES

Applicants for radioactive material licenses and other regulatory services and holders of radioactive material licenses shall pay the following fees.

~~Category of Materials Licenses and Types of Fees~~	~~Fee ($)~~
~~1. Special nuclear material:~~	
~~A. Licenses for possession and use of 200 grams or more of plutonium in unsealed form or 350 grams or more of contained U-235 in unsealed form or 200 grams or more of U-233 in unsealed form. This includes applications to terminate licenses as well as licenses authorizing possession only:~~	
~~Amendment~~	~~Full Cost~~
~~Inspection (nonroutine)~~	~~Full Cost~~
~~Annual Fee~~	~~71,450~~
~~B. Licenses for receipt and storage of spent fuel at an independent spent fuel storage installation (ISFSI):~~	
~~(Regulated by NRC)~~	~~N/A~~
~~C. Licenses for possession and use of special nuclear material in sealed sources contained in devices used in industrial measuring systems, including X-ray fluorescence analyzers:~~	
~~Amendment~~	~~125~~
~~Inspection (nonroutine)~~	~~435~~
~~Annual Fee~~	~~600~~
~~D. All other special nuclear material licenses, except licenses authorizing special nuclear material in unsealed form in combination that would constitute a critical quantity.~~	
~~Amendment~~	~~75~~
~~Inspection (nonroutine)~~	~~265~~
~~Annual Fee~~	~~730~~
~~2. Source material:~~	
~~A. Licenses for possession and use of source material in recovery operations such as milling, in-situ leaching, heap-leaching, refining uranium mill concentrates to uranium hexafluoride, or buying stations, ion exchange facilities and in processing of ores containing source material for extraction of metals other than uranium or thorium, including licenses authorizing the possession of byproduct waste material (tailings) from source material recovery operations, as well as licenses authorizing the possession and maintenance of a facility in a standby mode:~~	
~~Amendment~~	~~Full Cost~~
~~Inspection (nonroutine)~~	~~Full Cost~~
~~Annual Fee~~	~~371,295~~

~~B. Licenses for possession and use of source material for shielding:~~	
~~Amendment~~	~~40~~
~~Inspection (nonroutine)~~	~~115~~
~~Annual Fee~~	~~210~~
~~C. All other source material licenses:~~	
~~Amendment~~	~~150~~
~~Inspection (nonroutine)~~	~~500~~
~~Annual Fee~~	~~1530~~
~~3. Byproduct material and naturally occurring or accelerator-produced radioactive material:~~	
~~A. Licenses of broad scope for possession and use of byproduct material or naturally occurring or accelerator-produced radioactive material issued pursuant to chapter 33-10-03 for processing or manufacturing of items containing byproduct material or naturally occurring or accelerator-produced radioactive material for commercial distribution:~~	
~~Amendment~~	~~75~~
~~Inspection (nonroutine)~~	~~1050~~
~~Annual Fee~~	~~4400~~
~~B. Other licenses for possession and use of byproduct material or naturally occurring or accelerator-produced radioactive material issued pursuant to chapter 33-10-03 for processing or manufacturing of items containing byproduct material or naturally occurring or accelerator-produced radioactive material for commercial distribution:~~	
~~Amendment~~	~~185~~
~~Inspection (nonroutine)~~	~~665~~
~~Annual Fee~~	~~2000~~
~~C. Licenses issued pursuant to chapter 33-10-03 authorizing the processing or manufacturing and distribution or redistribution of radiopharmaceuticals, generators, reagent kits and/or sources and devices containing byproduct material or naturally occurring or accelerator-produced radioactive material:~~	
~~Amendment~~	~~150~~
~~Inspection (nonroutine)~~	~~635~~
~~Annual Fee~~	~~4000~~
~~D. License and approvals issued pursuant to chapter 33-10-03 authorizing distribution or redistribution of radiopharmaceuticals, generators, reagent kits and/or sources or devices not involving processing of byproduct material or naturally occurring or accelerator-produced radioactive material:~~	
~~Amendment~~	~~105~~
~~Inspection (nonroutine)~~	~~400~~
~~Annual Fee~~	~~1750~~
~~E. Licenses for possession and use of byproduct material or naturally occurring or accelerator-produced radioactive material in sealed sources for irradiation of materials in which the source is not removed from its shield (self-shielded units):~~	
~~Amendment~~	~~115~~
~~Inspection (nonroutine)~~	~~230~~
~~Annual Fee~~	~~810~~

~~F. License for possession and use of less than 370 terabecquerels [10,000 curies] of byproduct material or naturally occurring or accelerator-produced radioactive material in sealed sources for irradiation of materials in which the source is exposed for irradiation purposes:~~	
~~Amendment~~	~~115~~
~~Inspection (nonroutine)~~	~~425~~
~~Annual Fee~~	~~1500~~
~~G. Licenses for possession and use of 370 terabecquerels [10,000 curies] or more of byproduct material or naturally occurring or accelerator-produced radioactive material in sealed sources for irradiation of materials in which the source is exposed for irradiation purposes:~~	
~~Amendment~~	~~155~~
~~Inspection (nonroutine)~~	~~465~~
~~Annual Fee~~	~~7150~~
~~H. Licenses issued pursuant to chapter 33-10-03 to distribute items containing byproduct material or naturally occurring or accelerator-produced radioactive material that require device review to persons exempt from the licensing requirements of chapter 33-10-03, except specific licenses authorizing redistribution of items that have been authorized for distribution to persons exempt from the licenses of chapter 33-10-03:~~	
~~Amendment~~	~~85~~
~~Inspection (nonroutine)~~	~~345~~
~~Annual Fee~~	~~2265~~
~~I. Licenses issued pursuant to chapter 33-10-03 to distribute items containing byproduct material or naturally occurring or accelerator-produced radioactive material, or quantities of byproduct material or naturally occurring or accelerator-produced radioactive material that do not require device evaluation to persons exempt from the licensing requirements of chapter 33-10-03, except for specific licenses authorizing redistribution of items that have been authorized for distribution to persons exempt from the licensing requirements of chapter 33-10-03:~~	
~~Amendment~~	~~115~~
~~Inspection (nonroutine)~~	~~230~~
~~Annual Fee~~	~~3410~~
~~J. Licenses issued pursuant to chapter 33-10-03 to distribute items containing byproduct material or naturally occurring or accelerator-produced radioactive material that require sealed source and/or device review to persons generally licensed under chapter 33-10-03, except specific licenses authorizing redistribution of items that have been authorized for distribution to persons generally licensed under this chapter:~~	
~~Amendment~~	~~130~~
~~Inspection (nonroutine)~~	~~345~~
~~Annual Fee~~	~~2200~~

~~K. Licenses issued pursuant to chapter 33-10-03 to distribute items containing byproduct material or naturally occurring or accelerator-produced radioactive material, or quantities of byproduct material or naturally occurring or accelerator-produced radioactive material that do not require sealed source and/or device review to persons generally licensed under this chapter, except specific licenses authorizing for redistribution of items that have been authorized for distribution to persons generally licensed under this chapter:~~	
~~Amendment~~	~~95~~
~~Inspection (nonroutine)~~	~~345~~
~~Annual Fee~~	~~2030~~
~~L. Licenses of broad scope for possession and use of byproduct material or naturally occurring or accelerator-produced radioactive material issued pursuant to chapter 33-10-03 for research and development that do not authorize commercial distribution:~~	
~~Amendment~~	~~165~~
~~Inspection (nonroutine)~~	~~400~~
~~Annual Fee~~	~~1200~~
~~M. Other licenses for possession and use of byproduct material or naturally occurring or accelerator-produced radioactive material issued pursuant to chapter 33-10-03 for research and development that do not authorize commercial distribution:~~	
~~Amendment~~	~~210~~
~~Inspection (nonroutine)~~	~~310~~
~~Annual Fee~~	~~1700~~
~~N. Licenses that authorize services for other licensees, except (1) licenses that authorize calibration and/or leak testing services only are subject to the fees specified in fee Category 3P, and (2) licenses that authorize waste disposal services are subject to the fees specified in fee Categories 4A, 4B, and 4C:~~	
~~Amendment~~	~~135~~
~~Inspection (nonroutine)~~	~~345~~
~~Annual Fee~~	~~2000~~
~~O. License for possession and use of byproduct material or naturally occurring or accelerator-produced radioactive material issued pursuant to chapter 33-10-05 for industrial radiography operations:~~	
~~Amendment~~	~~165~~
~~Inspection (nonroutine)~~	~~835~~
~~Annual Fee~~	~~2700~~
~~P. All other specific byproduct material or naturally occurring or accelerator-produced radioactive material licenses, except those in Categories 4A through 9D:~~	
~~Amendment~~	~~125~~
~~Inspection (nonroutine)~~	~~600~~
~~Annual Fee~~	~~770~~

4. Waste disposal and processing:	
A. Licenses specifically authorizing the receipt of waste byproduct material, naturally occurring or accelerator-produced radioactive material, source material, or special nuclear material from other persons for the purpose of contingency storage or commercial land disposal by the licensee; or licenses authorizing contingency storage of low-level radioactive waste at the site of nuclear power reactors; or licenses for receipt of waste from other persons for incineration or other treatment, packaging of resulting waste and residues, and transfer of packages to another person authorized to receive or dispose of waste material:	
Amendment	Full Cost
Inspection (nonroutine)	Full Cost
Annual Fee	43,380
B. Licenses specifically authorizing the receipt of waste byproduct material, naturally occurring or accelerator-produced radioactive material, source material, or special nuclear material from other persons for the purpose of packaging or repackaging the material. The licensee will dispose of the material by transfer to another person authorized to receive or dispose of the material:	
Amendment	65
Inspection (nonroutine)	700
Annual Fee	5465
C. Licenses specifically authorizing the receipt of prepackaged waste byproduct material, naturally occurring or accelerator-produced radioactive material, source material, or special nuclear material from other persons. The licensee will dispose of the material by transfer to another person authorized to receive or dispose of the material:	
Amendment	75
Inspection (nonroutine)	700
Annual Fee	2500
5. Well logging:	
A. Licenses for possession and use of byproduct material, naturally occurring or accelerator-produced radioactive material, source material, and/or special nuclear material for well logging, well surveys, and tracer studies other than field flooding tracer studies:	
Amendment	180
Inspection (nonroutine)	400
Annual Fee	2300
B. Licenses for possession and use of byproduct material or naturally occurring or accelerator-produced radioactive material, for field flooding tracer studies:	
Amendment	Full Cost
Inspection (nonroutine)	335
Annual Fee	5130

~~6. Nuclear laundries:~~	
~~A. Licenses for commercial collection and laundry of items contaminated with byproduct material, naturally occurring or accelerator-produced radioactive material, source material, or special nuclear material:~~	
~~Amendment~~	~~115~~
~~Inspection (nonroutine)~~	~~635~~
~~Annual Fee~~	~~2400~~
~~7. Human use of byproduct, naturally occurring or accelerator-produced, source, or special nuclear material:~~	
~~A. Licenses issued pursuant to chapter 33-10-03 for human use of byproduct material, naturally occurring or accelerator-produced radioactive material, source material, or special nuclear material in sealed sources contained in teletherapy devices:~~	
~~Amendment~~	
~~Inspection (nonroutine)~~	~~145~~
~~Annual Fee~~	~~635~~
	~~5630~~
~~B. Licenses of broad scope issued to medical institutions or two or more physicians pursuant to chapter 33-10-03 authorizing research and development, including human use of byproduct material, except licenses for byproduct material, naturally occurring or accelerator-produced radioactive material, source material, or special nuclear material in sealed sources contained in teletherapy devices:~~	
~~Amendment~~	~~120~~
~~Inspection (nonroutine)~~	~~600~~
~~Annual Fee~~	~~5800~~
~~C. Other licenses issued pursuant to chapter 33-10-03 for human use of byproduct material, naturally occurring or accelerator-produced radioactive material, source material, and/or special nuclear material, except licenses for byproduct material, source material, naturally occurring or accelerator-produced radioactive material, or special nuclear material in sealed sources contained in teletherapy devices:~~	
~~Amendment~~	~~145~~
~~Inspection (nonroutine)~~	~~500~~
~~Annual Fee~~	~~1965~~
~~8. Civil defense:~~	
~~A. Licenses for possession and use of byproduct material, naturally occurring or accelerator-produced radioactive material, source material, or special nuclear material for civil defense activities:~~	
~~Amendment~~	~~105~~
~~Inspection (nonroutine)~~	~~230~~
~~Annual Fee~~	~~700~~
~~9. Device, product or sealed source safety evaluation:~~	
~~A. Safety evaluation of devices or products containing byproduct material, naturally occurring or accelerator-produced radioactive material, source material, or special nuclear material, except reactor fuel devices, for commercial distribution:~~	
~~Amendment~~	~~400~~
~~Inspection (nonroutine)~~	~~Full Cost~~
~~Annual Fee~~	~~3200~~

~~B. Safety evaluation of devices or products containing byproduct material, naturally occurring or accelerator-produced radioactive material, source material, or special nuclear material manufactured in accordance with the unique specifications of, and for use by a single applicant, except reactor fuel devices:~~	
~~Amendment~~	~~195~~
~~Inspection (nonroutine)~~	~~Full Cost~~
~~Annual Fee~~	~~1630~~
~~C. Safety evaluation of sealed sources containing byproduct material, naturally occurring or accelerator-produced radioactive material, source material, or special nuclear material, except reactor fuel, for commercial distribution:~~	
~~Amendment~~	~~75~~
~~Inspection (nonroutine)~~	~~Full Cost~~
~~Annual Fee~~	~~700~~
~~D. Safety evaluation of sealed sources containing byproduct material, naturally occurring or accelerator-produced radioactive material, source material, or special nuclear material, manufactured in accordance with the unique specifications of, and for use by a single applicant, except reactor fuel:~~	
~~Amendment~~	~~40~~
~~Inspection (nonroutine)~~	~~Full Cost~~
~~Annual Fee~~	~~330~~
~~10. Transportation of radioactive material: (Regulated by NRC)~~	~~N/A~~
~~11. Review of standardized spent fuel facilities: (Regulated by NRC)~~	~~N/A~~
~~12. Special projects:~~	~~Full Cost~~
~~13. A. Spent fuel storage cask Certificate of Compliance: (Regulated by NRC)~~	~~N/A~~
~~B. Inspections related to spent fuel storage cask Certificate of Compliance: (Regulated by NRC)~~	~~N/A~~
~~C. Inspections related to storage of spent fuel under of this chapter: (Regulated by NRC)~~	~~N/A~~
~~14. Byproduct, naturally occurring or accelerator-produced, source, or special nuclear material licenses and other approvals authorizing decommissioning, decontamination, reclamation or site restoration activities pursuant to 10 CFR parts 30, 40, 70 and 72:~~	
~~Amendment~~	~~Full Cost~~
~~Inspection (nonroutine)~~	~~Full Cost~~
~~Annual Fee~~	~~Full Cost~~
~~15. Import and Export licenses: (Regulated by NRC)~~	~~N/A~~

~~16. Reciprocity:~~ ~~Other agreement state and NRC licensees who conduct activities in North Dakota under the reciprocity provisions of chapters 33-10-02 and 33-10-03.~~ ~~Application fee (due 3 days prior to entry into State)~~ ~~Inspections (nonroutine)~~	~~Fees as specified in annual fees for license type~~ ~~Fees as specified under inspection fees for license type~~
~~17. Demonstration and sales of devices containing radioactive materials.~~	~~160 per year~~
~~18. Radiation training courses.~~	~~160 per year~~
~~19. Decontamination services.~~	~~800 per year~~
~~20. Installation, removal, repair and servicing of devices containing radioactive materials.~~	~~760 per year~~
~~21. Multiple offices:~~ ~~Add the following fees per additional office location:~~ ~~Amendment~~ ~~Inspection (nonroutine)~~ ~~Annual Fee~~	~~same as base fee~~ ~~same as base fee~~ ~~25% of base fee~~
~~22. Administrative amendment (limited to the following amendment requests:~~ ~~Corporate name change~~ ~~Minor O&E manual changes (industrial sources)~~ ~~Filing of training certificates (gauge users)~~	~~$85~~
~~23. Inspection of radioactive materials package shipments to low-level radioactive waste disposal facility.~~	~~Full Cost~~
~~24. Certificate - in vitro testing with radioactive material under general license. Application - 3 year certificate.~~	~~$100~~

History: Effective October 1, 1982; amended effective June 1, 1986; June 1, 1992; July 1, 1995.
General Authority: NDCC 28-32-02, 23-20.1-04.5
Law Implemented: NDCC 23-20.1-04, 23-20.1-04.5

APPENDIX A - SCHEDULE OF FEES FOR RADIOACTIVE MATERIAL LICENSEES

Applicants for radioactive material licenses and other regulatory services and holders of radioactive material licenses shall pay the following fees:

Category	Description	Base Fees (USD)		Additional Charges
1. SPECIAL NUCLEAR MATERIAL				
A	Licenses for possession and use of 200 grams or more of plutonium in unsealed form or 350 grams or more of contained U-235 in unsealed form or 200 grams or more of U-233 in unsealed form. This includes applications to terminate licenses as well as licenses authorizing possession only.	Amendment Non-routine Inspection Annual Fee	Full Cost Full Cost $82,100	Items 26 and/or 30 as applicable.
B	Licenses for receipt and storage of spent fuel at an independent spent fuel storage installation. (Regulated by NRC)	Amendment Non-routine Inspection Annual Fee	N/A N/A N/A	N/A
C	Licenses for possession and use of special nuclear material in sealed sources contained in devices used in industrial measuring systems, including X-ray fluorescence analyzers.	Amendment Non-routine Inspection Annual Fee	$150 $500 $700	Items 26 and/or 30 as applicable.
D	All other special nuclear material licenses except licenses authorizing special nuclear material in unsealed form in combination that would constitute a critical quantity.	Amendment Non-routine Inspection Annual Fee	$150 $500 $1050	Items 26 and/or 30 as applicable.
2. SOURCE MATERIAL				
A	Licenses for possession and use of source material in recovery operations such as milling, in-situ leaching, heap-leaching, refining uranium mill concentrates to uranium hexafluoride, or buying stations, ion exchange facilities and in processing of ores containing source material for extraction of metals other than uranium or thorium, including licenses authorizing the possession of byproduct waste material (tailings) from source material recovery operations, as well as licenses authorizing the possession and maintenance of a facility in a standby mode.	Amendment Non-routine Inspection Annual Fee	Full Cost Full Cost $426,900	Items 26 and/or 30 as applicable.

Category	Description	Base Fees (USD)		Additional Charges
B	Licenses for possession, use and or installation of source material for shielding only.	Amendment Non-routine Inspection Annual Fee	$50 $150 $250	Items 26 and/or 30 as applicable.
C	All other source material licenses.	Amendment Non-routine Inspection Annual Fee	$170 $570 $1750	Items 26 and/or 30 as applicable.
3. BYPRODUCT, NATURALLY OCCURING OR ACCELERATOR-PRODUCED RADIOACTIVE MATERIAL				
A	Licenses of broad scope for possession and use of byproduct material or naturally occurring or accelerator-produced radioactive material issued pursuant to chapter 33-10-03 for processing or manufacturing of items containing byproduct material or naturally occurring or accelerator-produced radioactive material for commercial distribution.	Amendment Non-routine Inspection Annual Fee	$100 $1200 $5000	Items 26 and/or 30 as applicable.
B	Other licenses for possession and use of byproduct material or naturally occurring or accelerator-produced radioactive material issued pursuant to chapter 33-10-03 for processing or manufacturing of items containing byproduct material or naturally occurring or accelerator-produced radioactive material for commercial distribution.	Amendment Non-routine Inspection Annual Fee	$210 $750 $2300	Items 26 and/or 30 as applicable.
C	Licenses issued pursuant to chapter 33-10-03 authorizing the processing or manufacturing and distribution or redistribution of radiopharmaceuticals, generators, reagent kits and/or sources and devices containing byproduct material or naturally occurring or accelerator-produced radioactive material.	Amendment Non-routine Inspection Annual Fee	$170 720 $5000	Items 26 and/or 30 as applicable.
D	License and approvals issued pursuant to chapter 33-10-03 authorizing distribution or redistribution of radiopharmaceuticals, generators, reagent kits and/or sources or devices not involving processing of byproduct material or naturally occurring or accelerator-produced radioactive material.	Amendment Non-routine Inspection Annual Fee	$120 $450 $2000	Items 26 and/or 30 as applicable.

Category	Description	Base Fees (USD)		Additional Charges
E	Licenses for possession and use of byproduct material or naturally occurring or accelerator-produced radioactive material in sealed sources for irradiation of materials in which the source is not removed from its shield (self-shielded units).	Amendment Non-routine Inspection Annual Fee	$130 $260 $900	Items 26 and/or 30 as applicable.
F	License for possession and use of less than 370 terabecquerels [10,000 curies] of byproduct material or naturally occurring or accelerator-produced radioactive material in sealed sources for irradiation of materials in which the source is exposed for irradiation purposes.	Amendment Non-routine Inspection Annual Fee	$130 $300 $870	Items 26 and/or 30 as applicable.
G	Licenses for possession and use of 370 terabecquerels [10,000 curies] or more of byproduct material or naturally occurring or accelerator-produced radioactive material in sealed sources for irradiation of materials in which the source is exposed for irradiation purposes.	Amendment Non-routine Inspection Annual Fee	$175 $525 $8000	Items 26 and/or 30 as applicable.
H	Licenses issued pursuant to chapter 33-10-03 to distribute items containing byproduct material or naturally occurring or accelerator-produced radioactive material that require device review to persons exempt from the licensing requirements of chapter 33-10-03, except specific licenses authorizing redistribution of items that have been authorized for distribution to persons exempt from the licenses of chapter 33-10-03.	Amendment Non-routine Inspection Annual Fee	$100 $400 $2600	Items 26 and/or 30 as applicable.
I	Licenses issued pursuant to chapter 33-10-03 to distribute items containing byproduct material or naturally occurring or accelerator-produced radioactive material, or quantities of byproduct material or naturally occurring or accelerator-produced radioactive material that do not require device evaluation to persons exempt from the licensing requirements of chapter 33-10-03, except for specific licenses authorizing redistribution of items that have been authorized for distribution to persons exempt from the licensing requirements of chapter 33-10-03.	Amendment Non-routine Inspection Annual Fee	$130 $260 $3900	Items 26 and/or 30 as applicable.

Category	Description	Base Fees (USD)		Additional Charges
J	Licenses issued pursuant to chapter 33-10-03 to distribute items containing byproduct material or naturally occurring or accelerator-produced radioactive material that require sealed source and/or device review to persons generally licensed under chapter 33-10-03, except specific licenses authorizing redistribution of items that have been authorized for distribution to persons generally licensed under this chapter.	Amendment Non-routine Inspection Annual Fee	$150 $390 $2400	Items 26 and/or 30 as applicable.
K	Licenses issued pursuant to chapter 33-10-03 to distribute items containing byproduct material or naturally occurring or accelerator-produced radioactive material, or quantities of byproduct material or naturally occurring or accelerator-produced radioactive material that do not require sealed source and/or device review to persons generally licensed under this chapter, except specific licenses authorizing for redistribution of items that have been authorized for distribution to persons generally licensed under this chapter.	Amendment Non-routine Inspection Annual Fee	$110 $390 $1000	Items 26 and/or 30 as applicable.
L	Licenses of broad scope for possession and use of byproduct material or naturally occurring or accelerator-produced radioactive material issued pursuant to chapter 33-10-03 for research and development that do not authorize commercial distribution.	Amendment Non-routine Inspection Annual Fee	$190 $450 $1500	Items 26 and/or 30 as applicable.
M	Other licenses for possession and use of byproduct material or naturally occurring or accelerator-produced radioactive material issued pursuant to chapter 33-10-03 for research and development that do not authorize commercial distribution.	Amendment Non-routine Inspection Annual Fee	$240 $350 $1400	Items 26 and/or 30 as applicable.
N	Licenses that authorize services for other licensees, except (1) licenses that authorize calibration or leak testing services only are subject to the fees specified in fee Categories 18 and 19, and (2) licenses that authorize waste disposal services are subject to the fees specified in fee Categories 4A, 4B, and 4C.	Amendment Non-routine Inspection Annual Fee	$150 $390 $2260	Items 26 and/or 30 as applicable.

Category	Description	Base Fees (USD)		Additional Charges
O	License for possession and use of byproduct material or naturally occurring or accelerator-produced radioactive material issued pursuant to chapter 33-10-05 for industrial radiographic operations.	Amendment Non-routine Inspection Annual Fee (Standard) Annual Fee (Small Entity)	$190 $940 $3050 $1350	Items 26 and/or 30 as applicable.
P	All other specific byproduct material or naturally occurring or accelerator-produced radioactive material licenses, except as described in items 1-6 below or listed in Categories 4A through 10D.	Amendment Non-routine Inspection Annual Fee	$140 $680 $870	Items 26 and/or 30 as applicable.
1	Fixed gas chromatographs and/or non-portable x-ray fluorescence analyzers only.	Amendment Non-routine Inspection Annual Fee	$115 $300 $400	Items 26 and/or 30 as applicable. An additional $100 if possess 10 or more devices.
2	Portable x-ray fluorescence analyzers only.	Amendment Non-routine Inspection Annual Fee	$115 $350 $500	Items 26 and/or 30 as applicable. An additional $100 if possess 10 or more devices.
3	Spinning pipe-thickness gauges only.	Amendment Non-routine Inspection Annual Fee	$140 $600 $800	Item 30 as applicable. An additional $100 per extra licensed location and an additional $100 if possess more than 5 devices.

Category	Description	Base Fees (USD)		Additional Charges
4	Moisture and/or density measuring gauges only.	Amendment Non-routine Inspection Annual Fee	$150 $500 $800	Item 30 as applicable. An additional $100 per extra licensed location and an additional $100 if possess 10 or more gauges.
5	All other portable and mobile gauging devices only.	Amendment Non-routine Inspection Annual Fee	$150 $650 $800	Item 30 as applicable. An additional $100 per extra licensed location and an additional $100 if possess 10 or more gauges.
6	Fixed level and/or density gauges only.	Amendment Non-routine Inspection Annual Fee	$140 $500 $800	Item 30 as applicable. An additional $100 per extra licensed location and an additional $150 if possess 25 or more gauges.
Q	Registration of a device(s) generally licensed under Chapter 33-10-03. (Each address or location where the device(s) are used or stored represents a separate general license and requires a separate registration and fee.)	Amendment Non-routine Inspection Annual Registration	$100 $250 $450	Item 30 as applicable. An additional $150 if possess 25 or more devices.

Category	Description	Base Fees (USD)		Additional Charges
4. WASTE DISPOSAL AND PROCESSING				
A	Licenses specifically authorizing the receipt of waste byproduct material, naturally occurring or accelerator-produced radioactive material, source material, or special nuclear material from other persons for the purpose of contingency storage or commercial land disposal by the licensee; or licenses authorizing contingency storage of low level radioactive waste at the site of nuclear power reactors; or licenses for receipt of waste from other persons for incineration or other treatment, packaging of resulting waste and residues, and transfer of packages to another person authorized to receive or dispose of waste material.	Amendment Non-routine Inspection Annual Fee	Full Cost Full Cost $49,900	Items 26 and/or 30 as applicable.
B	Licenses specifically authorizing the receipt of waste byproduct material, naturally occurring or accelerator-produced radioactive material, source material, or special nuclear material from other persons for the purpose of packaging or repackaging the material. The licensee will dispose of the material by transfer to another person authorized to receive or dispose of the material.	Amendment Non-routine Inspection Annual Fee	$100 $790 $6000	Items 26 and/or 30 as applicable.
C	Licenses specifically authorizing the receipt of prepackaged waste byproduct material, naturally occurring or accelerator-produced radioactive material, source material, or special nuclear material from other persons. The licensee will dispose of the material by transfer to another person authorized to receive or dispose of the material.	Amendment Non-routine Inspection Annual Fee	$100 $790 $2800	Items 26 and/or 30 as applicable.
5. WELL LOGGING				
A	Licenses for possession and use of byproduct material, naturally occurring or accelerator-produced radioactive material, source material, and/or special nuclear material for well logging, well surveys, and tracer studies other than field flooding tracer studies	Amendment Non-routine Inspection Annual Fee (Standard) Annual Fee (Small Entity)	$200 $450 $2500 $1200	Items 26 and/or 30 as applicable.

Category	Description	Base Fees (USD)		Additional Charges
B	Licenses for possession and use of byproduct material or naturally occurring or accelerator-produced radioactive material, for field flooding tracer studies.	Amendment Non-routine Inspection Annual Fee (Standard) Annual Fee (Small Entity)	Full Cost $380 $5800 $4000	Items 26 and/or 30 as applicable.
6. NUCLEAR LAUNDRY				
	Licenses for commercial collection and laundry of items contaminated with byproduct material, naturally occurring or accelerator-produced radioactive material, source material, or special nuclear material.	Amendment Non-routine Inspection Annual Fee	$130 $720 $2700	Items 26 and/or 30 as applicable.
7. HUMAN USE OF BYPRODUCT, NATURALLY OCCURRING OR ACCELERATOR PRODUCED, SOURCE, OR SPECIAL NUCLEAR MATERIAL				
A	Licenses issued pursuant to chapter 33-10-03 for human use of byproduct material, naturally occurring or accelerator-produced radioactive material, source material, or special nuclear material in sealed sources contained in teletherapy devices.	Amendment Non-routine Inspection Annual Fee	$160 $720 $6200	Items 26 and/or 30 as applicable.
B	Licenses of broad scope issued to medical institutions or two or more physicians pursuant to chapter 33-10-03 authorizing research and development, including human use of byproduct material, except licenses for byproduct material, naturally occurring or accelerator-produced radioactive material, source material, or special nuclear material in sealed sources contained in teletherapy devices.	Amendment Non-routine Inspection Annual Fee	$140 $680 $6500	Items 26 and/or 30 as applicable.
C	Other licenses issued pursuant to chapter 33-10-03 for human use of byproduct material, naturally occurring or accelerator-produced radioactive material, source material, and/or special nuclear material, except licenses for byproduct material, source material, naturally occurring or accelerator-produced radioactive material, special nuclear material in sealed sources contained in teletherapy devices, or as listed in items 1-4 below.	Amendment Non-routine Inspection Annual Fee	$160 $570 $2200	Items 26 and/or 30 as applicable.

Category	Description	Base Fees (USD)		Additional Charges
1	Licenses issued pursuant to chapter 33-10-03 for human use of byproduct material, naturally occurring or accelerator-produced radioactive material, source material, or special nuclear material including the possession and use of computerized remote high dose-rate afterloading brachytherapy (HDR) devices, and/or the use of radioactive material for positron emission tomography (PET).	Amendment Non-routine Inspection Annual Fee	$150 $670 $2500	Items 26 and/or 30 as applicable.
2	Licenses issued pursuant to chapter 33-10-03 for human use of byproduct material, naturally occurring or accelerator-produced radioactive material, source material, or special nuclear material including the possession and use of sealed sources for brachytherapy (except HDR devices).	Amendment Non-routine Inspection Annual Fee	$160 $560 $2400	Items 26 and/or 30 as applicable.
3	Licenses issued pursuant to chapter 33-10-03 for human use of byproduct material, naturally occurring or accelerator-produced radioactive material, source material, or special nuclear material for nuclear medicine diagnostic procedures only.	Amendment Non-routine Inspection Annual Fee	$140 $510 $2100	Items 26 and/or 30 as applicable.
4	Licenses issued pursuant to chapter 33-10-03 for human use of byproduct material, naturally occurring or accelerator-produced radioactive material, source material, or special nuclear material for nuclear medicine procedures performed by a mobile nuclear medicine service.	Amendment Non-routine Inspection Annual Fee	$160 $680 $2200	Item 30 as applicable. An additional $200 per extra licensed location and an additional $100 if licensed for the use of radioactive material for positron emission tomography (PET).
8. VETERINARY MEDICINE				
A	Licenses issued for the veterinary use of byproduct material, naturally occurring or accelerator-produced radioactive material, source material, or special nuclear material in animals for diagnostic procedures only.	Amendment Non-routine Inspection Annual Fee	$140 $450 $1300	Items 26 and/or 30 as applicable.

Category	Description	Base Fees (USD)		Additional Charges
B	Licenses issued for the veterinary use of byproduct material, naturally occurring or accelerator-produced radioactive material, source material, or special nuclear material in animals for diagnostic and/or therapeutic procedures.	Amendment Non-routine Inspection Annual Fee	$140 $450 $1500	Items 26 and/or 30 as applicable.
9. CIVIL DEFENSE				
	Licenses for possession and use of byproduct material, naturally occurring or accelerator-produced radioactive material, source material, or special nuclear material for civil defense activities.	Amendment Non-routine Inspection Annual Fee	$120 $260 $700	Items 26 and/or 30 as applicable.
10. DEVICE, PRODUCT OR SEALED SOURCE SAFETY EVALUATION				
A	Safety evaluation of devices or products containing byproduct material, naturally occurring or accelerator-produced radioactive material, source material, or special nuclear material, except reactor fuel devices, for commercial distribution.	Amendment Non-routine Inspection Annual Fee	N/A N/A N/A	N/A
B	Safety evaluation of devices or products containing byproduct material, naturally occurring or accelerator-produced radioactive material, source material, or special nuclear material manufactured in accordance with the unique specifications of, and for use by a single applicant, except reactor fuel devices.	Amendment Non-routine Inspection Annual Fee	N/A N/A N/A	N/A
C	Safety evaluation of sealed sources containing byproduct material, naturally occurring or accelerator-produced radioactive material, source material, or special nuclear material, except reactor fuel, for commercial distribution.	Amendment Non-routine Inspection Annual Fee	N/A N/A N/A	N/A
D	Safety evaluation of sealed sources containing byproduct material, naturally occurring or accelerator-produced radioactive material, source material, or special nuclear material, manufactured in accordance with the unique specifications of, and for use by a single applicant, except reactor fuel.	Amendment Non-routine Inspection Annual Fee	N/A N/A N/A	N/A
11.	Transportation of radioactive material (Regulated by DOT and/or NRC).	Amendment Non-routine Inspection Annual Fee	N/A N/A N/A	N/A

Category	Description	Base Fees (USD)		Additional Charges
12.	Review of standardized spent fuel facilities (Regulated by NRC).	Amendment	N/A	N/A
		Non-routine Inspection	N/A	
		Annual Fee	N/A	
13.	Special projects	Amendment	Full Cost	Items 26 and/or 30 as applicable.
		Non-routine Inspection	Full Cost	
		Annual Fee	Full Cost	
14. SPENT FUEL STORAGE				
A	Spent fuel storage cask Certificate of Compliance (Regulated by NRC).	Amendment	N/A	N/A
		Non-routine Inspection	N/A	
		Annual Fee	N/A	
B	Inspections related to spent fuel storage cast Certificate of Compliance (Regulated by NRC).	Amendment	N/A	N/A
		Non-routine Inspection	N/A	
		Annual Fee	N/A	
C	Inspections related to storage of spent fuel (Regulated by NRC).	Amendment	N/A	N/A
		Non-routine Inspection	N/A	
		Annual Fee	N/A	
15.	Byproduct, naturally occurring or accelerator-produced, source, or special nuclear material licenses and other approvals authorizing decommissioning, decontamination, reclamation or site restoration activities pursuant to 10 CFR parts 30, 40, 70 and 72.	Amendment	Full Cost	Items 26 and/or 30 as applicable.
		Non-routine Inspection	Full Cost	
		Annual Fee	Full Cost	
16.	Import and Export licenses (Regulated by NRC).	Amendment	N/A	N/A
		Non-routine Inspection	N/A	
		Annual Fee	N/A	

Category	Description	Base Fees (USD)		Additional Charges
17.	Reciprocity: Other agreement state and/or NRC licensees who conduct activities in North Dakota under the reciprocity provisions of chapters 33-10-02 and 33-10-03. (Application fee is due 3 working days prior to entering the State.)	Application Fee Non-routine Inspection	Same as Annual fee for license type Same as inspection fee for license type	Items 26 and/or 30 as applicable.
18. SERVICES FOR OTHER LICENSED ENTITIES				
A	Leak test and analysis services (for other licensed entities) only.	Amendment Non-routine Inspection Annual Fee	$140 $350 $650	Items 26 and/or 30 as applicable.
B	Instrument calibration services (for other licensed entities) only.	Amendment Non-routine Inspection Annual Fee	$140 $350 $650	Items 26 and/or 30 as applicable.
19.	Combination Leak test and analysis services and instrument calibration services (for other licensed entities) only.	Amendment Non-routine Inspection Annual Fee	$150 $400 $870	Items 26 and/or 30 as applicable.
20.	Calibration and/or reference sources (not for providing service to other licensed entities) only.	Amendment Non-routine Inspection Annual Fee	$100 $250 $450	Items 26 and/or 30 as applicable.

Category	Description	Base Fees (USD)		Additional Charges
21.	Storage of radioactive material only.	Amendment Non-routine Inspection Annual Fee	$140 $350 $600	Item 30 as applicable. An additional $100 per extra licensed location and an additional $100 if possess 10 or more sources.
22. DECONTAMINATION SERVICES				
A	Providing deliberate operations to reduce or remove residual radioactivity from equipment, facilities, and land owned, possessed, or controlled by other persons to a level that permits release of equipment, facilities, and land for unrestricted use and/or termination of a license rendered from a mobile unit.	Amendment Non-routine Inspection Annual Fee	$160 $500 $1200	Items 26 and/or 30 as applicable.
B	Providing deliberate operations to reduce or remove residual radioactivity from equipment, facilities, and land owned, possessed, or controlled by other persons to a level that permits release of equipment, facilities, and land for unrestricted use and/or termination of a license rendered from a fixed facility.	Amendment Non-routine Inspection Annual Fee	$250 $650 $8000	Items 26 and/or 30 as applicable.
23.	Radiation training courses involving the use of licensed material by the instructor and/or the participants.	Annual Fee	$200	Item 30 as applicable.
24.	Demonstration and sales of devices containing radioactive materials.	Annual Fee	$200	Item 30 as applicable.
25.	Installation, removal, repair and servicing of devices containing radioactive materials.	Annual Fee	$760	Item 30 as applicable.
26.	Multiple offices: Add the following fees per additional office location. (This category does not apply to additional licensed locations in Categories 3.P.3 to 3.P.6, or 21 above.)	Annual Fee	25% of Base Fee for Category Type Per Location	Item 30 as applicable.

Category	Description	Base Fees (USD)		Additional Charges
27.	Administrative amendment (limited to the following amendments only): - Corporate name change with no radiation safety program changes - Change of mailing address only (no change to locations of use) - Minor O&E procedures manual changes (industrial users only) - Filing of training certificates (gauge users only)	Amendment	$100	Item 30 as applicable.
28.	Inspection of radioactive materials package shipments to low-level radioactive waste disposal facility.	Inspection	Full Cost	Item 30 as applicable.
29.	Certificate - in vitro testing with radioactive material under general license.	Certificate Fee (Valid for 3 years)	$120	Item 30 as applicable.
30.	Late payment of any fees described in items 1-29 above.	From payment due date	Fee Amount	An additional $30 per 30 days late.

Note: All fee amounts are shown in U.S. Dollars (USD).

History: Effective October 1, 1982; amended effective June 1, 1986; June 1, 1992; July 1, 1995; May 1, 2001
General Authority: NDCC 28-32-02, 23-20.1-04.5
Law Implemented: NDCC 23-20.1-04, 23-20.1-04.5

APPENDIX B

SCHEDULE OF FEES FOR REGISTRATION
CERTIFICATION AND INSPECTIONS

Applications for registration of radiation machines and other regulatory services shall pay the following fees for each machine that they possess and use at their facilities. The fees cover a three-year registration period and the renewal fee is the amount listed.

Registration Category	Fee/Machine (in U.S. dollars)
Dentistry	~~80~~95
Medical:	
A. Radiographic Machine (including computed tomography)	~~130~~150
B. Fluoroscopic Machine	~~200~~230
C. Combined Radiographic-Fluoroscopic	~~260~~300
D. (1) Therapeutic: Linear Accelerator (less than 10 MEV)	~~200~~230
(2) Therapeutic: Linear Accelerator (greater than 10 MEV)	~~325~~375
E. Superficial X-ray	~~100~~115
Chiropractic	~~120~~140
Podiatry	~~100~~115
Veterinary Medicine	~~80~~95
Industrial Radiography	~~325~~375
Accelerators (Industrial and Research)	~~200~~230
Education and Research	~~200~~230

Other Registration Fees and Services	Annual Service Fees (in U.S. dollars)
X-ray Service and Installers	~~200~~230
Radiation Training Courses	~~130~~150
X-ray Sales and Demonstrations	~~200~~230
Combined Sales and Service (Assembler)	~~260~~300
Dosimetrist and Physicists	~~130~~150
Shielding Evaluations (Routine) evaluation	~~200~~230 per
Shielding Evaluations (Nonroutine)	Full cost
Reciprocity (X-ray producing machines)	~~200~~230 per year per machine

History: Effective October 1, 1982; amended effective June 1, 1986; June 1, 1992; July 1, 1995.
General Authority: NDCC 23-20.1-04.5, 28-32-02
Law Implemented: NDCC 23-20.1-04, 23-20.1-04.5

CHAPTER 33-10-12
RADIATION SAFETY REQUIREMENTS FOR WIRELINE SERVICE OPERATIONS AND SUBSURFACE TRACER STUDIES

33-10-12-01. Purpose. This chapter establishes radiation safety requirements for persons using sources of radiation for wireline service operations including well logging, mineral logging, radioactive tracers, radioactive markers, and ~~subsurface tracer studies~~ uranium sinker bars. The requirements of this chapter are in addition to, and not in substitution for, ~~the~~ other requirements of chapters 33-10-01, ~~33-10-02,~~ 33-10-03, 33-10-04.1, ~~and~~ 33-10-10, 33-10-11 and 33-10-13.

History: Effective June 1, 1986; amended effective June 1, 1992; March 1, 1994.
General Authority: NDCC 23-20.1-04
Law Implemented: NDCC 23-20.1-03, 23-20.1-04

33-10-12-02. Scope. This chapter applies to all licensees or registrants who use sources of radiation for wireline service operations including well logging, mineral logging, radioactive tracers, radioactive markers, or ~~subsurface tracer studies~~ uranium sinker bars. The requirements set out in this chapter do not apply to the issuance of a license authorizing the use of licensed material in tracer studies involving multiple wells, such as field flooding studies, or the use of sealed sources auxiliary to well logging but not lowered into wells.

History: Effective June 1, 1986.
General Authority: NDCC 23-20.1-04
Law Implemented: NDCC 23-20.1-03, 23-20.1-04

33-10-12-03. Definitions. As used in this chapter, the following definitions apply:

1. "Energy compensation source (ECS)" means a small sealed source, with an activity not exceeding three and seven tenths megabecquerels (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.

~~1~~2. "Field station" means a facility where radioactive sources may be stored or used and from which equipment is dispatched to temporary jobsites.

3. "Fresh water aquifer" means a geologic formation that is capable of yielding fresh water to a well or spring.

~~2~~4. "Injection tool" means a device used for controlled subsurface injection of radioactive tracer material.

~~3~~5. "Logging assistant" means 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 1 of section 33-10-12-08.

~~4~~6. "Logging supervisor" means the individual who uses sources of radiation or provides personal supervision of the utilization of sources of radiation at ~~the well site~~ a temporary jobsite and who is responsible to the licensee for assuring compliance with department requirements and conditions of the license.

~~5~~7. "Logging tool" means a device used subsurface to perform well logging.

~~6~~8. "Mineral logging" means any logging performed for the purpose of mineral exploration other than oil or gas.

~~7~~9. "Personal supervision" means guidance and instruction by the supervisor who is physically present at the jobsite and watching the performance of the operation in such proximity that contact can be maintained and immediate assistance given as required.

~~8~~10. "Radioactive marker" means radioactive material placed subsurface or on a structure intended for subsurface use for the purpose of depth determination or direction orientation. This term includes radioactive collar markers and radioactive iron nails.

11. "Safety review" means a periodic review provided by the licensee for its employees on radiation safety aspects of well logging. The review may include, as appropriate,

the results of internal inspections, new procedures or equipment, accidents or errors that have been observed, and opportunities for employees to ask questions.

~~9~~12. "Source holder" means a housing or assembly into which a radioactive source is placed ~~for the purpose of~~ to facilitat~~ing~~e the handling and use of the source in well logging operations.

~~10~~13. "Subsurface tracer study" means the release of a substance tagged with radioactive material for the purpose of tracing the movement or position of the tagged substance in the well bore or adjacent formation.

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

~~11~~15. "Temporary jobsite" means a location where radioactive materials are present for the purpose of performing wireline service operations or subsurface tracer studies.

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

~~12~~17. "Uranium sinker bar" means a weight containing depleted uranium used to pull a logging tool ~~down~~ toward the bottom of a well.

~~13~~18. "Well" or "Well bore" means a drilled hole in which wireline service operations and subsurface tracer studies are performed.

~~14~~19. "Well logging" means all operations involving 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 or adjacent formations.

~~15~~20. "Wireline" means a cable containing one or more electrical conductors which is used to lower and raise logging tools in the well bore.

~~16~~21. "Wireline service operation" means any evaluation or mechanical service which is performed in the well bore using devices on a wireline.

History: Effective June 1, 1986; amended effective June 1, 1992.

General Authority: NDCC 23-20.1-04
Law Implemented: NDCC 23-20.1-03, 23-20.1-04

33-10-12-04. Prohibition. No licensee may perform wireline service operations with a sealed source unless, prior to commencement of the operations, the licensee has a written agreement with the well operator, well owner, drilling contractor, or landowner which states that:

1. In the event a sealed source is lodged downhole, a reasonable effort at recovery will be made; ~~and~~

2. In the event a decision is made to abandon the sealed source downhole, the requirements of subsection 3 of section 33-10-12-09 shall be met.

3. The required radiation monitoring will be performed.

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

5. If the environment, any equipment or personnel are contaminated with licensed material, they shall be decontaminated before release from the site or released for unrestricted use.

6. The licensee shall retain a copy of the written agreement for three years after the completion of the well logging operation.

7. The licensee may apply 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 by this chapter.

History: Effective June 1, 1986; amended effective June 1, 1992.
General Authority: NDCC 23-20.1-04
Law Implemented: NDCC 23-20.1-04, 23-20.1-08

33-10-12-05. Equipment control.

1. **Limits on levels of radiation.** Sources of radiation shall be used, stored, and transported in such a manner that the transportation requirements of chapter 33-10-13

and the dose limitation requirements of chapter 33-10-04.1 are met.

2. **Storage precautions.**

   a. Each source of radiation, except accelerators, must be provided with a storage 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 or fire.

3. **Transport precautions.** Transport containers shall be physically secured to the transporting vehicle to prevent accidental loss, tampering, or unauthorized removal.

4. **Radiation survey instruments.**

   a. The licensee or registrant shall maintain sufficient calibrated and operable radiation survey instruments at each field station to make physical radiation surveys as required by this chapter and by section 33-10-04.1-09. Instrumentation shall be capable of measuring ~~twenty-five and eight tenths nanocoulombs per kilogram [0.1 milliroentgen]~~ one microsievert [0.1 millirem] per hour through at least ~~twelve and nine tenths microcoulombs per kilogram [50 milliroentgens]~~ five hundred microsievert [50 millirem] per hour. ~~Survey instruments acquired before March 1, 1992, and capable of measuring twenty-five and eight tenths nanocoulombs per kilogram [0.1 milliroentgen] per hour through at least five and sixteen hundredths microcoulombs per kilogram [20 milliroentgens] per hour also satisfy this requirement until March 1, 1997.~~

   b. Each radiation survey instrument shall be calibrated:

      (1) At intervals not to exceed six months and after each instrument servicing except battery replacement;

      (2) For linear scale instruments, at two points located approximately one-third and two-thirds of full-scale on each scale; for logarithmic scale instruments, at midrange of each decade,

and at two points of at least one decade; and for digital instruments, at appropriate points; and

(3) So that accuracy within plus or minus twenty percent of the true radiation level can be demonstrated on each scale.

c. Calibration records shall be maintained for a period of three years for inspection by the Department.

5. **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 becquerels [microcuries] and maintained for inspection by the department for three years from the date 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 department, the United States nuclear regulatory commission, an agreement state, or a licensing state. The test sample shall be taken from the surface of the source, source holder, or from the surface of the device in which the source is stored or mounted and on which one might expect contamination to accumulate. The test sample shall be analyzed for radioactive contamination, and the analysis shall be capable of detecting the presence of one hundred eighty-five becquerels [0.005 microcurie] of radioactive material on the test sample.~~ The wipe of a sealed source shall be performed using a leak test kit or method approved by the department, the United States nuclear regulatory commission, an agreement state or a licensing state. 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 one hundred eighty-five becquerels [0.005 microcurie] of radioactive material on the test sample and must be performed by a person approved by the department, the United States nuclear regulatory commission, an agreement state or a licensing state to perform the analysis.

c. **Interval of testing.**

(1) Each sealed source of radioactive material, except an energy compensation source (ECS), shall be tested at intervals not to exceed six months. In the absence of a certificate from a transferor indicating that a test has been made 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.

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

d. **Leaking or contaminated sources.** If the test reveals the presence of one hundred eighty-five becquerels [0.005 microcurie] 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 this article. A report describing the equipment involved, the test results, and the corrective action taken shall be filed with the department within five days of receiving the test results.

e. **Exemptions.** The following sources are exempt from the periodic leak test requirements of subdivisions a, b, c, and d of this subsection.

(1) Hydrogen-3 (tritium) sources.

(2) Sources of radioactive material with a half-life of thirty days or less.

(3) Sealed sources of radioactive material in gaseous form.

(4) Sources of beta and/or gamma-emitting radioactive material with an activtiy of three

and seven-tenths megabecquerels [100 microcuries] or less.

(5) Sources of ~~alpha-emitting~~ alpha and/or neutron emitting radioactive material with an activity of three hundred seventy kilobecquerels [10 microcuries] or less.

6. **~~Quarterly~~ Physical inventory.** Each licensee or registrant shall conduct a ~~quarterly~~ semi-annual physical inventory to account for all sources of radiation. Records ~~or~~ of inventories shall be maintained for three years from the date of the inventory for inspection by the department 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. Physical inventory records may be combined with leak test records.

7. **Utilization records.** Each licensee or registrant shall maintain current records, which shall be maintained for inspection by the department for three 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 well logging supervisor or field unit to whom assigned.

c. Locations where used and dates of use.

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 material.

8. **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 and manufactured after June 1, 1986, shall be certified by the manufacturer, or other testing organization acceptable to the department, 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.~~

~~(3) Has been individually pressure tested to at least twenty-four thousand, six hundred fifty-six pounds per square inch absolute without failure.~~

~~b. Sealed sources, except those containing radioactive material in gaseous form acquired after June 1, 1986, in the absence of a certificate from a transferor certifying that an individual sealed source meets the requirements of subdivision a, 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 June 1, 1986, shall be certified by the manufacturer, or other testing organization acceptable to the department, as meeting the sealed source performance requirements for oil well logging as contained in the American national standard N43.6, "Classification of sealed radioactive sources," (formerly N542, ANSI/NBS 126) in effect on June 1, 1986.~~

a. A licensee may use a sealed source for use in well logging applications if:

(1) The sealed source is doubly encapsulated;

(2) The sealed source contains licensed material whose chemical and physical forms are as insoluble and nondispersible as practical; and

(3) Meets the requirements of subdivision b, c, or d of this subsection.

b. 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 subdivision c, or d of this subsection.

c. 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."

d. For a sealed source manufactured after July 14, 1989, a licensee may use the sealed source, for use in well logging applications, if:

(1) 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 minus forty degrees celcius for twenty minutes, six hundred degrees celcius for one hour, and then be subject to a thermal shock test with a temperature drop from six hundred degrees celcius to twenty degrees celcius within fifteen seconds.

(b) Impact test. A five kilogram steel hammer, 2.5 centimeter in diameter, must be dropped from a height of one meter onto the test source.

(c) Vibration test. The test source must be subject to a vibration from twenty-five hertz to five hundred hertz at five times the acceleration of gravity for thirty minutes.

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

(e) Pressure test. The test source must be subject to an external pressure of 1.695×10^7 pascals [24,600 pounds per square inch absolute].

e. The requirements in subdivision a, b, c, or d of this subsection do not apply to sealed sources that contain licensed material in gaseous form.

f. The requirements in subdivision a, b, c, or d of this subsection do not apply to energy compensation sources (ECS). These must be registered with the department under chapter 33-10-03 or with the United States nuclear regulatory commission or another agreement state.

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

9. **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~~ CAUTION*
RADIOACTIVE MATERIAL

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

b. Each transport and 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~~ CAUTION*
RADIOACTIVE MATERIAL
NOTIFY CIVIL AUTHORITIES (OR NAME OF COMPANY)

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* or ~~CAUTION~~ DANGER

c. The licensee may not transport licensed material unless the material is packaged, labeled, marked and accompanied with appropriate shipping papers in accordance with regulations set out in chapter 33-10-13.

10. **Inspection and maintenance.**

a. Each licensee shall visually check source holders, logging tools and source handling tools for defects before each use to ensure that the equipment is in good working condition and that the required labeling is present.

~~a~~b. Each licensee or registrant shall conduct, at intervals not to exceed six months, a program of inspection and maintenance of source holders,

logging tools, source handling tools, storage containers, transport containers, uranium sinker bars and injection tools to assure proper labeling and physical condition. Records of inspection and maintenance shall be maintained for a period of three years for inspection by the department.

~~b~~c. If any inspection conducted pursuant to subdivision a or b of this subsection reveals damage to labeling or components critical to radiation safety, the device shall be removed from service until repairs have been made. A record must be made listing: the date of check, name of inspector, equipment involved, defects found and repairs made. These records must be maintained for three years after the defect is found.

~~c~~d. If a sealed source is stuck in the source holder, the licensee may not perform any operation, such as drilling, cutting, or chiseling, on the source holder unless the licensee is specifically approved by the United States nuclear regulatory commission, an agreement state, or a licensing state to perform this operation.

~~d~~e. The repair, opening, or modification of any sealed source shall be performed only by persons specifically authorized to do so by the department, the United States nuclear regulatory commission, an agreement state, or a licensing state.

11. **Subsurface tracer studies.**

a. The licensee shall require all personnel handling radioactive tracer material to use protective gloves and, if required by the license, other protective clothing and equipment. The licensee shall take precautions to avoid ingestion or inhalation of radioactive tracer material and to avoid contamination of field stations and temporary jobsites.

b. A licensee shall not knowingly inject licensed material into fresh water aquifers unless specifically authorized by the department.

12. **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 schedule B of chapter 33-10-03.

The use of markers is subject only to the requirements of 33-10-12-05.6.

13. **Uranium sinker bars.** The licensee may use a uranium sinker bar in well logging applications only if it is legibly impressed with the words, "CAUTION: RADIOACTIVE - DEPLETED URANIUM", and, "NOTIFY CIVIL AUTHORITIES (or COMPANY NAME) IF FOUND."

14. **Use of a sealed source in a well without a surface casing.** The 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 by the department, the U.S. nuclear regulatory commission or another agreement state.

15. **Energy compensation source.** The licensee may use an energy compensation source (ECS) which is contained within a logging tool, or other tool components, only if the energy compensation source contains quantities of licensed material not exceeding 3.7 megabecquerels [100 microcuries].

    a. For well logging applications with a surface casing for protecting fresh water aquifers, use of the ECS is only subject to the requirements of subsections 5, 6 and 7 of section 33-10-12-05.

    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 section 33-10-12-04; subsections 5, 6, 7 and 14 of section 33-10-12-05; and section 33-10-12-09.

16. **Tritium neutron generator target source.**

    a. Use of a tritium neutron generator target source, containing quantities not exceeding 1,110 megabecquerels [30 curies] and in a well with a surface casing to protect fresh water aquifers, is subject to the requirements of this chapter except section 33-10-12-04, subsection 33-10-12-05.8 and section 33-10-12-09.

    b. Use of a tritium neutron generator target source, containing quantities exceeding 1,110 megabecquerels [30 curies] or in a well without a surface casing to protect fresh water aquifers, is

subject to the requirements of this chapter except subsection 33-10-12-05.8.

History: Effective June 1, 1986; amended effective June 1, 1992; March 1, 1994; May 1, 1998.
General Authority: NDCC 23-20.1-04
Law Implemented: NDCC 23-20.1-03, 23-20.1-04

33-10-12-06. Requirements for personnel safety.

1. **Training requirements.**

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

      (1) Received, in a course recognized by the department, the United States nuclear regulatory commission, an agreement state, or a licensing state, instruction in the subjects outlined in appendix A of this chapter and demonstrated an understanding thereof by successfully completing a written test.

      (2) Read and received instruction in the rules contained in this chapter and the applicable sections of Chapters 33-10-01, 33-10-04.1, and 33-10-10 or their equivalent, conditions of appropriate license or certificate of registration, and the licensee's or registrant's operating and emergency procedures, and demonstrated an understanding thereof by successfully completing a written test.

      (3) Has completed on-the-job training and ~~d~~Demonstrated competence ~~to~~ in the use of sources of radiation, related handling tools, and radiation survey instruments ~~which will be used on the job~~ by a field evaluation.

   b. No licensee or registrant shall permit any individual to act as a logging assistant or to assist in the handling of sources of radiation until such individual has:

      (1) Received instruction in applicable rules of this chapter and applicable sections of chapters 33-10-01, 33-10-04.1, and 33-10-10 or

their equivalent and demonstrated an understanding thereof by successfully completing a written or oral test.

(2) Read or received instruction in the licensee's or registrant's operating and emergency procedures and demonstrated an understanding thereof by successfully completing a written or oral test.

(~~2~~3) 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 or registrant shall provide safety reviews for logging supervisors and logging assistants at least once during each calendar year.

~~c.~~d. The licensee or registrant shall maintain employee training records for inspection by the department for three years following termination of employment. Records of annual safety reviews must list the topics discussed and also be retained for three years.

2. **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 aquifiers (if appropriate) to be employed so that no individual is likely to be exposed to radiation doses in excess of the standards established in chapter 33-10-04.1.

b. Methods and occasions for conducting radiation surveys, including surveys for decontamination, as required by section 33-10-12-08.

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 jobsites and field stations, including the packaging and placing of

sources of radiation in vehicles, placarding the vehicles, and physically securing sources of radiation in transport vehicles during transportation to prevent accidental loss, tampering or unauthorized removal.

f. Minimizing exposure of individuals in the event of an accident, or from inhalation and ingestion of tracer materials.

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, ~~and~~ injection tools, and uranium sinker bars.

j. Procedures 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. For the use of tracers, decontamination of the environment, equipment, and personnel.

m. Maintenance of records generated by logging personnel at temporary jobsites.

n. Actions to be taken if a sealed source is ruptured, including actions to prevent the spread of contamination and minimize inhalation and ingestion of radioactive material and actions to obtain suitable radiation survey instruments as required by subsection 4 of section 33-10-12-05.

o. Use of remote handling tools for handling sealed sources and tracer material except low-activity calibration sources.

3. **Personnel monitoring.**

a. ~~No~~ The licensee or registrant shall not permit any individual to act as a logging supervisor or logging assistant or to assist in the handling of sources of radiation unless each such individual wears ~~either a film badge or a thermoluminescent~~

~~dosimeter (TLD). Each film badge, or thermoluminescent dosimeter~~ , at all times during the handling of licensed radioactive materials, a personnel dosimeter that is processed and evaluated by an accredited National Voluntary Laboratory Accreditation Program (NVLAP) processor. Each personnel dosimeter shall be assigned to and worn by only one individual. Film badges must be replaced at least monthly and ~~thermoluminescent~~ other personnel dosimeters replaced at least quarterly. After replacement, each ~~film badge or thermoluminescent~~ personnel dosimeter must be promptly processed.

b. The licensee shall provide bioassay services to individuals using radioactive material in subsurface tracer studies if required by the license.

~~b~~c. The licensee or registrant shall retain ~~P~~personnel monitoring records ~~shall be maintained~~ and bioassay results for inspection until the department authorizes disposition of the records.

History: Effective June 1, 1986; amended effective June 1, 1992; March 1, 1994.
General Authority: NDCC 23-20.1-04
Law Implemented: NDCC 23-20.1-03, 23-20.1-04

33-10-12-07. Precautionary procedures in logging and subsurface tracer operations.

1. **Security.**

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

b. During each logging or tracer application, except when the radiation sources are below ground or in secure shipping or storage containers, the logging supervisor or other designated employee shall maintain direct surveillance of the operation to protect against unauthorized or unnecessary entry

into a restricted area, as defined in Chapter 33-10-01.

2. **Handling tools.** The licensee shall provide and require the use of tools that will assure remote handling of sealed sources and tracer material other than low activity calibration sources.

~~3. **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.~~

~~b. No licensee shall cause the injection of radioactive material into potable aquifers without prior written authorization from the department.~~

~~4~~3. **Particle accelerators.** No licensee or registrant shall permit aboveground 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 subsections 1, 7 and 8 of section 33-10-04.1-06 and section 33-10-04.1-07, as applicable, are met.

4. **Radioactive contamination control.**

a. If the licensee detects evidence that a sealed source has ruptured or radioactive material has caused contamination, the licensee shall initiate the emergency procedures required by subsection 33-10-12-06.2.

b. If contamination results from the use of radioactive material in well logging, the licensee shall decontaminate all work areas, equipment and unrestricted areas.

c. During efforts to recover a sealed source lodged in a well, the licensee shall continuously monitor, with an appropriate radiation detection instrument or logging tool with a radiation detector, the circulating fluids from the well, if any, to check for contamination resulting from damage to the sealed source.

History: Effective June 1, 1986; amended effective June 1, 1992; March 1, 1994.

General Authority: NDCC 23-20.1-04
Law Implemented: NDCC 23-20.1-03, 23-20.1-04

33-10-12-08. Radiation surveys and records.

1. **Radiation surveys.**

   a. Radiation surveys or calculations shall be made and recorded for each area where radioactive materials are used or stored.

   b. Radiation surveys or calculations 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 or calculations 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 jobsite, the logging tool detector shall be energized, or a survey meter used, to assure that the logging tool is free of contamination.

   d. If the licensee has reason to believe that, as a result of any operation involving a sealed source, the encapsulation of the sealed source could be damaged by the operation, the licensee shall conduct a radiation survey, including a contamination survey, during and after the operation.

   e. Radiation surveys shall be made and recorded at the jobsite or wellhead 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.

   ~~e~~f. Records required pursuant to subdivisions a, b, c, d, and ~~d~~e of this subsection shall include the dates, the identification of individuals making the survey, the identification of survey instruments used, and an exact description of the location of the survey. Records of these surveys shall be maintained for inspection by the department for three years after completion of the survey.

2. **Documents and records required at field stations.** Each licensee or registrant shall maintain, for inspection by the department, the following documents and records for the specific devices and sources used at the field station:

   a. Appropriate license, certificate of registration, or equivalent documents.

   b. Operating and emergency procedures.

   c. Applicable chapters of this article.

   d. Records of the latest survey instrument calibrations pursuant to subsection 4 of section 33-10-12-05.

   e. Records of the latest leak test results pursuant to subsection 5 of section 33-10-12-05.

   f. ~~Quarterly~~ Physical inventories required pursuant to subsection 6 of section 33-10-12-05.

   g. Utilization records required pursuant to subsection 7 of section 33-10-12-05.

   h. Records of inspection and maintenance required pursuant to subsection 10 of section 33-10-12-05.

   i. Survey records required pursuant to subsection 1 of this section.

   j. Training records required pursuant to subsection 1 of section 33-10-12-06.

3. **Documents and records required at temporary jobsites.** Each licensee or registrant conducting operations at a temporary jobsite shall have the following documents and records available at that site for inspection by the department.

   a. Operating and emergency procedures.

   b. Survey records required pursuant to subsection 1 of this section 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 documents.

e. Shipping papers for the transportation of radioactive material.

History: Effective June 1, 1986; amended effective June 1, 1992.
General Authority: NDCC 23-20.1-04
Law Implemented: NDCC 23-20.1-03, 23-20.1-04

33-10-12-09. 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 33-10-04.1.

2. Whenever a sealed source or device containing radioactive material is lodged downhole, the licensee shall:

   a. Monitor at the surface for the presence of radioactive contamination with a radiation survey instrument or logging tool during logging tool recovery operations.

   b. Notify the department immediately by telephone and subsequently within thirty days, by confirmatory letter if the licensee knows or has reason to believe that a sealed source has been ruptured. This letter must 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.

3. When it becomes apparent that efforts to recover the radioactive source will not be successful, the licensee shall:

   a. Advise the well-operator of an appropriate method of abandonment, which shall include:

      (1) The immobilization and sealing in place of the radioactive source with a cement plug.

      (2) ~~The setting of a whipstock or other deflection device.~~ A means to prevent inadvertent

intrusion on the source, unless the source is not accessible to any subsequent drilling operations.

(3) ~~The mounting of a permanent identification plaque, at the surface of the well, containing the appropriate information required by subsection 4.~~ 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 seventeen centimeters (7 inches) square and three millimeters ($^1/_8$-inch thick). The plaque must contain the information required by subsection 4.

b. Notify the department by telephone~~, facsimile, or overnight express mail giving~~ of the circumstances of the loss, and

(1) request approval of the proposed abandonment procedures, or~~.~~

(2) state that the licensee implemented abandonment before receiving department approval because the licensee believed there was an immediate threat to public health and safety.

c. File a written report with the department within thirty days of the abandonment. The licensee shall also send a copy of the report to:

North Dakota Industrial Commission
Oil and Gas Division
600 East Boulevard
Bismarck, North Dakota 58505

The report must contain the following information:

(1) Date of occurrence.

(2) A description of the well logging source involved, including the radionuclide and its quantity, chemical, and physical form.

(3) Surface location and identification of well.

(4) Results of efforts to immobilize and set the source in place.

(5) A brief description of the attempted recovery effort.

(6) Depth of the radioactive source.

(7) Depth of the top of the cement plug.

(8) Depth of the well.

(9) The immediate threat to public health and safety justification for implementing abandonment prior to obtaining approval from the department.

(10) Any other information, such as a warning statement, contained on the permanent identification plaque.

(~~10~~11) The names of the state agencies receiving a copy of this report.

4. Whenever a sealed source containing radioactive material is abandoned downhole, the licensee shall provide a permanent plaque for posting the well or well bore. An example of a suggested plaque is shown in appendix B of this chapter. This plaque shall:

a. Be constructed of long-lasting material~~, such as stainless steel or monel~~ as described in paragraph 33-10-12-09.3.a(3) above.

b. Contain the following information engraved on its face:

(1) The word "CAUTION."

(2) The radiation symbol without the conventional color requirement.

(3) The date of abandonment.

(4) The name of the well operator or well owner.

(5) The well name and well identification number~~s~~ or other designation.

(6) The sealed source~~s~~(s) by radionuclide and activity.

(7) The source depth and the depth to the top of the plug.

(8) An appropriate warning, depending on the specific circumstances of each abandonment. Appropriate warnings may include: (a) "Do not drill below plug back depth;" (b) "Do not enlarge casing;" or (c) "Do not reenter ~~the hole~~ this well," followed by the words, "before contacting the North Dakota Department of Health".

5. The licensee shall immediately notify the department by telephone and subsequently by confirming letter if the licensee knows or has reason to believe that radioactive material has been lost in or in proximity to an underground potable aquifer. 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.

History: Effective June 1, 1986; amended effective June 1, 1992; March 1, 1994; May 1, 1998.
General Authority: NDCC 23-20.1-04
Law Implemented: NDCC 23-20.1-03, 23-20.1-04

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~~ licensed material.

E. Methods of minimizing radiation dose.

1. Working time.

2. Working distance.

3. Shielding.

F. Radiation safety practices including prevention of contamination and 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.

B. Sources of radiation.

C. Storage and control of equipment.

D. Operation and control of equipment.

E. Maintenance of equipment.

IV. Storage, control and disposal of licensed material.

V. The requirements of pertinent federal regulations and this article.

~~V~~VI. The licensee's or registrant's written operating and emergency procedures.

~~VI~~VII. The licensee's or registrant's recordkeeping procedures.

VIII. Case histories of accidents in well logging.

History: Effective June 1, 1986; amended effective June 1, 1992.

APPENDIX B

Example of plaque for identifying wells containing sealed sources of radioactive material abandoned downhole.

[COMPANY NAME]

[WELL IDENTIFICATION]

CAUTION

37 Gbq (1 Curie) Cesium-137 Radioactive Source
Abandoned 4-1-01 at 8400 ft.
Plug back depth 8200 ft.

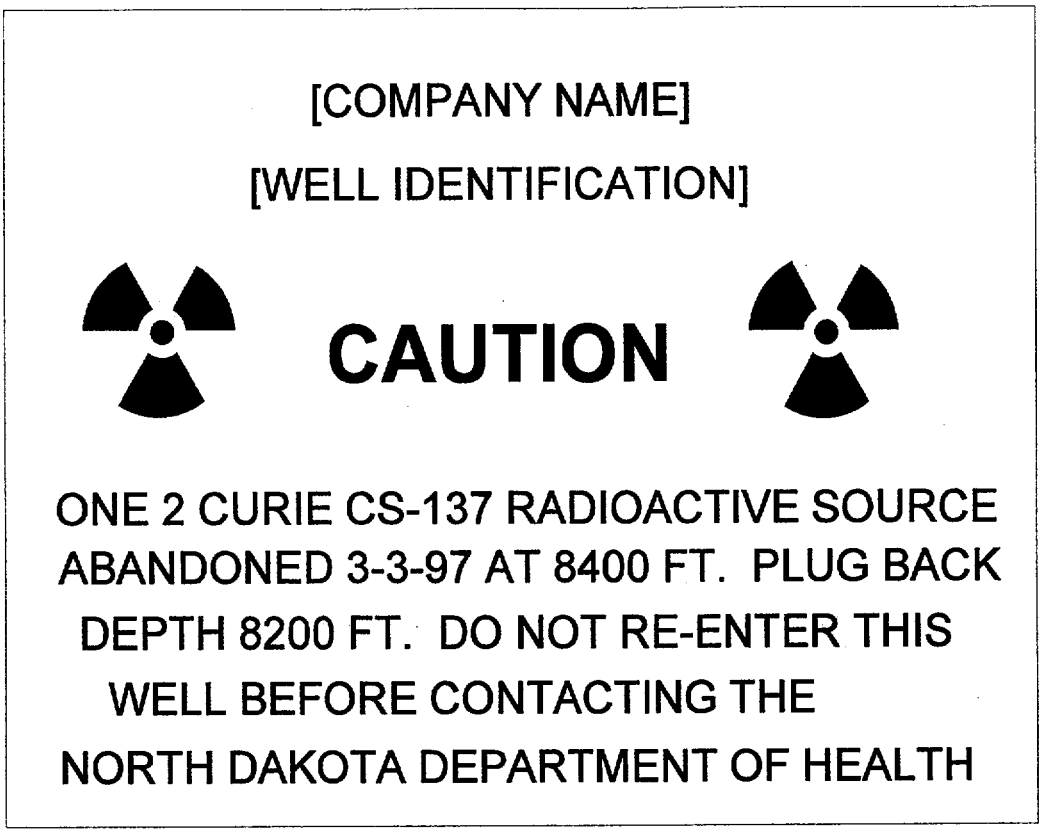
DO NOT RE-ENTER THIS WELL BEFORE
CONTACTING THE NORTH DAKOTA
DEPARTMENT OF HEALTH

The size of the plaque should be convenient for use on active or inactive wells, e.g., a 17 centimeter (7 inch) square. Letter size of the word "CAUTION" should be approximately twice the size of the rest of the information.

History: Effective June 1, 1986; amended effective June 1, 1992.

APPENDIX B

Example of Plaque for Identifying Wells Containing Sealed Sources Containing Radioactive Material Abandoned Downhole



The size of the plaque should be convenient for use on active or inactive wells, e.g., a seven-inch sqaure. Letter size of the word "CAUTION" should be approximately twice the letter size of the rest of the information, e.g., one-half-inch and one-fourth-inch letter size, respectively.

History: Effective June 1, 1986; amended effective June 1, 1992.

CHAPTER 33-10-13
TRANSPORTATION OF RADIOACTIVE MATERIAL

33-10-13-01. Purpose and scope. The rules in this chapter establish requirements for packaging, preparation for shipment, and transportation of radioactive material and apply to any person who transports radioactive material or delivers radioactive material to a carrier for transport. To ensure compatibility with international transportation standards, all limits in this chapter are given in terms of dual units: The international system of units (SI) followed by United States customary units. The United States customary units are not exact equivalents, but are rounded to a convenient value, providing a functionally equivalent unit. ~~For the purpose of this chapter, either unit may be used.~~

History: Effective June 1, 1992; amended effective May 1, 1998.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 28-32-02

33-10-13-02. Definitions. As used in this chapter, the following definitions apply:

1. "Carrier" means any person engaged in the transportation of passengers or property by land or water as a common, contract, or private carrier, or by civil aircraft.

2. "Certificate holder" means a person who has been issued a certificate of compliance or other package approval by the United States nuclear regulatory commission.

3. "Close reflection by water" means immediate contact by water of sufficient thickness for maximum reflection of neutrons.

4. "Closed transport vehicle" means a transport vehicle equipped with a securely attached exterior enclosure that during normal transportation restricts the access of unauthorized individuals to the cargo space containing the radioactive material. The enclosure may be either temporary or permanent but must limit access from top, sides, and ends. In the case of packaged materials, it may be of the "see-through" type.

5. "Containment system" means the assembly of components of the packaging intended to retain the radioactive material during transport.

6. "Conveyance" means:

   a. For transport by public highway or rail: any transport vehicle or large freight container;

   b. For transport by water: any vessel, or any hold, compartment, or defined deck area of a vessel including any transport vehicle on board the vessel; and

   c. For transport by aircraft: any aircraft.

7. "Exclusive use" means the sole use of a conveyance by a single consignor and for which all initial, intermediate, and final loading and unloading are carried out in accordance with the direction of the consignor or consignee. The consignor and the carrier must ensure that any loading or unloading is performed by personnel having radiological training and resources appropriate for safe handling of the consignment. The consigner must issue specific instructions, in writing, for maintenance or exclusive use shipment controls, and include them with

the shipping paper information provided to the carrier by the consigner.

8. "Fissile material" means any plutonium-238, plutonium-239, plutonium-241, uranium-233, uranium-235, or any combination of these radionuclides. Unirradiated natural uranium and depleted uranium, and natural uranium or depleted uranium that has been irradiated in thermal reactors only are not included in this definition. Department jurisdiction extends only to special nuclear material if quantities are not sufficient to form a critical mass as defined in chapter 33-10-01 of this article.

9. "Fissile material package" means a fissile material packaging together with its fissile material contents.

10. "Low specific activity (LSA) material" means radioactive material with limited specific activity that satisfies the descriptions and limits set forth below. Shielding materials surrounding the low specific activity material may not be considered in determining the estimated average specific activity of the package contents. Low specific activity material must be in one of three groups:

    a. Low specific activity-I (LSA-I).

        (1) Ores containing only naturally occurring radionuclides (e.g., uranium, thorium) and uranium or thorium concentrates of such ores; or

        (2) Solid unirradiated natural uranium or depleted uranium or natural thorium or their solid or liquid compounds or mixtures; or

        (3) Radioactive material, other than fissile material, for which the A_2 value is unlimited; or

        (4) Mill tailings, contaminated earth, concrete, rubble, other debris, and activated material in which the radioactive material is essentially uniformly distributed, and the average specific activity does not exceed one millionth of the A_2 per gram.

    b. Low specific activity-II (LSA-II).

(1) Water with tritium concentration up to eight tenths of a terabecquerel per liter [20.0 curies/liter]; or

(2) Material in which the radioactive material is distributed throughout, and the average specific activity does not exceed one ten thousandths of an A_2 per gram for solids and gases, and one hundred thousandths of an A_2 per gram for liquids.

c. Low specific activity-III (LSA-III). Solids (e.g., consolidated wastes, activated materials) in which:

(1) The radioactive material is distributed throughout a solid or a collection of solid objects, or is essentially uniformly distributed in a solid compact binding agent, such as concrete, bitumen, ceramic, etc.;

(2) The radioactive material is relatively insoluble, or it is intrinsically contained in a relatively insoluble material, so that, even under loss of packaging, the loss of radioactive material per package by leaching, when placed in water for seven days, would not exceed one-tenth of an A_2; and

(3) The average specific activity of the solid does not exceed two thousandths of an A_2 per gram.

11. "Maximum normal operating pressure" means the maximum gauge pressure that would develop in the containment system in a period of one year under the heat condition specified in 10 CFR 71.71(c)(1), in the absence of venting, external cooling by an ancillary system, or operational controls during transport.

12. "Normal form radioactive material" means radioactive material which has not been demonstrated to qualify as special form radioactive material.

13. "Optimum interspersed hydrogenous moderation" means the presence of hydrogenous material between packages to such an extent that the maximum nuclear reactivity results.

14. "Rules of the United States department of transportation" means the regulations in 49 CFR parts 100-189.

15. "Specific activity" of a radionuclide means the radioactivity of a radionuclide per unit mass of that nuclide. The specific activity of a material in which the radionuclide is essentially uniformly distributed is the radioactivity per unit mass of the material.

16. "Transport index" means the dimensionless number, rounded up to the first decimal place, placed on the label of a package to designate the degree of control to be exercised by the carrier during transportation. The transport index is determined as follows:

    a. For non-fissile material packages, the number determined by multiplying the maximum radiation level in millisievert (mSv) per hour at one meter [3.3 ft] from the external surface of the package by one hundred (equivalent to the maximum radiation level in millirem per hour at one meter [3.3 ft]) or

    b. For fissile material packages, the number determined by multiplying the maximum radiation level in millisievert per hour at one meter [3.3 ft] from the external surface of the package by one hundred (equivalent to the maximum radiation level in millirem per hour at one meter [3.3 ft]), or, for criticality control purposes, the number obtained as described in 10 CFR 71.59, whichever is larger.

17. "Type A quantity" means a quantity of radioactive material, the aggregate radioactivity of which does not exceed A_1 for special form radioactive material or A_2 for normal form radioactive material, where A_1 and A_2 are given in appendix A of this chapter or may be determined by procedures described in appendix A of this chapter.

18. "Type B package" means a Type B packaging together with its radioactive contents. A Type B package design is designated as B(U) or B(M). B(U) refers to the need for unilateral approval of international shipments; B(M) refers to the need for multilateral approval. There is no distinction made in how packages with these designations may be used in domestic transportation. To determine their distinction for international transportation, refer to 49 CFR part 173. A Type B package approved prior to September 6, 1983 was designated only as Type B. Limitations on its use are specified in section 33-10-13-08.

19. "Type B packaging" means a packaging designed to retain the integrity of containment and shielding when subjected to the normal conditions of transport and hypothetical accident test conditions set forth in 10 CFR part 71.

20. "Type B quantity" means a quantity of radioactive material greater than a Type A quantity.

History: Effective June 1, 1992; amended effective May 1, 1998.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 28-32-02

33-10-13-03. Requirement for license. No individual may transport radioactive material or deliver radioactive material to a carrier for transport except as authorized in a general or specific license issued by the department or as exempted in section 33-10-13-04.

History: Effective June 1, 1992.
General Authority: NDCC 23-20.1-04, 28-32-02
Law Implemented: NDCC 23-20.1-03, 23-20.1-04, 28-32-02

33-10-13-04. Exemptions.

1. Common and contract carriers, freight forwarders, and warehousemen which are subject to the requirements of the United States department of transportation in 49 CFR 170 through 189 or the United States postal service in the postal service manual (Domestic Mail Manual), section 124.3 incorporated by reference, 39 CFR 111.11 (1974), and the United States postal service are exempt from the requirements of this chapter to the extent that they transport or store radioactive material in the regular course of their carriage for others or storage incident thereto. Common and contract carriers who are not subject to the requirements of the United States department of transportation or United States postal service are subject to section 33-10-13-03 and other applicable requirements of this article.

2. Any licensee is exempt from the requirements of this chapter with respect to shipment or carriage of a package containing radioactive material having a specific activity not greater than seventy becquerels per gram [0.002 microcurie per gram].

3. With the exception of sections 33-10-13-05 and 33-10-13-16, a licensee is exempt from all requirements of this chapter, with respect to shipment or carriage of the following packages provided the packages contain no fissile material or meet the fissile material exemption standards in 10 CFR 71.53:

   a. A package containing no more than a Type A quantity of radioactive material;

   b. Packages transported between locations within the United States which contain only americium or plutonium in special form with an aggregate radioactivity not to exceed seven hundred forty gigabecquerels [20 curies].

   c. A package in which the only radioactive material is low specific activity (LSA) material or surface contaminated objects (SCO), provided the external radiation level at three meters from the unshielded material or objects does not exceed ten millisieverts per hour [1 rem/hour]; or

   d. A licensee is exempt from all requirements of this ~~part~~ chapter, other than sections 33-10-13-05 and 33-10-13-16, with respect to shipment or carriage of low specific activity (LSA) material in group LSA-I, or surface contaminated objects (SCOs) in group SCO-I.

History: Effective June 1, 1992; amended effective May 1, 1998.
General Authority: NDCC 23-20.1-04, 28-32-02
Law Implemented: NDCC 23-20.1-04, 28-32-02

33-10-13-05. Transportation of licensed material.

1. Each licensee who transports licensed material outside of the confines of the licensee's plant or other place of use, or who delivers licensed material to a carrier for transport, shall:

   a. Comply with the applicable requirements, appropriate to the mode of transport, of the regulations of the United States department of transportation; and

(1) The licensee shall particularly note United States department of transportation regulations in the following areas:

(a) Packaging--49 CFR part 173: subparts A, and B and I.

(b) Marking and labeling--49 CFR part 172: subparts D and E.

(c) Placarding--49 CFR part 172: subpart F, especially sections 172.500 through 172.519, 172.556, and appendices B and C.

(d) Accident reporting--49 CFR part 171: sections 171.15 and 171.16.

(e) Shipping papers and emergency information--49 CFR part 172: subparts C and G.

(f) Hazardous material employee training--49 CFR part 172: subpart H.

(g) Hazardous material shipper/carrier registration--49 CFR part 107: subpart G.

(h) Radiation protection program--49 CFR part 17~~2~~3: subpart I.

(2) The licensee shall also note United States department of transportation regulations pertaining to the following modes of transportation:

(a) Rail--49 CFR part 174: subparts A through D and K.

(b) Air--49 CFR part 175.

(c) Vessel--49 CFR part 176: subparts A through F and M.

(d) Public highway--49 CFR part 177 and parts 390 through 397.

b. Assure that any special instructions needed to safely open the package are sent to or have been made available to the consignee.

2. If, for any reason, the regulations of the United States department of transportation are not applicable to a shipment of licensed material, the licensee shall conform to the standards and requirements of those regulations to the same extent as if the shipment was subject to the regulations.

History: Effective June 1, 1992; May 1, 1998.
General Authority: NDCC 23-20.1-04, 28-32-02
Law Implemented: NDCC 23-20.1-03, 23-20.1-04, 28-32-02

33-10-13-06. General licenses for carriers.

1. A general license is hereby issued to any common or contract carrier not exempt under section 33-10-13-04 to receive, possess, transport, and store radioactive material in the regular course of their carriage for others or storage incident thereto, provided the transportation and storage is in accordance with the applicable requirements, appropriate to the mode of transport, of the United States department of transportation insofar as such requirements relate to the loading and storage of packages, placarding of the transporting vehicle, and incident reporting. Any notification of incidents referred to in those United States department of transportation requirements must be filed with, or made to, the department.

2. A general license is hereby issued to any private carrier to transport radioactive material, provided the transportation is in accordance with the applicable requirements, appropriate to the mode of transport, of the United States department of transportation insofar as such requirements relate to the loading and storage of packages, placarding of the transporting vehicle, and incident reporting. Any notification of incidents referred to in those United States department of transportation requirements must be filed with, or made to, the department.

3. Individuals who transport radioactive material pursuant to the general licenses in subsection 1 or 2 are exempt from the requirements of chapters 33-10-04.1 and 33-10-10 to the extent that they transport radioactive material.

History: Effective June 1, 1992.
General Authority: NDCC 23-20.1-04, 28-32-02
Law Implemented: NDCC 23-20.1-03, 23-20.1-04, 28-32-02

33-10-13-07. General license - Approved packages.

1. A general license is hereby issued to any licensee of the department to transport, or to deliver to a carrier for transport, licensed material in a package for which a license, certificate of compliance, or other approval has been issued by the United States nuclear regulatory commission.

2. This general license applies only to a licensee who:

   a. Has a copy of the specific license, certificate of compliance, or other approval of the package and has the drawings and other documents referenced in the approval relating to the use and maintenance of the packaging and to the actions to be taken prior to shipment;

   b. Complies with the terms and conditions of the license, certificate, or other approval, as applicable, and the applicable requirements of this chapter;

   c. Prior to the licensee's first use of the package, has registered with the United States nuclear regulatory commission; and

   d. Has a quality assurance program that meets the applicable requirements of 10 CFR 71, subpart H and <u>is</u> approved by the department <u>or the United States nuclear regulatory commission</u>.

3. The general license in subsection 1 applies only when the package approval authorizes use of the package under this general license.

4. For previously approved Type B packages which are not designated as either B(U) or B(M) in the certificate of compliance, this general license is subject to additional restrictions of section 33-10-13-08.

History: Effective June 1, 1992; amended effective May 1, 1998.
General Authority: NDCC 23-20.1-04, 28-32-02
Law Implemented: NDCC 23-20.1-04, 28-32-02

33-10-13-08. General license - Previously approved Type B packages.

1. A Type B package previously approved by the United States nuclear regulatory commission, but not designated as B(U) or B(M) in the certificate of compliance, may be used under the general license of section 33-10-13-07 with the following additional conditions:

   a. Fabrication of the packaging was satisfactorily completed before August 31, 1986, as demonstrated by application of its model number in accordance with United States nuclear regulatory commission regulations; and

   b. A package used for a shipment to a location outside the United States is subject to multilateral approval, as defined in 49 CFR 173.403; and

   c. A serial number that uniquely identifies each packaging which conforms to the approved design is assigned to, and legibly and durably marked on, the outside of each packaging.

2. A Type B(U) package, a Type B(M) package, a low specific activity (LSA) material package or a fissile material package, previously approved by the United States nuclear regulatory commission but without the designation "-85" in the identification number of the United States nuclear regulatory commission certificate of compliance, may be used under the general license of section 33-10-13-07 with the following additional conditions:

   a. Fabrication of the package is satisfactorily completed by April 1, 1999 as demonstrated by application of its model number in accordance with subsection 4 of section 33-10-13-14;

   b. A package used for a shipment to a location outside the United States is subject to multilateral approval as defined in 49 CFR 173.403; and

   c. A serial number that uniquely identifies each packaging which conforms to the approved design is assigned to, and legibly and durably marked on, the outside of each packaging.

History: Effective June 1, 1992; amended effective May 1, 1998.
General Authority: NDCC 23-20.1-04, 28-32-02
Law Implemented: NDCC 23-20.1-04, 28-32-02

33-10-13-09. General license - Specification container.

1. A general license is issued to any licensee of the department to transport, or to deliver to a carrier for transport, licensed material in a specification container for a Type B quantity of radioactive material as specified in 49 CFR parts 173 and 178.

2. This general license applies only to a licensee who has a quality assurance program that meets the applicable requirements of 10 CFR 71, subpart H and is approved by the department or the United States nuclear regulatory commission.

3. This general license applies only to a licensee who:

   a. Has a copy of the specification; and

   b. Complies with the terms and conditions of the specification and the applicable requirements of this chapter.

4. The general license in subsection 1 is subject to the limitation that the specification container may not be used for a shipment to a location outside the United States, except by multilateral approval, as defined in 49 CFR 173.403.

History: Effective June 1, 1992; amended effective May 1, 1998.
General Authority: NDCC 23-20.1-04, 28-32-02
Law Implemented: NDCC 23-20.1-04, 28-32-02

33-10-13-10. General license - use of foreign approved package.

1. A general license is issued to any licensee of the department to transport, or to deliver to a carrier for transport, licensed material in a package the design of which has been approved in a foreign national competent authority certificate which has been revalidated by the United States department of transportation as meeting the applicable requirements of 49 CFR 171.12.

2. This general license applies only to international shipments.

3. Except as otherwise provided in this section, the general license applies only to a licensee who has a quality assurance program that meets the applicable requirements of 10 CFR 71, subpart H and is approved by the department or the United States nuclear regulatory commission.

4. This general license applies only to a licensee who:

   a. Has a copy of the applicable certificate, the revalidation, and the drawings and other documents referenced in the certificate relating to the use and maintenance of the packaging and to the actions to be taken prior to shipment; and

   b. Complies with the terms and conditions of the certificate and revalidation and with the applicable requirements of this chapter. With respect to the quality assurance provisions of 10 CFR 71, subpart H, the licensee is exempt from design, construction and fabrication considerations.

History: Effective June 1, 1992; amended effective May 1, 1998.
General Authority: NDCC 23-20.1-04, 28-32-02
Law Implemented: NDCC 23-20.1-04, 28-32-02

33-10-13-11. General license - fissile material, limited quantity per package.

1. A general license is hereby issued to any licensee to transport fissile material, or to deliver fissile material to a carrier for transport, if the material is shipped in accordance with this section.

2. This general license applies only to a licensee who has a quality assurance program that meets the applicable requirements of 10 CFR 71, subpart H and is approved by the department or the United States nuclear regulatory commission.

3. This general license applies only when a package contains no more than a Type A quantity of radioactive material, including only one of the following:

   a. Up to forty grams of uranium-235;

   b. Up to thirty grams of uranium-233;

   c. Up to twenty-five grams of the fissile radionuclides of plutonium, except that for encapsulated plutonium-beryllium neutron sources in special form, an A_1 quantity of plutonium may be present; or

d. A combination of fissile radionuclides in which the sum of the ratios of the amount of each radionuclide to the corresponding maximum amounts in subdivisions a, b and c of this subsection does not exceed unity.

4. a. Except as specified in subdivision b of this subsection this general license applies only when a package containing more than fifteen grams of fissile radionuclides is labeled with a transport index not less than the number given by the following equation:

$$\text{Minimum Transport Index} = (0.4x + 0.67y + z)\left(1 - \frac{15}{x+y+z}\right)$$

where the package contains x grams of uranium-235, y grams of uranium-233, and z grams of the fissile radionuclides of plutonium.

b. For a package in which the only fissile material is in the form of encapsulated plutonium-beryllium neutron sources in special form, the transport index based on criticality considerations may be taken as 0.026 times the number of grams of the fissile radionuclides of plutonium in excess of fifteen grams.

c. In all cases, the transport index must be rounded up to one decimal place and may not exceed ten.

History: Effective June 1, 1992; amended effective May 1, 1998.
General Authority: NDCC 23-20.1-04, 28-32-02
Law Implemented: NDCC 23-20.1-04, 28-32-02

33-10-13-12. General license - fissile material, limited moderator per package.

1. A general license is issued to any licensee to transport fissile material, or to deliver fissile material to a carrier for transport, if the material is shipped in accordance with this section.

2. This general license applies only to a licensee who has a quality assurance program that meets the applicable requirements of 10 CFR 71, subpart H and is approved by the department or the United States nuclear regulatory commission.

3. This general license applies only when all of the following requirements are met.

a. The package contains no more than a Type A quantity of radioactive material.

b. Neither beryllium nor hydrogenous material enriched in deuterium is present.

c. The total mass of graphite present does not exceed seven and seven tenths times the total mass of uranium-235 plus plutonium.

d. Substances having a higher hydrogen density than water are not present, except that polyethylene may be used for packing or wrapping.

e. Uranium-233 is not present, and the amount of plutonium does not exceed one percent of the amount of uranium-235.

f. The amount of uranium-235 is limited as follows:

(1) If the fissile radionuclides are not uniformly distributed, the maximum amount of uranium-235 per package may not exceed the value given in the following table:

Table 1

Uranium enrichment in weight percent of uranium-235 not exceeding	Permissible maximum grams of uranium-235 per package
24	40
20	42
15	45
11	48
10	51
9.5	52
9	54
8.5	55
8	57
7.5	59
7	60
6.5	62
6	65
5.5	68
5	72
4.5	76

4	80
3.5	88
3	100
2.5	120
2	164
1.5	272
1.35	320
1	680*
0.92	1200*

*Pursuant to the department's agreement with the United States nuclear regulatory commission, jurisdiction extends only to three hundred fifty grams of uranium-235.

(2) If the fissile radionuclides are distributed uniformly, the maximum amount of uranium-235 per package may not exceed the value given in the following table:

Table 2

Uranium enrichment in weight percent of uranium-235 not exceeding	Permissible maximum grams of uranium-235 per package
4	84
3.5	92
3	112
2.5	148
2	240
1.5	560*
1.35	800*

*Pursuant to the department's agreement with the United States nuclear regulatory commission, jurisdiction extends only to three hundred fifty grams of uranium-235.

g. The transport index of each package based on criticality considerations is taken as ten times the number of grams of uranium-235 in the package divided by the maximum allowable number of grams per package in accordance with table 1 or 2 above as applicable.

History: Effective June 1, 1992; effective amended May 1, 1998.
General Authority: NDCC 23-20.1-04, 28-32-02
Law Implemented: NDCC 23-20.1-04, 28-32-02

33-10-13-13. Fissile material - Assumptions as to unknown properties. When the isotopic abundance, mass, concentration, degree of irradiation, degree of moderation, or other pertinent property of fissile material in any package is not known, the licensee shall package the fissile material as if the unknown properties had credible values that would cause the maximum nuclear reactivity.

History: Effective June 1, 1992.
General Authority: NDCC 23-20.1-04, 28-32-02
Law Implemented: NDCC 23-20.1-03, 23-20.1-04, 28-32-02

33-10-13-14. Preliminary determinations. Prior to the first use of any packaging for the shipment of radioactive material:

1. The licensee shall ascertain that there are no defects which could significantly reduce the effectiveness of the packaging;

2. Where the maximum normal operating pressure will exceed thirty-five kilopascal (5 psi) gauge, the licensee shall test the containment system at an internal pressure at least fifty percent higher than the maximum normal operating pressure to verify the capability of that system to maintain its structural integrity at that pressure;

3. The licensee shall determine that the packaging has been fabricated in accordance with the design approved by the United States nuclear regulatory commission; and

4. The licensee shall conspicuously and durably mark the packaging with its model number, gross weight, and a package identification number assigned by the United States nuclear regulatory commission.

History: Effective June 1, 1992; amended effective May 1, 1998.
General Authority: NDCC 23-20.1-04, 28-32-02
Law Implemented: NDCC 23-20.1-03, 23-20.1-04, 28-32-02

33-10-13-15. Routine determinations. Prior to each shipment of licensed material, the licensee shall determine that:

1. The package is proper for the contents to be shipped;

2. The package is in unimpaired physical condition except for superficial defects such as marks or dents;

3. Each closure device of the packaging, including any required gasket, is properly installed and secured and free of defects;

4. Any system for containing liquid is adequately sealed and has adequate space or other specified provision for expansion of the liquid;

5. Any pressure relief device is operable and set in accordance with written procedures;

6. The package has been loaded and closed in accordance with written procedures;

7. Any structural part of the package which could be used to lift or tie down the package during transport is rendered inoperable for that purpose unless it satisfies design requirements specified by the United States nuclear regulatory commission;

8. The level of removable radioactive contamination on the external surfaces of each package offered for shipment is as low as reasonably achievable, and within the limits specified in 49 CFR 173.443.

9. External radiation levels around the package and around the vehicle, if applicable, will not exceed two millisieverts per hour [200 millirems per hour] at any point on the external surface of the package at any time during transportation. The transport index may not exceed ten;

10. For a package transported in exclusive use by rail, highway, or water, radiation levels external to the package may exceed the limits specified in subsection 9 but may not exceed any of the following:

    a. Two ~~hundred millirems~~ millisieverts per hour [200 millirem per hour] on the accessible external surface of the package unless the following conditions are met, in which case the limit is ten millisieverts per hour [1000 <u>millirem</u> per hour];

        (1) The shipment is made in a closed transport vehicle;

        (2) Provisions are made to secure the package so that its position within the vehicle remains fixed during transportation; and

(3) There are no loading or unloading operations between the beginning and end of the transportation;

b. Two millisieverts per hour [200 millirems per hour] at any point on the outer surface of the vehicle, including the upper and lower surfaces, or, in the case of a flatbed style vehicle, with a personnel barrier at any point on the vertical planes projected from the outer edges of the vehicle, on the upper surface of the load [or enclosure, if used], and on the lower external surface of the vehicle. If no personnel barrier, the package cannot exceed 2 millisieverts per hour [200 millirems per hour] at the surface;

c. One-tenth millisievert per hour [10 millirems per hour] at any point two meters from the vertical planes represented by the outer lateral surfaces of the vehicle, or, in the case of a flat-bed style vehicle, at any point two meters from the vertical planes projected from the outer edges of the vehicle; and

d. Two hundredths millisieverts per hour [2 millirems per hour] in any normally occupied positions of the vehicle, except that this provision does not apply to private motor carriers when individuals occupying these positions are provided with special health supervision, personnel radiation exposure monitoring devices, and training in accordance with subsection 2 of section 33-10-10-02 of this article;

11. For shipments made under the provisions of subsection 10, the shipper shall provide specific written instructions to the carrier for maintenance of the exclusive use shipment controls. The instructions must be included with the shipping paper information;

12. The written instructions required for exclusive use shipments must be sufficient so that, when followed, they will cause the carrier to avoid actions that will unnecessarily delay delivery or unnecessarily result in increased radiation levels or radiation exposures to transport workers or members of the general public; and

13. A package must be prepared for transport so that in still air at thirty-eight degrees Celsius [100 degrees Fahrenheit] and in the shade, no accessible surface of a package would have a temperature exceeding fifty degrees

Celsius [122 degrees Fahrenheit] in a nonexclusive use shipment or eighty-two degrees Celsius [180 degrees Fahrenheit] in an exclusive use shipment. Accessible package surface temperatures may not exceed these limits at any time during transportation.

History: Effective June 1, 1992; amended effective July 1, 1995; May 1, 1998.
General Authority: NDCC 23-20.1-04, 28-32-02
Law Implemented: NDCC 23-20.1-04, 28-32-02

33-10-13-16. Air transport of plutonium.

1. Notwithstanding the provisions of any general licenses and notwithstanding any exemptions stated directly in this chapter or included indirectly by citation of the United States department of transportation regulations, as may be applicable, the licensee shall assure that plutonium in any form is not transported by air, or delivered to a carrier for air transport, unless:

   a. The plutonium is contained in a medical device designed for individual human application;

   b. The plutonium is contained in a material in which the specific activity is not greater than seventy becquerels per gram [0.002 microcuries per gram] of material and in which the radioactivity is essentially uniformly distributed;

   c. The plutonium is shipped in a single package containing no more than an A_2 quantity of plutonium in any isotope or form and is shipped in accordance with section 33-10-13-05; or

   d. The plutonium is shipped in a package specifically authorized for the shipment of plutonium by air in the Certificate of Compliance for that package issued by the United States nuclear regulatory commission.

2. Nothing in subsection 1 is to be interpreted as removing or diminishing the requirements of section 33-10-13-11.

3. For a shipment of plutonium by air which is subject to subdivision d of subsection 1, the licensee shall, through special arrangement with the carrier, require compliance with 49 CFR 175.704, as applicable to the air transport of plutonium.

History: Effective June 1, 1992; amended effective May 1, 1998.
General Authority: NDCC 23-20.1-04, 28-32-02
Law Implemented: NDCC 23-20.1-04, 28-32-02

33-10-13-17. Shipment records. Each licensee shall maintain for a period of two years after shipment a record of each shipment of licensed material not exempt under section 33-10-13-04, showing, where applicable:

1. Identification of the packaging by model number;
2. Verification that there were no significant defects in the packaging, as shipped;
3. Volume and identification of coolant;
4. Type and quantity of licensed material in each package, and the total quantity of each shipment;
5. Date of the shipment;
6. Name and address of the transferee;
7. Address to which the shipment was made; and
8. Results of the determinations required by section 33-10-13-15.

History: Effective June 1, 1992.
General Authority: NDCC 23-20.1-04, 28-32-02
Law Implemented: NDCC 23-20.1-03, 23-20.1-04, 28-32-02

33-10-13-18. Reports. The licensee shall report to the department within thirty days:

1. Any instance in which there is significant reduction in the effectiveness of any authorized packaging during use; and
2. Details of any defects with safety significance in the packaging after first use, with the means employed to repair the defects and prevent their recurrence.
3. Instances in which the conditions of approval in the certificate of compliance were not observed in making a shipment.

History: Effective June 1, 1992; amended effective May 1, 1998.

General Authority: NDCC 23-20.1-04, 28-32-02
Law Implemented: NDCC 23-20.1-03, 23-20.1-04, 28-32-02

33-10-13-19. Advance notification of transport of irradiated reactor fuel and nuclear waste.

1. Prior to the transport of any irradiated reactor fuel or nuclear waste outside of the confines of the licensee's facility or other place of use or storage, or prior to the delivery of any irradiated reactor fuel or nuclear waste to a carrier for transport, each licensee shall provide advance notification of such transport to the governor, or governor's designee, of each state through which the irradiated reactor fuel or nuclear waste will be transported. A list of the mailing addresses of the governors and governors' designees is available upon request from the director, office of state and tribal programs, office of governmental and public affairs, United States nuclear regulatory commission, Washington, D.C. 20555-0001.

2. Advance notification is required only when:

   a. The irradiated reactor fuel or nuclear waste is required to be in Type B packaging for transportation;

   b. The irradiated reactor fuel or nuclear waste is being transported to, through, or across state boundaries to a disposal site or to a collection point for transport to a disposal site; and

   c. The quantity of licensed material in a single package exceeds any of the following:

      (1) Three thousand times the A_1 value of the radionuclides as specified in appendix A, for special form radioactive material;

      (2) Three thousand times the A_2 value of the radionuclides as specified in appendix A, for normal form radioactive material; or

      (3) One thousand terabecquerels [27,000 curie].

3. Procedures for submitting advance notification.

   a. The notification must be made in writing to the office of each appropriate governor or governor's designee and to the department.

b. A notification delivered by mail must be postmarked at least seven days before the beginning of the seven-day period during which departure of the shipment is estimated to occur.

c. A notification delivered by messenger must reach the office of the governor or of the governor's designee at least four days before the beginning of the seven-day period during which departure of the shipment is estimated to occur.

d. The licensee shall retain a copy of the notification as a record for three years.

4. Information to be furnished in advance notification of shipment. Each advance notification of shipment of irradiated reactor fuel or nuclear waste must contain the following information:

a. The name, address, and telephone number of the shipper, carrier, and receiver of the irradiated reactor fuel or nuclear waste shipment;

b. A description of the irradiated reactor fuel or nuclear waste contained in the shipment, as specified in 49 CFR 172.202 and 172.203(d);

c. The point of origin of the shipment and the seven-day period during which departure of the shipment is estimated to occur;

d. The seven-day period during which arrival of the shipment at state boundaries is estimated to occur;

e. The destination of the shipment, and the seven-day period during which arrival of the shipment is estimated to occur; and

f. A point of contact, with a telephone number, for current shipment information.

5. Revision notice. A licensee who finds that schedule information previously furnished to a governor or governor's designee, in accordance with this section, will not be met, shall telephone a responsible individual in the office of the governor of the state or of the governor's designee and inform that individual of the extent of the delay beyond the schedule originally reported. The licensee shall maintain a record of the name of the individual contacted for three years.

6. Cancellation notice.

   a. Each licensee who cancels an irradiated reactor fuel or nuclear waste shipment for which advance notification has been sent shall send a cancellation notice to the governor of each state or to the governor's designee previously notified.

   b. The licensee shall state in the notice that it is a cancellation and identify the advance notification that is being canceled. The licensee shall retain a copy of the notice as a record for three years.

History: Effective June 1, 1992; amended effective May 1, 1998.
General Authority: NDCC 23-20.1-04, 28-32-02
Law Implemented: NDCC 23-20.1-03, 23-20.1-04, 28-32-02

33-10-13-20. Quality assurance requirements. - Repealed effective May 1, 1998.

History: Effective June 1, 1992.
General Authority: NDCC 23-20.1-04, 28-32-02
Law Implemented: NDCC 23-20.1-03, 23-20.1-04, 28-32-02

33-10-13-21. Completeness and accuracy of information.

1. Information provided to the department by an applicant for a license, or by a licensee, or information required by statute or by article 33-10, orders, or license conditions to be maintained by the applicant or the licensee must be complete and accurate in all material respects.

2. Each applicant or licensee shall notify the department of information identified by the applicant or licensee as having, for the regulated activity, a significant implication for public health and safety or common defense and security. An applicant or licensee violates this requirement only if the applicant or licensee fails to notify the department of information that the applicant or licensee has identified as having a significant implication for public health and safety or common defense and security. Notification must be provided to the department within two working days of identifying the information. This requirement is not applicable to information that is already required to be provided to the department by other reporting or updating requirements.

33-10-13-22. Deliberate misconduct.

1. This section applies to any--

   a. Licensee;

   b. Certificate holder;

   c. Quality assurance program approval holder;

   d. Applicant for a license, certificate, or quality assurance program approval;

   e. Contractor (including a supplier or consultant) or subcontractor, to any person identified in subdivisions a through d of this subsection; or

   f. Employee of any person identified in subdivisions a through e of this subsection.

2. A person identified in subsection 1 of this section who knowingly provides to any entity, listed in subdivisions a through f of subsection 1 of this section any components, materials, or other goods or services that relate to a licensee's, certificate holder's, quality assurance program approval holder's or applicant's activities subject to article 33-10 may not:

   a. Engage in deliberate misconduct that causes or would have caused, if not detected, a licensee, certificate holder, quality assurance program approval holder, or any applicant to be in violation of any rule, regulation, or order; or any term, condition, or limitation of any license, certificate or approval issued by the department; or

   b. Deliberately submit to the department, a licensee, a certificate holder, quality assurance program approval holder, an applicant for a license, certificate or quality assurance program approval, or a licensee's, applicant's, certificate holder's or quality assurance program approval holder's contractor or subcontractor, information that the person submitting the information knows to be incomplete or inaccurate in some respect material to the department.

3. A person who violates subsection 2 of this section may be subject to enforcement action.

4. For the purposes of subdivision a of subsection 2 of this section, deliberate misconduct by a person means an intentional act or omission that the person knows:

   a. Would cause a licensee, certificate holder, quality assurance program approval holder or applicant for a license, certificate, or quality assurance program approval to be in violation of any rule, regulation, or order; or any term, condition, or limitation, of any license or certificate issued by the department; or

   b. Constitutes a violation of a requirement, procedure, instruction, contract, purchase order, or policy of a licensee, certificate holder, quality assurance program approval holder, applicant, or the contractor or subcontractor of any of them.

APPENDIX A

DETERMINATION OF A_1 AND A_2

1. Values of A_1 and A_2 for individual radionuclides, which are the bases for many activity limits elsewhere in these rules are given in Table I. The curie (Ci) values specified are obtained by converting from the Terabecquerel (TBq) figure. The curie values are expressed to three significant figures to assure that the difference in the TBq and Ci quantities is one tenth of one percent or less. Where values of A_1 or A_2 are unlimited, it is for radiation control purposes only. For nuclear criticality safety, some materials are subject to controls placed on fissile material.

2. For individual radionuclides whose identities are known, but which are not listed in Table I, the determination of the values of A_1 and A_2 requires department approval, except that the values of A_1 and A_2 in Table II may be used without obtaining department approval.

3. In the calculations of A_1 and A_2 for a radionuclide not in Table I, a single radioactive decay chain, in which radionuclides are present in their naturally occurring proportions, and in which no daughter nuclide has a half-life either longer than 10 days, or longer than that of the parent nuclide, shall be considered as a single radionuclide, and the activity to be taken into account, and the A_1 or A_2 value to be applied shall be those corresponding to the parent nuclide of that chain. In the case of radioactive decay chains in which any daughter nuclide has a half-life either longer than 10 days, or greater than that of the parent nuclide, the parent and those daughter nuclides shall be considered as mixtures of different nuclides.

4. For mixtures of radionuclides whose identities and respective activities are known, the following conditions apply:

   a. For special form radioactive material, the maximum quantity transported in a Type A package:

$$\sum_I \frac{B(i)}{A_1(i)} \leq 1$$

   Where B(i) is the activity of radionuclide I and $A_1(i)$ is the A_1 value for radionuclide I.

b. For normal form radioactive material, the maximum quantity transported in a Type A package:

$$\sum_{I} \frac{B(i)}{A_2(i)} \leq 1$$

Where B(i) is the activity of radionuclide I and $A_2(i)$ is the A_2 value for radionuclide I.

c. An A_1 value for mixtures of special form material may be determined as follows:

$$A_1 \text{ for mixture} = \frac{1}{\sum_{I} \frac{f(i)}{A_1(i)}}$$

Where f(i) is the fraction of activity of nuclide I in the mixture and $A_1(i)$ is the appropriate A_1 value for nuclide I.

d. An A_2 value for mixtures of normal form material may be determined as follows:

$$A_2 \text{ for mixture} = \frac{1}{\sum_{I} \frac{f(i)}{A_2(i)}}$$

Where f(i) is the fraction of activity of nuclide I in the mixture and $A_2(i)$ is the appropriate A_2 value for nuclide I.

5. When the identity of each radionuclide is known, but the individual activities of some of the radionuclides are not known, the radionuclides may be grouped and the lowest A_1 or A_2 value, as appropriate, for the radionuclides in each group may be used in applying the formulas in subsection 4. Groups may be based on the total alpha activity and the total beta/gamma activity when these are known, using the lowest A_1 or A_2 values for the alpha emitters and beta/gamma emitters.

History: Effective June 1, 1992; amended effective May 1, 1998.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 28-32-02

TABLE I
A_1 and A_2 Values for Radionuclides
(See Footnotes at end of Table)

Symbol of Radionuclide	Element and Atomic Number	A_1(TBq)	A_1(Ci)	A_2(TBq)	A_2(Ci)	Specific Activity (TBq/g)	Specific Activity (Ci/g)
Ac-225	Actinium(89)	0.6	16.2	1E-2	0.270	2.1E3	5.8E4
Ac-227		40	1080	2E-5	5.41E-4	2.7	7.2E1
Ac-228		0.6	16.2	0.4	10.8	8.4E4	2.2E6
Ag-105	Silver(47)	2	54.1	2	54.1	1.1E3	3.0E4
Ag-108m		0.6	16.2	0.6	16.2	9.7E-1	2.6E1
Ag-110m		0.4	10.8	0.4	10.8	1.8E2	4.7E3
Ag-111		0.6	16.2	0.5	13.5	5.8E3	1.6E5
Al-26	Aluminum(13)	0.4	10.8	0.4	10.8	7.0E-4	1.9E-2
Am-241	Americium(95)	2	54.1	2E-4	5.41E-3	1.3E-1	3.4
Am-242m		2	54.1	2E-4	5.41E-3	3.6E-1	1.0E1
Am-243		2	54.1	2E-4	5.41E-3	7.4E-3	2.0E-1
Ar-37	Argon(18)	40	1080	40	1080	3.7E3	9.9E4
Ar-39		20	541	20	541	1.3	3.4E1
Ar-41		0.6	16.2	0.6	16.2	1.5E6	4.2E7
Ar-42		0.2	5.41	0.2	5.41	9.6	2.6E2
As-72	Arsenic(33)	0.2	5.41	0.2	5.41	6.2E4	1.7E6
As-73		40	1080	40	1080	8.2E2	2.2E4
As-74		1	27.0	0.5	13.5	3.7E3	9.9E4
As-76		0.2	5.41	0.2	5.41	5.8E4	1.6E6
As-77		20	541	0.5	13.5	3.9E4	1.0E6
At-211	Astatine(85)	30	811	2	54.1	7.6E4	2.1E6
Au-193	Gold(79)	6	162	6	162	3.4E4	9.2E5
Au-194		1	27.0	1	27.0	1.5E4	4.1E5
Au-195		10	270	10	270	1.4E2	3.7E3
Au-196		2	54.1	2	54.1	4.0E3	1.1E5
Au-198		3	81.1	0.5	13.5	9.0E3	2.4E5
Au-199		10	270	0.9	24.3	7.7E3	2.1E5
Ba-131	Barium(56)	2	54.1	2	54.1	3.1E3	8.4E4
Ba-133m		10	270	0.9	24.3	2.2E4	6.1E5
Ba-133		3	81.1	3	81.1	9.4	2.6E2
Ba-140		0.4	10.8	0.4	10.8	2.7E3	7.3E4
Be-7	Beryllium(4)	20	541	20	541	1.3E4	3.5E5

Symbol of Radionuclide	Element and Atomic Number	A_1(TBq)	A_1(Ci)	A_2(TBq)	A_2(Ci)	Specific Activity (TBq/g)	Specific Activity (Ci/g)
Be-10		20	541	0.5	13.5	8.3E-4	2.2E-2
Bi-205	Bismuth(83)	0.6	16.2	0.6	16.2	1.5E-3	4.2E4
Bi-206		0.3	8.11	0.3	8.11	3.8E3	1.0E5
Bi-207		0.7	18.9	0.7	18.9	1.9	5.2E1
Bi-210m		0.3	8.11	3E-2	0.811	2.1E-5	5.7E-4
Bi-210		0.6	16.2	0.5	13.5	4.6E3	1.2E5
Bi-212		0.3	8.11	0.3	8.11	5.4E5	1.5E7
Bk-247	Berkelium(97)	2	54.1	2E-4	5.41E-3	3.8E-2	1.0
Bk-249		40	1080	8E-2	2.16	6.1E1	1.6E3
Br-76	(Bromine)(35)	0.3	8.11	0.3	8.11	9.4E4	2.5E6
Br-77		3	81.1	3	81.1	2.6E4	7.1E5
Br-82		0.4	10.8	0.4	10.8	4.0E4	1.1E6
C-11	Carbon(6)	1	27.0	0.5	13.5	3.1E7	8.4E8
C-14		40	1080	2	54.1	1.6E-1	4.5
Ca-41	Calcium(20)	40	1080	40	1080	3.1E-3	8.5E-2
Ca-45		40	1080	0.9	24.3	6.6E2	1.8E4
Ca-47		0.9	24.3	0.5	13.5	2.3E4	6.1E5
Cd-109	Cadmium(48)	40	1080	1	27.0	9.6E1	2.6E3
Cd-113m		20	541	9E-2	2.43	8.3	2.2E2
Cd-115m		0.3	8.11	0.3	8.11	9.4E2	2.5E4
Cd-115		4	108	0.5	13.5	1.9E4	5.1E5
Ce-139	Cerium(58)	6	162	6	162	2.5E2	6.8E3
Ce-141		10	270	0.5	13.5	1.1E3	2.8E4
Ce-143		0.6	16.2	0.5	13.5	2.5E4	6.6E5
Ce-144		0.2	5.41	0.2	5.41	1.2E2	3.2E3
Cf-248	Californium(98)	30	811	3E-3	8.11E-2	5.8E1	1.6E3
Cf-249		2	54.1	2E-4	5.41E-3	1.5E-1	4.1
Cf-250		5	135	5E-4	1.35E-2	4.0	1.1E2
Cf-251		2	54.1	2E-4	5.41E-3	5.9E-2	1.6
Cf-252		0.1	2.70	1E-3	2.70E-2	2.0E1	5.4E2
Cf-253		40	1080	6E-2	1.62	1.1E3	2.9E4
Cf-254		3E-3	8.11E-2	6E-4	1.62E-2	3.1E2	8.5E3
Cl-36	Chlorine(17)	20	541	0.5	13.5	1.2E-3	3.3E-2
Cl-38		0.2	5.41	0.2	5.41	4.9E6	1.3E8
Cm-240	Curium(96)	40	1080	2E-2	0.541	7.5E2	2.0E4

Symbol of Radionuclide	Element and Atomic Number	A_1(TBq)	A_1(Ci)	A_2(TBq)	A_2(Ci)	Specific Activity (TBq/g)	Specific Activity (Ci/g)
Cm-241		2	54.1	0.9	24.3	6.1E2	1.7E4
Cm-242		40	1080	1E-2	0.270	1.2E2	3.3E3
Cm-243		3	81.1	3E-4	8.11E-3	1.9	5.2E1
Cm-244		4	108	4E-4	1.08E-2	3.0	8.1E1
Cm-245		2	54.1	2E-4	5.41E-3	6.4E-3	1.7E-1
Cm-246		2	54.1	2E-4	5.41E-3	1.1E-2	3.1E-1
Cm-247		2	54.1	2E-4	5.41E-3	3.4E-6	9.3E-5
Cm-248		4E-2	1.08	5E-5	1.35E-3	1.6E-4	4.2E-3
Co-55	Cobalt(27)	0.5	13.5	0.5	13.5	1.1E5	3.1E6
Co-56		0.3	8.11	0.3	8.11	1.1E3	3.0E4
Co-57		8	216	8	216	3.1E2	8.4E3
Co-58m		40	1080	40	1080	2.2E5	5.9E6
Co-58		1	27.0	1	27.0	1.2E3	3.2E4
Co-60		0.4	10.8	0.4	10.8	4.2E1	1.1E3
Cr-51	Chromium(24)	30	811	30	811	3.4E3	9.2E4
Cs-129	Cesium(55)	4	108	4	108	2.8E4	7.6E5
Cs-131		40	1080	40	1080	3.8E3	1.0E5
Cs-132		1	27.0	1	27.0	5.7E3	1.5E5
Cs-134m		40	1080	9	243	3.0E5	8.0E6
Cs-134		0.6	16.2	0.5	13.5	4.8E1	1.3E3
Cs-135		40	1080	0.9	24.3	4.3E-5	1.2E-3
Cs-136		0.5	13.5	0.5	13.5	2.7E3	7.3E4
Cs-137		2	54.1	0.5	13.5	3.2	8.7E1
Cu-64	Copper(29)	5	135	0.9	24.3	1.4E5	3.9E6
Cu-67		9	243	0.9	24.3	2.8E4	7.6E5
Dy-159	Dysprosium(66)	20	541	20	541	2.1E2	5.7E3
Dy-165		0.6	16.2	0.5	13.5	3.0E5	8.2E6
Dy-166		0.3	8.11	0.3	8.11	8.6E3	2.3E5
Er-169	Erbium(68)	40	1080	0.9	24.3	3.1E3	8.3E4
Er-171		0.6	16.2	0.5	13.5	9.0E4	2.4E6
Es-253	Einsteinium(99)*	200	5400	2E-2	5.41E-1		
Es-254		30	811	3E-3	8.11E-2		
Es-254m		0.6	16.2	0.4	10.8		
Es-255							
Eu-147	Europium(63)	2	54.1	2	54.1	1.4E3	3.7E4

Symbol of Radionuclide	Element and Atomic Number	A_1(TBq)	A_1(Ci)	A_2(TBq)	A_2(Ci)	Specific Activity (TBq/g)	Specific Activity (Ci/g)
Eu-148		0.5	13.5	0.5	13.5	6.0E2	1.6E4
Eu-149		20	541	20	541	3.5E2	9.4E3
Eu-150		0.7	18.9	0.7	18.9	6.1E4	1.6E6
Eu-152m		0.6	16.2	0.5	13.5	8.2E4	2.2E6
Eu-152		0.9	24.3	0.9	24.3	6.5	1.8E2
Eu-154		0.8	21.6	0.5	13.5	9.8	2.6E2
Eu-155		20	541	2	54.1	1.8E1	4.9E2
Eu-156		0.6	16.2	0.5	13.5	2.0E3	5.5E4
F-18	Fluorine(9)	1	27.0	0.5	13.5	3.5E6	9.5E7
Fe-52	Iron(26)	0.2	5.41	0.2	5.41	2.7E5	7.3E6
Fe-55		40	1080	40	1080	8.8E1	2.4E3
Fe-59		0.8	21.6	0.8	21.6	1.8E3	5.0E4
Fe-60		40	1080	0.2	5.41	7.4E-4	2.0E-2
Fm-255	Fermium(100)**	40	1080	0.8	21.6		
Fm-257		10	270	8E-3	2.16E-1		
Ga-67	Gallium(31)	6	162	6	162	2.2E4	6.0E5
Ga-68		0.3	8.11	0.3	8.11	1.5E6	4.1E7
Ga-72		0.4	10.8	0.4	10.8	1.1E5	3.1E6
Gd-146	Gadolinium(64)	0.4	10.8	0.4	10.8	6.9E2	1.9E4
Gd-148		3	81.1	3E-4	8.11E-3	1.2	3.2E1
Gd-153		10	270	5	135	1.3E2	3.5E3
Gd-159		4	108	0.5	13.5	3.9E4	1.1E6
Ge-68	Germanium(32)	0.3	8.11	0.3	8.11	2.6E2	7.1E3
Ge-71		40	1080	40	1080	5.8E3	1.6E5
Ge-77		0.3	8.11	0.3	8.11	1.3E5	3.6E6
H-3	Hydrogen(1)	See T-Tritium					
Hf-172	Hafnium(72)	0.5	13.5	0.3	8.11	4.1E1	1.1E3
Hf-175		3	81.1	3	81.1	3.9E2	1.1E4
Hf-181		2	54.1	0.9	24.3	6.3E2	1.7E4
Hf-182		4	108	3E-2	0.811	8.1E-6	2.2E-4
Hg-194	Mercury(80)	1	27.0	1	27.0	1.3E-1	3.5
Hg-195m		5	135	5	135	1.5E4	4.0E5
Hg-197m		10	270	0.9	24.3	2.5E4	6.7E5
Hg-197		10	270	10	270	9.2E3	2.5E5
Hg-203		4	108	0.9	24.3	5.1E2	1.4E4

Symbol of Radionuclide	Element and Atomic Number	A_1(TBq)	A_1(Ci)	A_2(TBq)	A_2(Ci)	Specific Activity (TBq/g)	Specific Activity (Ci/g)
Ho-163	Holmium(67)	40	1080	40	1080	2.7	7.6E1
Ho-166m		0.6	16.2	0.3	8.11	6.6E-2	1.8
Ho-166		0.3	8.11	0.3	8.11	2.6E4	7.0E5
I-123	Iodine(53)	6	162	6	162	7.1E4	1.9E6
I-124		0.9	24.3	0.9	24.3	9.3E3	2.5E5
I-125		20	541	2	54.1	6.4E2	1.7E4
I-126		2	54.1	0.9	24.3	2.9E3	8.0E4
I-129		Unlimited	Unlimited	Unlimited	Unlimited	6.5E-6	1.8E-4
I-131		3	81.1	0.5	13.5	4.6E3	1.2E5
I-132		0.4	10.8	0.4	10.8	3.8E5	1.0E7
I-133		0.6	16.2	0.5	13.5	4.2E4	1.1E6
I-134		0.3	8.11	0.3	8.11	9.9E5	2.7E7
I-135		0.6	16.2	0.5	13.5	1.3E5	3.5E6
In-111	Indium(49)	2	54.1	2	54.1	1.5E4	4.2E5
In-113m		4	108	4	108	6.2E5	1.7E7
In-114m		0.3	8.11	0.3	8.11	8.6E2	2.3E4
In-115m		6	162	0.9	24.3	2.2E5	6.1E6
Ir-189	Iridium(77)	10	270	10	270	1.9E3	5.2E4
Ir-190		0.7	18.9	0.7	18.9	2.3E3	6.2E4
Ir-192		1	27.0	0.5	13.5	3.4E2	9.2E3
Ir-193m		10	270	10	270	2.4E3	6.4E4
Ir-194		0.2	5.41	0.2	5.41	3.1E4	8.4E5
K-40	Potassium(19)	0.6	16.2	0.6	16.2	2.4E-7	6.4E-6
K-42		0.2	5.41	0.2	5.41	2.2E5	6.0E6
K-43		1.0	27.0	0.5	13.5	1.2E5	3.3E6
Kr-81	Krypton(36)	40	1080	40	1080	7.8E-4	2.1E-2
Kr-85m		6	162	6	162	3.0E5	8.2E6
Kr-85		20	541	10	270	1.5E1	3.9E2
Kr-87		0.2	5.41	0.2	5.41	1.0E6	2.8E7
La-137	Lanthanum(57)	40	1080	2	54.1	1.6E-3	4.4E-2
La-140		0.4	10.8	0.4	10.8	2.1E4	5.6E5
Lu-172	Lutetium(71)	0.5	13.5	0.5	13.5	4.2E3	1.1E5
Lu-173		8	216	8	216	5.6E1	1.5E3
Lu-174m		20	541	8	216	2.0E2	5.3E3
Lu-174		8	216	4	108	2.3E1	6.2E2

Symbol of Radionuclide	Element and Atomic Number	A_1(TBq)	A_1(Ci)	A_2(TBq)	A_2(Ci)	Specific Activity (TBq/g)	Specific Activity (Ci/g)
Lu-177		30	811	0.9	24.3	4.1E3	1.1E5
MFP	For mixed fission products, use formula for mixtures or Table II						
Mg-28	Magnesium(12)	0.2	5.41	0.2	5.41	2.0E5	5.4E6
Mn-52	Manganese(25)	0.3	8.11	0.3	8.11	1.6E4	4.4E5
Mn-53		Unlimited	Unlimited	Unlimited	Unlimited	6.8E-5	1.8E-3
Mn-54		1	27.0	1	27.0	2.9E2	7.7E3
Mn-56		0.2	5.41	0.2	5.41	8.0E5	2.2E7
Mo-93	Molybdenum(42)	40	1080	7	189	4.1E-2	1.1
Mo-99		0.6	16.2	0.5	13.5***	1.8E4	4.8E5
N-13	Nitrogen(7)	0.6	16.2	0.5	13.5	5.4E7	1.5E9
Na-22	Sodium(11)	0.5	13.5	0.5	13.5	2.3E2	6.3E3
Na-24		0.2	5.41	0.2	5.41	3.2E5	8.7E6
Nb-92m	Niobium(41)	0.7	18.9	0.7	18.9	5.2E3	1.4E5
Nb-93m		40	1080	6	162	8.8	2.4E2
Nb-94		0.6	16.2	0.6	16.2	6.9E-3	1.9E-1
Nb-95		1	27.0	1	27.0	1.5E3	3.9E4
Nb-97		0.6	16.2	0.5	13.5	9.9E5	2.7E7
Nd-147	Neodymium(60)	4	108	0.5	13.5	3.0E3	8.1E4
Nd-149		0.6	16.2	0.5	13.5	4.5E5	1.2E7
Ni-59	Nickel(28)	40	1080	40	1080	3.0E-3	8.0E-2
Ni-63		40	1080	30	811	2.1	5.7E1
Ni-65		0.3	8.11	0.3	8.11	7.1E5	1.9E7
Np-235	Neptunium(93)	40	1080	40	1080	5.2E1	1.4E3
Np-236		7	189	1E-3	2.70E-2	4.7E-4	1.3E-2
Np-237		2	54.1	2E-4	5.41E-3	2.6E-5	7.1E-4
Np-239		6	162	0.5	13.5	8.6E3	2.3E5
Os-185	Osmium(76)	1	27.0	1	27.0	2.8E2	7.5E3
Os-191m		40	1080	40	1080	4.6E4	1.3E6
Os-191		10	270	0.9	24.3	1.6E3	4.4E4
Os-193		0.6	16.2	0.5	13.5	2.0E4	5.3E5
Os-194		0.2	5.41	0.2	5.41	1.1E1	3.1E2
P-32	Phosphorus(15)	0.3	8.11	0.3	8.11	1.1E4	2.9E5
P-33		40	1080	0.9	24.3	5.8E3	1.6E5
Pa-230	Protactinium(91)	2	54.1	0.1	2.70	1.2E3	3.3E4
Pa-231		0.6	16.2	6E-5	1.62E-3	1.7E-3	4.7E-2

Symbol of Radionuclide	Element and Atomic Number	A_1(TBq)	A_1(Ci)	A_2(TBq)	A_2(Ci)	Specific Activity (TBq/g)	Specific Activity (Ci/g)
Pa-233		5	135	0.9	24.3	7.7E2	2.1E4
Pb-201	Lead(82)	1	27.0	1	27.0	6.2E4	1.7E6
Pb-202		40	1080	2	54.1	1.2E-4	3.4E-3
Pb-203		3	81.1	3	81.1	1.1E4	3.0E5
Pb-205		Unlimited	Unlimited	Unlimited	Unlimited	4.5E-6	1.2E-4
Pb-210		0.6	16.2	9E-3	0.243	2.8	7.6E1
Pb-212		0.3	8.11	0.3	8.11	5.1E4	1.4E6
Pd-103	Palladium(46)	40	1080	40	1080	2.8E3	7.5E4
Pd-107		Unlimited	Unlimited	Unlimited	Unlimited	1.9E-5	5.1E-4
Pd-109		0.6	16.2	0.5	13.5	7.9E4	2.1E6
Pm-143	Promethium(61)	3	81.1	3	81.1	1.3E2	3.4E3
Pm-144		0.6	16.2	0.6	16.2	9.2E1	2.5E3
Pm-145		30	811	7	189	5.2	1.4E2
Pm-147		40	1080	0.9	24.3	3.4E1	9.3E2
Pm-148m		0.5	13.5	0.5	13.5	7.9E2	2.1E4
Pm-149		0.6	16.2	0.5	13.5	1.5E4	4.0E5
Pm-151		3	81.1	0.5	13.5	2.7E4	7.3E5
Po-208	Polonium(84)	40	1080	2E-2	0.541	2.2E1	5.9E2
Po-209		40	1080	2E-2	0.541	6.2E-1	1.7E1
Po-210		40	1080	2E-2	0.541	1.7E2	4.5E3
Pr-142	Praseodymium(59)	0.2	5.41	0.2	5.41	4.3E4	1.2E6
Pr-143		4	108	0.5	13.5	2.5E3	6.7E4
Pt-188	Platinum(78)	0.6	16.2	0.6	16.2	2.5E3	6.8E4
Pt-191		3	81.1	3	81.1	8.7E3	2.4E5
Pt-193m		40	1080	9	243	5.8E3	1.6E5
Pt-193		40	1080	40	1080	1.4	3.7E1
Pt-195m		10	270	2	54.1	6.2E3	1.7E5
Pt-197m		10	270	0.9	24.3	3.7E5	1.0E7
Pt-197		20	541	0.5	13.5	3.2E4	8.7E5
Pu-236	Plutonium(94)	7	189	7E-4	1.89E-2	2.0E1	5.3E2
Pu-237		20	541	20	541	4.5E2	1.2E4
Pu-238		2	54.1	2E-4	5.41E-3	6.3E-1	1.7E1
Pu-239		2	54.1	2E-4	5.41E-3	2.3E-3	6.2E-2
Pu-240		2	54.1	2E-4	5.41E-3	8.4E-3	2.3E-1
Pu-241		40	1080	1E-2	0.270	3.8	1.0E2

Symbol of Radionuclide	Element and Atomic Number	A_1(TBq)	A_1(Ci)	A_2(TBq)	A_2(Ci)	Specific Activity (TBq/g)	Specific Activity (Ci/g)
Pu-242		2	54.1	2E-4	5.41E-3	1.5E-4	3.9E-3
Pu-244		0.3	8.11	2E-4	5.41E-3	6.7E-7	1.8E-5
Ra-223	Radium(88)	0.6	16.2	3E-2	0.811	1.9E3	5.1E4
Ra-224		0.3	8.11	6E-2	1.62	5.9E3	1.6E5
Ra-225		0.6	16.2	2E-2	0.541	1.5E3	3.9E4
Ra-226		0.3	8.11	2E-2	0.541	3.7E-2	1.0
Ra-228		0.6	16.2	4E-2	1.08	1.0E1	2.7E2
Rb-81	Rubidium(37)	2	54.1	0.9	24.3	3.1E5	8.4E6
Rb-83		2	54.1	2	54.1	6.8E2	1.8E4
Rb-84		1	27.0	0.9	24.3	1.8E3	4.7E4
Rb-86		0.3	8.11	0.3	8.11	3.0E3	8.1E4
Rb-87		Unlimited	Unlimited	Unlimited	Unlimited	3.2E-9	8.6E-8
Rb(natural)		Unlimited	Unlimited	Unlimited	Unlimited	6.7E6	1.8E8
Re-183	Rhenium(75)	5	135	5	135	3.8E2	1.0E4
Re-184m		3	81.1	3	81.1	1.6E2	4.3E3
Re-184		1	27.0	1	27.0	6.9E2	1.9E4
Re-186		4	108	0.5	13.5	6.9E3	1.9E5
Re-187		Unlimited	Unlimited	Unlimited	Unlimited	1.4E-9	3.8E-8
Re-188		0.2	5.41	0.2	5.41	3.6E4	9.8E5
Re-189		4	108	0.5	13.5	2.5E4	6.8E5
Re(natural)		Unlimited	Unlimited	Unlimited	Unlimited		2.4E-8
Rh-99	Rhodium(45)	2	54.1	2	54.1	3.0E3	8.2E4
Rh-101		4	108	4	108	4.1E1	1.1E3
Rh-102m		2	54.1	0.9	24.3	2.3E2	6.2E3
Rh-102		0.5	13.5	0.5	13.5	4.5E1	1.2E3
Rh-103m		40	1080	40	1080	1.2E6	3.3E7
Rh-105		10	270	0.9	24.3	3.1E4	8.4E5
Rn-222	Radon(86)	0.2	5.41	4E-3	0.108	5.7E3	1.5E5
Ru-97	Ruthenium(44)	4	108	4	108	1.7E4	4.6E5
Ru-103		2	54.1	0.9	24.3	1.2E3	3.2E4
Ru-105		0.6	16.2	0.5	13.5	2.5E5	6.7E6
Ru-106		0.2	5.41	0.2	5.41	1.2E2	3.3E3
S-35	Sulfur(16)	40	1080	2	54.1	1.6E3	4.3E4
Sb-122	Antimony(51)	0.3	8.11	0.3	8.11	1.5E4	4.0E5
Sb-124		0.6	16.2	0.5	13.5	6.5E2	1.7E4

Symbol of Radionuclide	Element and Atomic Number	A_1(TBq)	A_1(Ci)	A_2(TBq)	A_2(Ci)	Specific Activity (TBq/g)	Specific Activity (Ci/g)
Sb-125		2	54.1	0.9	24.3	3.9E1	1.0E3
Sb-126		0.4	10.8	0.4	10.8	3.1E3	8.4E4
Sc-44	Scandium(21)	0.5	13.5	0.5	13.5	6.7E5	1.8E7
Sc-46		0.5	13.5	0.5	13.5	1.3E3	3.4E4
Sc-47		9	243	0.9	24.3	3.1E4	8.3E5
Sc-48		0.3	8.11	0.3	8.11	5.5E4	1.5E6
Se-75	Selenium(34)	3	81.1	3	81.1	5.4E2	1.5E4
Se-79		40	1080	2	54.1	2.6E-3	7.0E-2
Si-31	Silicon(14)	0.6	16.2	0.5	13.5	1.4E6	3.9E7
Si-32		40	1080	0.2	5.41	3.9	1.1E2
Sm-145	Samarium(62)	20	541	20	541	9.8E1	2.6E3
Sm-147		Unlimited	Unlimited	Unlimited	Unlimited	8.5E-1	2.3E-8
Sm-151		40	1080	4	108	9.7E-1	2.6E1
Sm-153		4	108	0.5	13.5	1.6E4	4.4E5
Sn-113	Tin(50)	4	108	4	108	3.7E2	1.0E4
Sn-117m		6	162	2	54.1	3.0E3	8.2E4
Sn-119m		40	1080	40	1080	1.4E2	3.7E3
Sn-121m		40	1080	0.9	24.3	2.0	5.4E1
Sn-123		0.6	16.2	0.5	13.5	3.0E2	8.2E3
Sn-125		0.2	5.41	0.2	5.41	4.0E3	1.1E5
Sn-126		0.3	8.11	0.3	8.11	1.0E-3	2.8E-2
Sr-82	Strontium(38)	0.2	5.41	0.2	5.41	2.3E3	6.2E4
Sr-85m		5	135	5	135	1.2E6	3.3E7
Sr-85		2	54.1	2	54.1	8.8E2	2.4E4
Sr-87m		3	81.1	3	81.1	4.8E5	1.3E7
Sr-89		0.6	16.2	0.5	13.5	1.1E3	2.9E4
Sr-90		0.2	5.41	0.1	2.70	5.1	1.4E2
Sr-91		0.3	8.11	0.3	8.11	1.3E5	3.6E6
Sr-92		0.8	21.6	0.5	13.5	4.7E5	1.3E7
T	Tritium(1)	40	1080	40	1080	3.6E2	9.7E3
Ta-178	Tantalum(73)	1	27.0	1	27.0	4.2E6	1.1E8
Ta-179		30	811	30	811	4.1E1	1.1E3
Ta-182		0.8	21.6	0.5	13.5	2.3E2	6.2E3
Tb-157	Terbium(65)	40	1080	10	270	5.6E-1	1.5E1
Tb-158		1	27.0	0.7	18.9	5.6E-1	1.5E1

Symbol of Radionuclide	Element and Atomic Number	A_1(TBq)	A_1(Ci)	A_2(TBq)	A_2(Ci)	Specific Activity (TBq/g)	Specific Activity (Ci/g)
Tb-160		0.9	24.3	0.5	13.5	4.2E2	1.1E4
Tc-95m	Technetium(43)	2	54.1	2	54.1	8.3E2	2.2E4
Tc-96m		0.4	10.8	0.4	10.8	1.4E6	3.8E7
Tc-96		0.4	10.8	0.4	10.8	1.2E4	3.2E5
Tc-97m		40	1080	40	1080	5.6E2	1.5E4
Tc-97		Unlimited	Unlimited	Unlimited	Unlimited	5.2E-5	1.4E-3
Tc-98		0.7	18.9	0.7	18.9	3.2E-5	8.7E-4
Tc-99m		8	216	8	216	1.9E5	5.3E6
Tc-99		40	1080	0.9	24.3	6.3E-4	1.7E-2
Te-118	Tellurium(52)	0.2	5.41	0.2	5.41	6.8E3	1.8E5
Te-121m		5	135	5	135	2.6E2	7.0E3
Te-121		2	54.1	2	54.1	2.4E3	6.4E4
Te-123m		7	189	7	189	3.3E2	8.9E3
Te-125m		30	811	9	243	6.7E2	1.8E4
Te-127m		20	541	0.5	13.5	3.5E2	9.4E3
Te-127		20	541	0.5	13.5	9.8E4	2.6E6
Te-129m		0.6	16.2	0.5	13.5	1.1E3	3.0E4
Te-129		0.6	16.2	0.5	13.5	7.7E5	2.1E7
Te-131m		0.7	18.9	0.5	13.5	3.0E4	8.0E5
Te-132		0.4	10.8	0.4	10.8	1.1E4	3.0E5
Th-227	Thorium(90)	9	243	1E-2	0.270	1.1E3	3.1E4
Th-228		0.3	8.11	4E-4	1.08E-2	3.0E1	8.2E2
Th-229		0.3	8.11	3E-5	8.11E-4	7.9E-3	2.1E-1
Th-230		2	54.1	2E-4	5.41E-3	7.6E-4	2.1E-2
Th-231		40	1080	0.9	24.3	2.0E4	5.3E5
Th-232		Unlimited	Unlimited	Unlimited	Unlimited	4.0E-9	1.1E-7
Th-234		0.2	5.41	0.2	5.41	8.6E2	2.3E4
Th(natural)		Unlimited	Unlimited	Unlimited	Unlimited	8.1E-9	2.2E-7
Ti-44	Titanium(22)	0.5	13.5	0.2	5.41	6.4	1.7E2
Tl-200	Thallium(81.1)	0.8	21.6	0.8	21.6	2.2E4	6.0E5
Tl-201		10	270	10	270	7.9E3	2.1E5
Tl-202		2	54.1	2	54.1	2.0E3	5.3E4
Tl-204		4	108	0.5	13.5	1.7E1	4.6E2
Tm-167	Thulium(69)	7	189	7	189	3.1E3	8.5E4
Tm-168		0.8	21.6	0.8	21.6	3.1E2	8.3E3

Symbol of Radionuclide	Element and Atomic Number	A_1(TBq)	A_1(Ci)	A_2(TBq)	A_2(Ci)	Specific Activity (TBq/g)	Specific Activity (Ci/g)
Tm-170		4	108	0.5	13.5	2.2E2	6.0E3
Tm-171		40	1080	10	270	4.0E1	1.1E3
U-230	Uranium(92)	40	1080	1E-2	0.270	1.0E3	2.7E4
U-232		3	81.1	3E-4	8.11E-3	8.3E-1	2.2E1
U-233		10	270	1E-3	2.70E-2	3.6E-4	9.7E-3
U-234		10	270	1E-3	2.70E-2	2.3E-4	6.2E-3
U-235		Unlimited	Unlimited	Unlimited	Unlimited	8.0E-8	2.2E-6
U-236		10	270	1E-3	2.70E-2	2.4E-6	6.5E-5
U-238		Unlimited	Unlimited	Unlimited	Unlimited	1.2E-8	3.4E-7
U(natural)		Unlimited	Unlimited	Unlimited	Unlimited	2.6E-8	7.1E-7
U(enriched 5% or less)		Unlimited	Unlimited	Unlimited	Unlimited		(See Table ~~A-3~~III)
U(enriched more than 5%)			10	270	1E-3	2.70E-2	(See Table ~~A-3~~III)
U(depleted)		Unlimited	Unlimited	Unlimited	Unlimited		(See Table ~~A-3~~III)
V-48	Vanadium(23)	0.3	8.11	0.3	8.11	6.3E3	1.7E5
V-49		40	1080	40	1080	3.0E2	8.1E3
W-178	Tungsten(74)	1	27.0	1	27.0	1.3E3	3.4E4
W-181		30	811	30	811	2.2E2	6.0E3
W-185		40	1080	0.9	24.3	3.5E2	9.4E3
W-187		2	54.1	0.5	13.5	2.6E4	7.0E5
W-188		0.2	5.41	0.2	5.41	3.7E2	1.0E4
Xe-122	Xenon(54)	0.2	5.41	0.2	5.41	4.8E4	1.3E6
Xe-123		0.2	5.41	0.2	5.41	4.4E5	1.2E7
Xe-127		4	108	4	108	1.0E3	2.8E4
Xe-131m		40	1080	40	1080	3.1E3	8.4E4
Xe-133		20	541	20	541	6.9E3	1.9E5
Xe-135		4	108	4	108	9.5E4	2.6E6
Y-87	Yttrium(39)	2	54.1	2	54.1	1.7E4	4.5E5
Y-88		0.4	10.8	0.4	10.8	5.2E2	1.4E4
Y-90		0.2	5.41	0.2	5.41	2.0E4	5.4E5
Y-91m		2	54.1	2	54.1	1.5E6	4.2E7
Y-91		0.3	8.11	0.3	8.11	9.1E2	2.5E4

Symbol of Radionuclide	Element and Atomic Number	A_1(TBq)	A_1(Ci)	A_2(TBq)	A_2(Ci)	Specific Activity (TBq/g)	Specific Activity (Ci/g)
Y-92		0.2	5.41	0.2	5.41	3.6E5	9.6E6
Y-93		0.2	5.41	0.2	5.41	1.2E5	3.3E6
Yb-169	Ytterbium(70)	3	81.1	3	81.1	8.9E2	2.4E4
Yb-175		30	811	0.9	24.3	6.6E3	1.8E5
Zn-65	Zinc(30)	2	54.1	2	54.1	3.0E2	8.2E3
Zn-69m		2	54.1	0.5	13.5	1.2E5	3.3E6
Zn-69		4	108	0.5	13.5	1.8E6	4.9E7
Zr-88	Zirconium(40	3	81.1	3	81.1	6.6E2	1.8E4
Zr-93		40	1080	0.2	5.41	9.3E-5	2.5E-3
Zr-95		1	27.0	0.9	24.3	7.9E2	2.1E4
Zr-97		0.3	8.11	0.3	8.11	7.1E4	1.9E6

* International shipments of Einsteinium require multilateral approval of A_1 and A_2 values.
** International shipments of Fermium require multilateral approval of A_1 and A_2 values.
*** 20 Ci for Mo99 for domestic use.

Table II
General Values for A_1 and A_2

Contents	A_1		A_2	
	(TBq)	(Ci)	(TBq)	(Ci)
Only beta- or gamma-emitting nuclides are known to be present	0.2	5	0.02	0.5
Alpha-emitting nuclides are known to be present, or no relevent data are available	0.10	2.70	$2x10^{-5}$	$5.41x10^{-4}$

Table III
Activity-Mass Relationships for Uranium

Uranium Enrichment* wt % U-235 present	Specific Activity TBq/g	Specific Activity Ci/g
0.45	1.8×10^{-8}	5.0×10^{-7}
0.72 (natural)	2.6×10^{-8}	7.1×10^{-7}
1.0	2.8×10^{-8}	7.6×10^{-7}
1.5	3.7×10^{-8}	1.0×10^{-6}
5.0	1.0×10^{-7}	2.7×10^{-6}
10.0	1.8×10^{-7}	4.8×10^{-6}
20.0	3.7×10^{-7}	1.0×10^{-5}
35.0	7.4×10^{-7}	2.0×10^{-5}
50.0	9.3×10^{-7}	2.5×10^{-5}
90.0	2.2×10^{-6}	5.8×10^{-5}
93.0	2.6×10^{-6}	7.0×10^{-5}
95.0	3.4×10^{-5}	9.1×10^{-5}

*The figures for uranium include representative values for the activity of the uranium-234 which is concentrated during the enrichment process.

CHAPTER 33-10-14
LICENSES AND RADIATION SAFETY REQUIREMENTS FOR IRRADIATORS

33-10-14-01. Purpose and scope.

1. This chapter contains requirements for the issuance of a license authorizing the use of sealed sources containing radioactive materials in irradiators used to irradiate objects or materials using gamma radiation. This chapter also contains radiation safety requirements for operating irradiators. The requirements of this chapter are in addition to other requirements of this article. In particular, the provisions of chapters 33-10-03, 33-10-04.1, 33-10-10, and 33-10-11 apply to applications and licenses subject to this chapter. Nothing in this chapter relieves the licensee from complying with other applicable federal, state, and local regulations governing the siting, zoning, land use, and building code requirements for industrial facilities.

2. The rules in this chapter apply to panoramic irradiators that have either dry or wet storage of the radioactive sealed sources and to underwater irradiators in which both the source and the product being irradiated are under water. Irradiators whose dose rates exceed five grays [500 rads] per hour at one meter from the radioactive sealed sources in air or in water, as applicable for the irradiator type, are covered by this chapter.

3. The rules in this chapter do not apply to self-contained dry-source-storage irradiators (those in which both the source and the area subject to irradiation are contained within a device and are not accessible by personnel), medical radiology or teletherapy, radiography (the

irradiation of materials for nondestructive testing purposes), gauging, or open-field (agricultural) irradiators.

History: Effective July 1, 1995.
General Authority: NDCC 23-20.1-04
Law Implemented: NDCC 23-20.1-03, 23-20.1-04

33-10-14-02. Definitions.

1. "Annually" means either:

   a. At intervals not to exceed one year; or

   b. One per year, at about the same time each year (plus or minus one month).

2. "Badge" means a personnel monitoring device such as a film badge, TLD or other type of personnel monitoring device processed and evaluated by an accredited National Voluntary Laboratory Accreditation Program (NVLAP) processor.

~~2~~3. "Doubly encapsulated sealed source" means a sealed source in which the radioactive material is sealed within a capsule and that capsule is sealed within another capsule.

~~3~~4. "Irradiator" means a facility that uses radioactive sealed sources for the irradiation of objects or materials and in which radiation dose rates exceeding five grays [500 rads] per hour exist at one meter from the sealed radioactive sources in air or water, as applicable for the irradiator type, but does not include irradiators in which both the sealed source and the area subject to irradiation are contained within a device and are not accessible to personnel.

~~4~~5. "Irradiator operator" means an individual who has successfully completed the training and testing described in subsection 1 of section 33-10-14-08 and is authorized by the terms of the license to operate the irradiator without a supervisor present.

~~5~~6. "Panoramic dry-source-storage irradiator" means an irradiator in which the irradiations occur in air in areas potentially accessible to personnel and in which the sources are stored in shields made of solid

materials. The term includes beam-type dry-source-storage irradiators in which only a narrow beam of radiation is produced for performing irradiations.

~~6~~7. "Panoramic irradiator" means an irradiator in which the irradiations are done in air in areas potentially accessible to personnel. The term includes beam-type irradiators.

~~7~~8. "Panoramic wet-source-storage irradiator" means an irradiator in which the irradiations occur in air in areas potentially accessible to personnel and in which the sources are stored under water in a storage pool.

~~8~~9. "Pool irradiator" means any irradiator at which the sources are stored or used in a pool of water including panoramic wet-source-storage irradiators and underwater irradiators.

~~9~~10. "Product conveyor system" means a system for moving the product to be irradiated to, from, and within the area where irradiation takes place.

~~10~~11. "Radiation room" means a shielded room in which irradiations take place. Underwater irradiators do not have radiation rooms.

~~11~~12. "Seismic area" means any area where the probability of a horizontal acceleration in rock of more than three tenths times the acceleration of gravity in two hundred fifty years is greater than ten percent, as designated by the United States geological survey.

~~12~~13. "Underwater irradiator" means an irradiator in which the sources always remain shielded under water and humans do not have access to the sealed sources or the space subject to irradiation without entering the pool.

History: Effective July 1, 1995.
General Authority: NDCC 23-20.1-04, 28-32-02
Law Implemented: NDCC 23-20.1-04

33-10-14-03. Specific licenses for irradiators. The department will approve an application for a specific license for the use of licensed material in an irradiator if the applicant meets the requirements contained in this section.

1. The applicant shall satisfy the general requirements specified in chapter 33-10-03 and the requirements contained in this chapter.

2. The application must describe the training provided to irradiator operators including:

   a. Classroom training.

   b. On-the-job or simulator training.

   c. Safety reviews.

   d. Means employed by the applicant to test each operator's understanding of the department's rules and licensing requirements and the irradiator operating and emergency procedures.

   e. Minimum training and experience of personnel who may provide training.

3. The application must include an outline of the written operating and emergency procedures listed in subsection 2 of section 33-10-14-08 that describes the radiation safety aspects of the procedures.

4. The application must describe the organizational structure for managing the irradiator, specifically the radiation safety responsibilities and authorities of the radiation safety officer and those management personnel who have important radiation safety responsibilities or authorities. In particular, the application must specify who, within the management structure, has the authority to stop unsafe operations. The application must also describe the training and experience required for the position of radiation safety officer.

5. The application must include a description of the access control systems required by subsection 2 of section 33-10-14-05, the radiation monitors required by subsection 5 of section 33-10-14-05, the method of detecting leaking sources required by subsection 5 of section 33-10-14-08 including the sensitivity of the method, and a diagram of the facility that shows the locations of all required interlocks and radiation monitors.

6. If the applicant intends to perform leak testing of dry-source-storage sealed sources, the applicant shall establish procedures for leak testing and submit a

description of these procedures to the department. The description must include the:

a. Instruments to be used.

b. Methods of performing the analysis.

c. Pertinent experience of the individual who analyzes the samples.

7. If licensee personnel are to load or unload sources, the applicant shall describe the qualifications and training of the personnel and the procedures to be used. If the applicant intends to contract for source loading or unloading at its facility, the loading or unloading must be done by an organization specifically authorized by the department, the United States nuclear regulatory commission, or an agreement state to load or unload irradiator sources.

8. The application must describe the inspection and maintenance checks, including the frequency of the checks required by subsection 6 of section 33-10-14-08.

History: Effective July 1, 1995.
General Authority: NDCC 23-20.1-04
Law Implemented: NDCC 23-20.1-03, 23-20.1-04

33-10-14-04. Start of construction. The applicant may not begin construction of a new irradiator prior to the submission to the department of both an application for a license for the irradiator and the fee required by chapter 33-10-11. As used in this section, the term "construction" includes the construction of any portion of the permanent irradiator structure on the site but does not include: engineering and design work, purchase of a site, site surveys or soil testing, site preparation, site excavation, construction of warehouse or auxiliary structures, and other similar tasks. Any activities undertaken prior to the issuance of a license are entirely at the risk of the applicant and have no bearing on the issuance of a license with respect to the requirements of this article.

History: Effective July 1, 1995.
General Authority: NDCC 23-20.1-04
Law Implemented: NDCC 23-20.1-04, 23-20.1-04.5

33-10-14-05. Performance requirements.

1. **Performance criteria for sealed sources.**

a. Requirements. Sealed sources installed after July 1, 1993:

(1) Must have a certificate of registration issued under 10 Code of Federal Regulations 32.210.

(2) Must be doubly encapsulated.

(3) Must use radioactive material that is as nondispersible as practical and that is as insoluble as practical if the source is used in a wet-source-storage or wet-source-change irradiator.

(4) Must be encapsulated in a material resistant to general corrosion and to localized corrosion, such as 316L stainless steel or other material with equivalent resistance if the sources are for use in irradiator pools.

(5) In prototype testing of the sealed source, must have been leak tested and found leak-free after each of the tests described in paragraphs b through g.

b. Temperature. The test source must be held at minus forty degrees Centigrade for twenty minutes, six hundred degrees Centigrade for one hour, and then be subjected to a thermal shock test with a temperature drop from six hundred degrees Centigrade to twenty degrees Centigrade within fifteen seconds.

c. Pressure. The test source must be twice subjected for at least five minutes to an external pressure (absolute) of two million newtons per square meter.

d. Impact. A two kilogram steel weight, two and five-tenths centimeters in diameter, must be dropped from a height of one meter onto the test source.

e. Vibration. The test source must be subjected three times for ten minutes each to vibrations sweeping from twenty-five hertz to five hundred hertz with a peak amplitude of five times the acceleration of gravity. In addition, each test source must be vibrated for thirty minutes at each resonant

frequency found.

f. Puncture. A fifty gram weight and pin, three tenths centimeter pin diameter, must be dropped from a height of one meter onto the test source.

g. Bend. If the length of the source is more than fifteen times larger than the minimum cross-sectional dimension, the test source must be subjected to a force of two thousand newtons at its center equidistant from two support cylinders, the distance between which is ten times the minimum cross-sectional dimension of the source.

2. **Access control.**

a. Each entrance to a radiation room at a panoramic irradiator must have a door or other physical barrier to prevent inadvertent entry of personnel if the sources are not in the shielded position. Product conveyor systems may serve as barriers as long as they reliably and consistently function as a barrier. It must not be possible to move the sources out of their shielded position if the door or barrier is open. Opening the door or barrier while the sources are exposed must cause the sources to return promptly to their shielded position. The personnel entrance door or barrier must have a lock that is operated by the same key used to move the sources. The doors and barriers must not prevent any individual in the radiation room from leaving.

b. In addition, each entrance to a radiation room at a panoramic irradiator must have an independent backup access control to detect personnel entry while the sources are exposed. Detection of entry while the sources are exposed must cause the sources to return to their fully shielded position and must also activate a visible and audible alarm to make the individual entering the room aware of the hazard. The alarm must also alert at least one other individual who is onsite of the entry. That individual shall be trained on how to respond to the alarm and prepared to promptly render or summon assistance.

c. A radiation monitor must be provided to detect the presence of high radiation levels in the radiation

room of a panoramic irradiator before personnel entry. The monitor must be integrated with personnel access door locks to prevent room access when radiation levels are high. Attempted personnel entry, while the monitor measures high radiation levels, must activate the alarm described in paragraph b. The monitor may be located in the entrance (normally referred to as the maze) but not in the direct radiation beam.

d. Before the sources move from their shielded position in a panoramic irradiator, the source control must automatically activate conspicuous visible and audible alarms to alert people in the radiation room that the sources will be moved from their shielded position. The alarms must give individuals enough time to leave the room before the sources leave the shielded position.

e. Each radiation room at a panoramic irradiator must have a clearly visible and readily accessible control that would allow an individual in the room to make the sources return to their fully shielded position.

f. Each radiation room of a panoramic irradiator must contain a control that prevents the sources from moving from the shielded position unless the control has been activated and the door or barrier to the radiation room has been closed within a preset time after activation of the control.

g. Each entrance to the radiation room of a panoramic irradiator and each entrance to the area within the personnel access barrier of an underwater irradiator must have a sign bearing the radiation symbol and the words, "Caution (or danger) radioactive material". Panoramic irradiators must also have a sign stating "High radiation area" but the sign may be removed, covered, or otherwise made inoperative when the sources are fully shielded.

h. If the radiation room of a panoramic irradiator has roof plugs or other movable shielding, it must not be possible to operate the irradiator unless the shielding is in its proper location. This requirement may be met by interlocks that prevent operation if shielding is not placed properly or by an operating procedure requiring inspection of

shielding before operating.

i. Underwater irradiators must have a personnel access barrier around the pool which must be locked to prevent access when the irradiator is not attended. Only operators and facility management may have access to keys to the personnel access barrier. There must be an intrusion alarm to detect unauthorized entry when the personnel access barrier is locked. Activation of the intrusion alarm must alert an individual (not necessarily on-site) who is prepared to respond or summon assistance.

3. **Shielding.**

a. The radiation dose rate in areas that are normally occupied during operation of a panoramic irradiator may not exceed two hundredths millisievert [2 millirems] per hour at any location thirty centimeters or more from the wall of the room when the sources are exposed. The dose rate must be averaged over an area not to exceed one hundred square centimeters having no linear dimension greater than twenty centimeters. Areas where the radiation dose rate exceeds two hundredths millisievert [2 millirems] per hour must be locked, roped off, or posted.

b. The radiation dose at thirty centimeters over the edge of the pool of a pool irradiator may not exceed two hundredths millisievert [2 millirems] per hour when the sources are in the fully shielded position.

c. The radiation dose rate at one meter from the shield of a dry-source-storage panoramic irradiator when the source is shielded may not exceed two hundredths millisievert [2 millirems] per hour and at five centimeters from the shield may not exceed two tenths millisievert [20 millirems] per hour.

4. **Fire protection.**

a. The radiation room at a panoramic irradiator must have heat and smoke detectors. The detectors must activate an audible alarm. The alarm must be capable of alerting a person who is prepared to summon assistance promptly. The sources must

automatically become fully shielded if a fire is detected.

b. The radiation room at a panoramic irradiator must be equipped with a fire extinguishing system capable of extinguishing a fire without the entry of personnel into the room. The system for the radiation room must have a shutoff valve to control flooding into unrestricted areas.

5. **Radiation monitors.**

a. Irradiators with automatic product conveyor systems must have a radiation monitor with an audible alarm located to detect loose radioactive sources that are carried toward the product exit. If the monitor detects a source, an alarm must sound and product conveyors must stop automatically. The alarm must be capable of alerting an individual in the facility who is prepared to summon assistance. Underwater irradiators in which the product moves within an enclosed stationary tube are exempt from the requirements of this paragraph.

b. Underwater irradiators that are not in a shielded radiation room must have a radiation monitor over the pool to detect abnormal radiation levels. The monitor must have an audible alarm and a visible indicator at entrances to the personnel access barrier around the pool. The audible alarm may have a manual shutoff. The alarm must be capable of alerting an individual who is prepared to respond promptly.

6. **Control of source movement.**

a. The mechanism that moves the sources of a panoramic irradiator must require a key to actuate. Actuation of the mechanism must cause an audible signal to indicate that the sources are leaving the shielded position. Only one key may be in use at any time, and only operators or facility management may possess it. The key must be attached to a portable radiation survey meter by a chain or cable. The lock for source control must be designed so that the key may not be removed if the sources are in an unshielded position. The door to the radiation room must require the same key.

b. The console of a panoramic irradiator must have a source position indicator that indicates when the sources are in the fully shielded position, when they are in transit, and when the sources are exposed.

c. The control console of a panoramic irradiator must have a control that promptly returns the sources to the shielded position.

d. Each control for a panoramic irradiator must be clearly marked as to its function.

7. **Irradiator pools.**

a. For licenses initially issued after July 1, 1993, irradiator pools must either:

(1) Have a watertight stainless steel liner or a liner metallurgically compatible with other components in the pool; or

(2) Be constructed so that there is a low likelihood of substantial leakage and have a surface designed to facilitate decontamination. In either case, the licensee shall have a method to safely store the sources during repairs of the pool.

b. For licenses initially issued after July 1, 1993, irradiator pools must have no outlets more than five-tenths meter below the normal low water level that could allow water to drain out of the pool. Pipes that have intakes more than five-tenths meter below the normal low water level and that could act as siphons must have siphon breakers to prevent the siphoning of pool water.

c. A means must be provided to replenish water losses from the pool.

d. A visible indicator must be provided in a clearly visible location to indicate if the pool water level is below the normal low water level or above the normal high water level.

e. Irradiator pools must be equipped with a purification system designed to be capable of maintaining the water during normal operation at a

conductivity of twenty microsiemens per centimeter or less and with a clarity so that the sources can be seen clearly.

f. A physical barrier, such as a railing or cover, must be used around or over irradiator pools during normal operation to prevent personnel from accidentally falling into the pool. The barrier may be removed during maintenance, inspection, and service operations.

g. If long-handled tools or poles are used in irradiator pools, the radiation dose rate on the handling areas of the tools may not exceed two hundredths millisievert [2 millirems] per hour.

8. **Source rack protection.** If the product to be irradiated moves on a product conveyor system, the source rack and the mechanism that moves the rack must be protected by a barrier or guides to prevent products and product carriers from hitting or touching the rack or mechanism.

9. **Power failures.**

a. If electrical power at a panoramic irradiator is lost for longer than ten seconds, the sources must automatically return to the shielded position.

b. The lock on the door of the radiation room of a panoramic irradiator may not be deactivated by a power failure.

c. During a power failure, the area of any irradiator where sources are located may be entered only when using an operable and calibrated radiation survey meter.

History: Effective July 1, 1995.
General Authority: NDCC 23-20.1-04
Law Implemented: NDCC 23-20.1-04

33-10-14-06. Design requirements. Irradiators whose construction ~~begins~~ began after July 1, 1993, must meet the design requirements of this section.

1. **Shielding.** For panoramic irradiators, the licensee shall design shielding walls to meet generally accepted building code requirements for reinforced concrete and

design the walls, wall penetrations, and entranceways to meet the radiation shielding requirements of subsection 3 of section 33-10-14-05. If the irradiator will use more than two hundred thousand terabecquerels [5 million curies] of activity, the licensee shall evaluate the effects of heating of the shielding walls by the irradiator sources.

2. **Foundations.** For panoramic irradiators, the licensee shall design the foundation, with consideration given to soil characteristics, to ensure it is adequate to support the weight of the facility shield walls.

3. **Pool integrity.** For pool irradiators, the licensee shall design the pool to assure that it is leak resistant, that it is strong enough to bear the weight of the pool water and shipping casks, that a dropped cask would not fall on sealed sources, that all outlets or pipes meet the requirements of subdivision b of subsection 7 of section 33-10-14-05, and that metal components are metallurgically compatible with other components in the pool.

4. **Water handling system.** For pool irradiators, the licensee shall verify that the design of the water purification system is adequate to meet the requirements of subdivision e of subsection 7 of section 33-10-14-05. The system must be designed so that water leaking from the system does not drain to unrestricted areas without being monitored.

5. **Radiation monitors.** For all irradiators, the licensee shall evaluate the location and sensitivity of the monitor to detect sources carried by the product conveyor system as required by subdivision a of subsection 5 of section 33-10-14-05. The licensee shall verify that the product conveyor is designed to stop before a source on the product conveyor would cause a radiation overexposure to any person. For pool irradiators, if the licensee uses radiation monitors to detect contamination under subdivision b of subsection 5 of section 33-10-14-08, the licensee shall verify that the design of radiation monitoring systems to detect pool contamination includes sensitive detectors located close to where contamination is likely to concentrate.

6. **Source rack.** For pool irradiators, the licensee shall verify that there are no crevices on the source or between the source and sourceholder that would promote

corrosion on a critical area of the source. For panoramic irradiators, the licensee shall determine that source rack drops due to loss of power will not damage the source rack and that source rack drops due to failure of cables (or alternate means of support) will not cause loss of integrity of sealed sources. For panoramic irradiators, the licensee shall review the design of the mechanism that moves the sources to assure that the likelihood of a stuck source is low and that, if the rack sticks, a means exists to free it with minimal risk to personnel.

7. **Access control.** For panoramic irradiators, the licensee shall verify from the design and logic diagram that the access control system will meet the requirements of subsection 2 of section 33-10-14-05.

8. **Fire protection.** For panoramic irradiators, the licensee shall verify that the number, location, and spacing of the smoke and heat detectors are appropriate to detect fires and that the detectors are protected from mechanical and radiation damage. The licensee shall verify that the design of the fire extinguishing system provides the necessary discharge patterns, densities, and flow characteristics for complete coverage of the radiation room and that the system is protected from mechanical and radiation damage.

9. **Source return.** For panoramic irradiators, the licensee shall verify that the source rack will automatically return to the fully shielded position if offsite power is lost for more than ten seconds.

10. **Seismic.** For panoramic irradiators to be built in seismic areas, the licensee shall design the reinforced concrete radiation shields to retain their integrity in the event of an earthquake by designing to the seismic requirements of an appropriate source such as American concrete institute standard ACI 318-89, "building code requirements for reinforced concrete", chapter 21, "special provisions for seismic design", or local building codes, if current.

11. **Wiring.** For panoramic irradiators, the licensee shall verify that electrical wiring and electrical equipment in the radiation room are selected to minimize failures due to prolonged exposure to radiation.

History: Effective July 1, 1995.

General Authority: 23-20.1-04
Law Implemented: 23-20.1-04

33-10-14-07 Construction monitoring and acceptance testing. The requirements of this section must be met for irradiators whose construction ~~begins~~ began after July 1, 1993. The requirements must be met prior to loading sources.

1. **Shielding.** For panoramic irradiators, the licensee shall monitor the construction of the shielding to verify that its construction meets design specifications and generally accepted building code requirements for reinforced concrete.

2. **Foundations.** For panoramic irradiators, the licensee shall monitor the construction of the foundations to verify that their construction meets design specifications.

3. **Pool integrity.** For pool irradiators, the licensee shall verify that the pool meets design specifications and shall test the integrity of the pool. The licensee shall verify that outlets and pipes meet the requirements of subdivision b of subsection 7 of section 33-10-14-05.

4. **Water handling system.** For pool irradiators, the licensee shall verify that the water purification system, the conductivity meter, and the water level indicators operate properly.

5. **Radiation monitors.** For all irradiators, the licensee shall verify the proper operation of the monitor to detect sources carried on the product conveyor system and the related alarms and interlocks required by subdivision a of subsection 5 of section 33-10-14-05. For pool irradiators, the licensee shall verify the proper operation of the radiation monitors and the related alarm if used to meet subdivision b of subsection 5 of section 33-10-14-08. For underwater irradiators, the licensee shall verify the proper operation of the over-the-pool monitor, alarms, and interlocks required by subdivision b of subsection 5 of section 33-10-14-05.

6. **Source rack.** For panoramic irradiators, the licensee shall test the movement of the source racks for proper operation prior to source loading; testing must include source rack lowering due to simulated loss of power. For all irradiators with product conveyor systems, the

licensee shall observe and test the operation of the conveyor system to assure that the requirements in subsection 8 of section 33-10-14-05 are met for protection of the source rack and the mechanism that moves the rack; testing must include tests of any limit switches and interlocks used to protect the source rack and mechanism that moves the rack from moving product carriers.

7. **Access control.** For panoramic irradiators, the licensee shall test the completed access control system to assure that it functions as designed and that all alarms, controls, and interlocks work properly.

8. **Fire protection.** For panoramic irradiators, the licensee shall test the ability of the heat and smoke detectors to detect a fire, to activate alarms, and to cause the source rack to automatically become fully shielded. The licensee shall test the operability of the fire extinguishing system.

9. **Source return.** For panoramic irradiators, the licensee shall demonstrate that the source racks can be returned to their fully shielded positions without offsite power.

10. **Computer systems.** For panoramic irradiators that use a computer system to control the access control system, the licensee shall verify that the access control system will operate properly if offsite power is lost and shall verify that the computer has security features that prevent an irradiator operator from commanding the computer to override the access control system when it is required to be operable.

11. **Wiring.** For panoramic irradiators, the licensee shall verify that the electrical wiring and electrical equipment that were installed meet the design specifications.

History: Effective July 1, 1995.
General Authority: NDCC 23-20.1-04
Law Implemented: NDCC 23-20.1-04

33-10-14-08. Operation of irradiators.

1. **Training.**

   a. Before an individual is permitted to operate an

irradiator without a supervisor present, the individual must be instructed in:

(1) The fundamentals of radiation protection applied to irradiators, including the differences between external radiation and radioactive contamination, units of radiation dose, dose limits, why large radiation doses must be avoided, how shielding and access controls prevent large doses, how an irradiator is designed to prevent contamination, the proper use of survey meters and personnel dosimeters, other radiation safety features of an irradiator, and the basic function of the irradiator;

(2) The requirements of chapters 33-10-10 and 33-10-14 that are relevant to the irradiator;

(3) The operation of the irradiator;

(4) Those operating and emergency procedures listed in subsection 2 of section 33-10-14-08 that the individual is responsible for performing; and

(5) Case histories of accidents or problems involving irradiators.

b. Before an individual is permitted to operate an irradiator without a supervisor present, the individual shall pass a written test on the instruction received consisting primarily of questions based on the licensee's operating and emergency procedures that the individual is responsible for performing and other operations necessary to safely operate the irradiator without supervision.

c. Before an individual is permitted to operate an irradiator without a supervisor present, the individual must have received on-the-job training or simulator training in the use of the irradiator as described in the license application. The individual shall also demonstrate the ability to perform those portions of the operating and emergency procedures that the individual is to perform.

d. The licensee shall conduct safety reviews for irradiator operators at least annually. The licensee shall give each operator a brief written test on the information. Each safety review must include, to the extent appropriate, each of the following:

(1) Changes in operating and emergency procedures since the last review, if any;

(2) Changes in rules and license conditions since the last review, if any;

(3) Reports on recent accidents, mistakes, or problems that have occurred at irradiators, if any;

(4) Relevant results of inspections of operator safety performance;

(5) Relevant results of the facility's inspection and maintenance checks; and

(6) A drill to practice an emergency or abnormal event procedure.

e. The licensee shall evaluate the safety performance of each irradiator operator at least annually to ensure that rules, license conditions, and operating and emergency procedures are followed. The licensee shall discuss the results of the evaluation with the operator and shall instruct the operator on how to correct any mistakes or deficiencies observed.

f. Individuals who will be permitted unescorted access to the radiation room of the irradiator or the area around the pool of an underwater irradiator, but who have not received the training required for operators and the radiation safety officer, shall be instructed and tested in any precautions they should take to avoid radiation exposure, any procedures or parts of procedures listed in subsection 2 of section 33-10-14-08 that they are expected to perform or comply with, and their proper response to alarms required in this chapter. Tests may be oral.

g. Individuals who must be prepared to respond to

alarms required by subdivision b of subsection 2 of section 33-10-14-05, subdivision i of subsection 2 of section 33-10-14-05, subdivision a of subsection 4 of section 33-10-14-05, subdivision a of subsection 5 of section 33-10-14-05, subdivision b of subsection 5 of section 33-10-14-05, and subdivision b of subsection 5 of this section must be trained and tested on how to respond. Each individual must be retested at least ~~once a year~~ annually. Tests may be oral.

2. **Operating and emergency procedures.**

a. The licensee shall have and follow written operating procedures for:

(1) Operation of the irradiator, including entering and leaving the radiation room;

(2) Use of personnel dosimeters;

(3) Surveying the shielding of panoramic irradiators;

(4) Monitoring pool water for contamination while the water is in the pool and before release of pool water to unrestricted areas;

(5) Leak testing of sources;

(6) Inspection and maintenance checks required by subsection 6 of section 33-10-14-08;

(7) Loading, unloading, and repositioning sources, if the operations will be performed by the licensee; and

(8) Inspection of movable shielding required by subdivision h of subsection 2 of section 33-10-14-05, if applicable.

b. The licensee shall have and follow emergency or abnormal event procedures, appropriate for the irradiator type, for:

(1) Sources stuck in the unshielded position;

(2) Personnel overexposures;

(3) A radiation alarm from the product exit portal monitor or pool monitor;

(4) Detection of leaking sources, pool contamination, or alarm caused by contamination of pool water;

(5) A low or high water level indicator, an abnormal water loss, or leakage from the source storage pool;

(6) A prolonged loss of electrical power;

(7) A fire alarm or explosion in the radiation room;

(8) An alarm indicating unauthorized entry into the radiation room, area around pool, or another alarmed area;

(9) Natural phenomena, including an earthquake, a tornado, flooding, or other phenomena as appropriate for the geographical location of the facility; and

(10) The jamming of automatic conveyor systems.

c. The licensee may revise operating and emergency procedures without department approval only if all of the following conditions are met:

(1) The revisions do not reduce the safety of the facility;

(2) The revisions are consistent with the outline or summary of procedures submitted with the license application;

(3) The revisions have been reviewed and approved by the radiation safety officer; and

(4) The users or operators are instructed and tested on the revised procedures before they are put into use.

3. **Personnel monitoring.**

a. Irradiator operators shall wear ~~either a film badge or a thermoluminescent dosimeter (TLD)~~ a personnel

dosimeter that is processed and evaluated by an accredited national voluntary laboratory accreditation program (NVLAP) processor while operating a panoramic irradiator or while in the area around the pool of an underwater irradiator. The ~~film badge or TLD~~ badge processor must be accredited ~~by the national voluntary laboratory accreditation program~~ for high energy photons in the normal and accident dose ranges (see subdivision c of subsection 1 of section 33-10-04.1-09). Each ~~film badge or TLD~~ badge must be assigned to and worn by only one individual. Film badges must be processed at least monthly, and ~~TLDs~~ other badges must be processed at least quarterly.

b. Other individuals who enter the radiation room of a panoramic irradiator shall wear a dosimeter, which may be a pocket dosimeter. For groups of visitors, only two people who enter the radiation room are required to wear dosimeters. If pocket dosimeters are used to meet the requirements of this subdivision, a check of their response to radiation must be done at least annually. Acceptable dosimeters must read within plus or minus ~~thirty~~ twenty percent of the true radiation dose.

4. **Radiation surveys.**

a. A radiation survey of the area outside the shielding of the radiation room of a panoramic irradiator must be conducted with the sources in the exposed position before the facility starts to operate. A radiation survey of the area above the pool of pool irradiators must be conducted after the sources are loaded but before the facility starts to operate. Additional radiation surveys of the shielding must be performed at intervals not to exceed three years and before resuming operation after addition of new sources or any modification to the radiation room shielding or structure that might increase dose rates.

b. If the radiation levels specified in subsection 3 of section 33-10-14-05 are exceeded, the facility must be modified to comply with the requirements in subsection 3 of section 33-10-14-05.

c. Portable radiation survey meters must be calibrated at least annually to an accuracy of plus or minus

twenty percent for the gamma energy of the sources in use. The calibration must be done at two points on each scale or, for digital instruments, at one point per decade over the range that will be used. Portable radiation survey meters must be of a type that does not saturate and read zero at high radiation dose rates.

d. Water from the irradiator pool, other potentially contaminated liquids, and sediments from pool vacuuming must be monitored for radioactive contamination before release to unrestricted areas. Radioactive concentrations must not exceed those specified in chapter 33-10-04.1, table II, column 2 or table III of appendix B, "Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sanitary Sewerage".

e. Before releasing resins for unrestricted use, they must be monitored before release in an area with a background level less than five-tenths microsievert [0.05 millirem] per hour. The resins may be released only if the survey does not detect radiation levels above background radiation levels. The survey meter used must be capable of detecting radiation levels of five-tenths microsievert [0.05 millirem] per hour.

5. **Detection of leaking sources.**

a. Each dry-source-storage sealed source must be tested for leakage at intervals not to exceed six months using a leak test kit or method approved by the department, the United States nuclear regulatory commission, or an agreement state. 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. The test must be capable of detecting the presence of two hundred becquerels [0.005 microcurie] of radioactive material and must be performed by a person approved by the department, the United States nuclear regulatory commission, or an agreement state to perform the test.

b. For pool irradiators, sources may not be put into the pool unless the licensee tests the sources for leaks or has a certificate from a transferor that leak test has been done within the six months before the transfer. Water from the pool must be checked for contamination each day the irradiator operates. The check may be done either by using a radiation monitor on a pool water circulating system or by analysis of a sample of pool water. If a check for contamination is done by analysis of a sample of pool water, the results of the analysis must be available within twenty-four hours. If the licensee uses a radiation monitor on a pool water circulating system, the detection of above normal radiation levels must activate an alarm. The alarm set-point must be set as low as practical, but high enough to avoid false alarms. The licensee may reset the alarm set-point to a higher level if necessary to operate the pool water purification system to clean up contamination in the pool if specifically provided for in written emergency procedures.

c. If a leaking source is detected, the licensee shall arrange to remove the leaking source from service and have it decontaminated, repaired, or disposed of by a department, United States nuclear regulatory commission or agreement state licensee that is authorized to perform these functions. The licensee shall promptly check its personnel, equipment, facilities, and irradiated product for radioactive contamination. No product may be shipped until the product has been checked and found free of contamination. If a product has been shipped that may have been inadvertently contaminated, the licensee shall arrange to locate and survey that product for contamination. If any personnel are found to be contaminated, decontamination must be performed promptly. If contaminated equipment, facilities, or products are found, the licensee shall arrange to have them decontaminated or disposed of by a department, United States nuclear regulatory commission or agreement state licensee that is authorized to perform these functions. If a pool is contaminated, the licensee shall arrange to clean the pool until the contamination levels do not exceed the appropriate concentration in table II, column 2, appendix B to chapter 33-10-04.1. (See

subsection 5 of section 33-10-04.1-16 for reporting requirements.)

6. **Inspection and maintenance.**

a. The licensee shall perform inspection and maintenance checks that include, as a minimum, each of the following at the frequency specified in the license or license application:

(1) Operability of each aspect of the access control system required by subsection 2 of section 33-10-14-05.

(2) Functioning of the source position indicator required by subdivision b of subsection 6 of section 33-10-14-05.

(3) Operability of the radiation monitor for radioactive contamination in pool water required by subdivision b of subsection 5 of section 33-10-14-08 using a radiation check source, if applicable.

(4) Operability of the over-pool radiation monitor at underwater irradiators as required by subdivision b of subsection 5 of section 33-10-14-05.

(5) Operability of the product exit monitor required by subdivision a of subsection 5 of section 33-10-14-05.

(6) Operability of the emergency source return control required by subdivision c of subsection 6 of section 33-10-14-05.

(7) Leak-tightness of systems through which pool water circulates (visual inspection).

(8) Operability of the heat and smoke detectors and extinguisher system required by subsection 4 of section 33-10-14-05, but without turning extinguishers on.

(9) Operability of the means of pool water replenishment required by subdivision c of subsection 7 of section 33-10-14-05.

(10) Operability of the indicators of high and low pool water levels required by subdivision d of subsection 7 of section 33-10-14-05.

(11) Operability of the intrusion alarm required by subdivision i of subsection 2 of section 33-10-14-05, if applicable.

(12) Functioning and wear of the system, mechanisms, and cables used to raise and lower sources.

(13) Condition of the barrier to prevent products from hitting the sources or source mechanism as required by subsection 8 of section 33-10-14-05.

(14) Amount of water added to the pool to determine if the pool is leaking.

(15) Electrical wiring on required safety systems for radiation damage.

(16) Pool water conductivity measurements and analysis as required by subdivision b of subsection 7 of section 33-10-14-08.

b. Malfunctions and defects found during inspection and maintenance checks must be repaired without undue delay.

7. **Pool water purity.**

a. Pool water purification system must be run sufficiently to maintain the conductivity of the pool water below twenty microsiemens per centimeter under normal circumstances. If pool water conductivity rises above twenty microsiemens per centimeter, the licensee shall take prompt actions to lower the pool water conductivity and shall take corrective actions to prevent future recurrences.

b. The licensee shall measure the pool water conductivity frequently enough, but no less than weekly, to assure that the conductivity remains below twenty microsiemens per centimeter. Conductivity meters must be calibrated at least annually.

8. **Attendance during operation.**

a. Both an irradiator operator and at least one other individual, who is trained on how to respond and prepared to promptly render or summon assistance if the access control alarm sounds, shall be present on-site:

(1) Whenever the irradiator is operated using an automatic product conveyor system; and

(2) Whenever the product is moved into or out of the radiation room when the irradiator is operated in a batch mode.

b. At a panoramic irradiator at which static irradiations (no movement of the product) are occurring, a person who has received the training on how to respond to alarms described in subdivision g of subsection 1 of section 33-10-14-08 must be onsite.

c. At an underwater irradiator, an irradiator operator must be present at the facility whenever the product is moved into or out of the pool. Individuals who move the product into or out of the pool of an underwater irradiator need not be qualified as irradiator operators; however, they must have received the training described in subdivisions f and g of subsection 1 of section 33-10-14-08. Static irradiations may be performed without a person present at the facility.

9. **Entering and leaving the radiation room.**

a. Upon first entering the radiation room of a panoramic irradiator after an irradiation, the irradiator operator shall use a survey meter to determine that the source has returned to its fully shielded position. The operator shall check the functioning of the survey meter with a radiation check source prior to entry.

b. Before exiting from and locking the door to the radiation room of a panoramic irradiator prior to a planned irradiation, the irradiator operator shall:

(1) Visually inspect the entire radiation room to verify that no one else is in it.

(2) Activate a control in the radiation room that permits the sources to be moved from the shielded position only if the door to the radiation room is locked within a preset time after setting the control.

c. During a power failure, the area around the pool of an underwater irradiator may not be entered without using an operable and calibrated radiation survey meter unless the over-the-pool monitor required by subdivision b of subsection 5 of section 33-10-14-05 is operating with backup power.

10. **Irradiation of explosive or flammable materials.**

a. Irradiation of explosive material is prohibited unless the licensee has received prior written authorization from the department. Authorization will not be granted unless the licensee can demonstrate that detonation of the explosive would not rupture the sealed sources, injure personnel, damage safety systems, or cause radiation overexposures of personnel.

b. Irradiation of more than small quantities of flammable material (flashpoint below 140 degrees Fahrenheit [60 degrees Celsius]) is prohibited in panoramic irradiators unless the licensee has received prior written authorization from the department. Authorization will not be granted unless the licensee can demonstrate that a fire in the radiation room could be controlled without damage to sealed sources or safety systems and without radiation overexposures of personnel.

History: Effective July 1, 1995.
General Authority: NDCC 23-20.1-04
Law Implemented: NDCC 23-20.1-04

33-10-14-09. Records.

1. **Records and retention periods.** The licensee shall maintain the following records at the irradiator for the periods specified.

a. A copy of the license, license conditions, documents incorporated into a license by reference, and amendments thereto until superseded by new

documents or until the department terminates the license for documents not superseded.

b. Records of each individual's training, tests, and safety reviews provided to meet the requirements of subdivisions a, b, c, d, f and g of subsection 1 of section 33-10-14-08 until three years after the individual terminates work.

c. Records of the annual evaluations of the safety performance of irradiator operators required by subdivision e of subsection 1 of section 33-10-14-08 for three years after the evaluation.

d. A copy of the current operating and emergency procedures required by subsection 2 of section 33-10-14-08 until superseded or the department terminates the license. Records of the radiation safety officer's review and approval of changes in procedures as required by paragraph 3 of subdivision c of subsection 2 of section 33-10-14-08 retained for three years from the date of the change.

e. ~~Film badge and TLD results~~ Evaluations of badges required by subsection 3 of section 33-10-14-08 until the department terminates the license.

f. Records of radiation surveys required by subsection 4 of section 33-10-14-08 for three years from the date of the survey.

g. Records of radiation survey meter calibrations required by subsection 4 of section 33-10-14-08 and pool water conductivity meter calibrations required by subdivision b of subsection 7 of section 33-10-14-08 until three years from the date of calibration.

h. Records of the results of leak tests required by subdivision a of subsection 5 of section 33-10-14-08 and the results of contamination checks required by subdivision b of subsection 5 of section 33-10-14-08 for three years from the date of each test.

i. Records of inspection and maintenance checks required by subsection 6 of section 33-10-14-08 for three years.

j. Records of major malfunctions, significant defects, operating difficulties or irregularities, and major operating problems that involve required radiation safety equipment for three years after repairs are completed.

k. Records of the receipt, transfer and disposal of all licensed sealed sources as required by sections 33-10-04.1-15 and 33-10-01-06.

l. Records on the design checks required by section 33-10-14-06 and the construction control checks as required by section 33-10-14-07 until the license is terminated. The records must be signed and dated. The title or qualification of the person signing must be included.

m. Records related to decommissioning of the irradiator as required by subdivision g of subsection 14 of section 33-10-03-05.

2. **Reports.**

a. In addition to the reporting requirements in chapter 33-10-04.1, the licensee shall report the following events:

(1) Source struck in an unshielded position.

(2) Any fire or explosion in a radiation room.

(3) Damage to the source racks.

(4) Failure of the cable or drive mechanism used to move the source racks.

(5) Inoperability of the access control system.

(6) Detection of radiation source by the product exit monitor.

(7) Detection of radioactive contamination attributable to licensed radioactive material.

(8) Structural damage to the pool liner or walls.

(9) Abnormal water loss or leakage from the source storage pool.

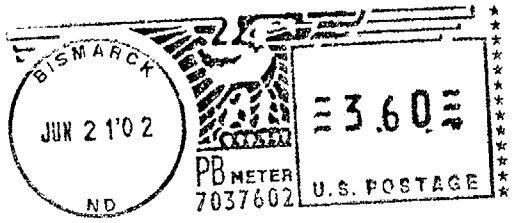
(10) Pool water conductivity exceeding one hundred microsiemens per centimeter.

b. The report must include a telephone report within twenty-four hours as described in paragraph 1 of subdivision c of subsection 5 of section 33-10-04.1-16, and a written report within thirty days as described in paragraph 2 of subdivision c of subsection 5 of section 33-10-04.1-16.

History: Effective July 1, 1995.
General Authority: NDCC 23-20.1-04
Law Implemented: NDCC 23-20.1-03, 23-20.1-09.1

RETURN SERVICE REQUESTED

THIRD CLASS



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