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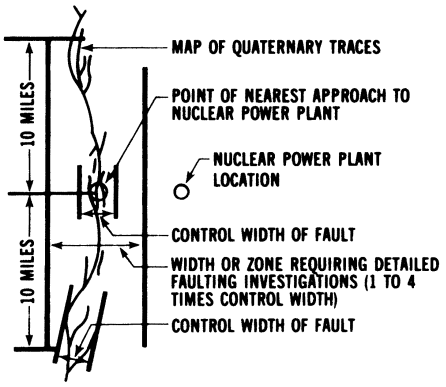

FIGURE 1—DIAGRAMMATIC ILLUSTRATION OF DELINEATION OF WIDTH OF ZONE REQUIRING DETAILED FAULTING INVESTIGATIONS FOR SPECIFIC NUCLEAR POWER PLANT LOCATION.

(Sec. 201, Pub. L. 93–438, 88 Stat. 1243 (42 U.S.C. 5841))

[38 FR 31281, Nov. 13, 1973, as amended at 38 FR 32575, Nov. 27, 1973; 42 FR 2052, Jan. 10, 1977; 78 FR 34250, June 7, 2013]

PART 110—EXPORT AND IMPORT OF NUCLEAR EQUIPMENT AND MATERIAL

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APPENDIX P TO PART 110—CATEGORY 1 AND 2 RADIOACTIVE MATERIAL

AUTHORITY: Atomic Energy Act of 1954, secs. 11, 51, 53, 54, 57, 62, 63, 64, 65, 81, 82, 103, 104, 109, 111, 121, 122, 123, 124, 126, 127, 128, 129, 133, 134, 161, 170H, 181, 182, 183, 184, 186, 187, 189, 223, 234 (42 U.S.C. 2014, 2071, 2073, 2074, 2077, 2092, 2093, 2094, 2095, 2111, 2112, 2133, 2134, 2139, 2141, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2160c, 2160d, 2201, 2210h, 2231, 2232, 2233,

2234, 2236, 2237, 2239, 2273, 2282); Energy Reorganization Act of 1974, sec. 201 (42 U.S.C. 5841); Administrative Procedure Act (5 U.S.C. 552, 553); 42 U.S.C. 2139a, 2155a; 44 U.S.C. 3504 note.

Section 110.1(b) also issued under 22 U.S.C. 2403; 22 U.S.C. 2778a; 50 App. U.S.C. 2401 *et seq.*

SOURCE: 43 FR 21641, May 19, 1978, unless otherwise noted.

Subpart A—General Provisions

§ 110.1 Purpose and scope.

(a) The regulations in this part prescribe licensing, enforcement, and rulemaking procedures and criteria, under the Atomic Energy Act, for the export of nuclear equipment and material, as set out in §§ 110.8 and 110.9, and the import of nuclear equipment and material, as set out in § 110.9a. This part also gives notice to all persons who knowingly provide to any licensee, applicant, contractor, or subcontractor, components, equipment, materials, or other goods or services, that relate to a licensee's or applicant's activities subject to this part, that they may be individually subject to NRC enforcement action for violation of § 110.7b.

(b) The regulations in this part apply to all persons in the United States except:

(1) Persons who import or export U.S. Munitions List nuclear items such as uranium depleted in the isotope-235 and incorporated in defense articles. These persons are subject to the regulations promulgated pursuant to the Arms Export Control Act and administered by the Department of State, Directorate of Defense Trade Controls, and the Department of Justice, Bureau of Alcohol, Tobacco, Firearms and Explosives, as authorized by section 110 of the International Security and Development Cooperation Act of 1980.

(2) Persons who export uranium depleted in the isotope-235 and incorporated in commodities solely to take advantage of high density or pyrophoric characteristics. These persons are subject to the controls of the Department of Commerce under the Export Administration Act, as continued in force under Executive Order 13222 (August 22, 2001), as extended;

(3) Persons who export nuclear referral list commodities such as bulk zirconium, rotor and bellows equipment, maraging steel, nuclear reactor related equipment, including process control systems and simulators. These persons are subject to the licensing authority of the Department of Commerce pursuant to 15 CFR part 730 *et seq.;*

(4) Persons who import deuterium, nuclear grade graphite, or nuclear equipment other than production or utilization facilities. A uranium enrichment facility is not a production facility for the purposes of import; and

(5) Shipments which are only passing through the U.S. (in bond shipments) do not require an NRC import or export license; however, they must comply with the Department of Transportation/IAEA packaging, and State transportation requirements.

[49 FR 47197, Dec. 3, 1984; 49 FR 49841, Dec. 24, 1984, as amended at 55 FR 34519, Aug. 23, 1990; 56 FR 40692, Aug. 15, 1991; 58 FR 13001, Mar. 9, 1993; 61 FR 35602, July 8, 1996; 63 FR 1900, Jan. 13, 1998; 65 FR 70289, Nov. 22, 2000; 75 FR 44085, July 28, 2010]

§ 110.2 Definitions.

As used in this part,

Accelerator-produced radioactive material means any material made radioactive by a particle accelerator.

Agreement for cooperation means any agreement with another nation or group of nations concluded under section 123 of the Atomic Energy Act.

Atomic Energy Act means the Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 *et seq.*).

Bulk material means any quantity of any one or more of the radionuclides listed in Table 1 of Appendix P to this part in a form that is:

(1) Not a Category 1 radioactive source;

(2) Not a Category 2 radioactive source;

(3) Not plutonium-238; and

(4) Deemed to pose a risk similar to or greater than a Category 2 radioactive source.

Byproduct material means

(1) Any radioactive material (except special nuclear material) yielded in, or made radioactive by, exposure to the radiation incident to the process of producing or utilizing special nuclear material;

(2) The tailings or wastes produced by the extraction or concentration of uranium or thorium from ore (see 10 CFR 20.1003);

(3)(i) Any discrete source of radium-226 that is produced, extracted, or converted after extraction, before, on, or after August 8, 2005, for use for a commercial, medical, or research activity; or

(ii) Any material that has been made radioactive by use of a particle accelerator and is produced, extracted, or converted after extraction, before, on, or after August 8, 2005 for use for a commercial, medical, or research activity; and

(4) Any discrete source of naturally occurring radioactive material, other than source material, that—

(i) The Commission, in consultation with the Administrator of the Environmental Protection Agency, the Secretary of Energy, the Secretary of Homeland Security, and the head of any other appropriate Federal agency, determines would pose a threat similar to the threat posed by a discrete source of radium-226 to the public health and safety or the common defense and security; and

(ii) Before, on, or after August 8, 2005 is extracted or converted after extraction for use in a commercial, medical, or research activity.

Classified Information means Classified National Security Information under Executive Order 13526, as amended, or any predecessor or successor Executive Order and Restricted Data under the Atomic Energy Act.

Commission means the United States Nuclear Regulatory Commission or its duly authorized representatives.

Common defense and security means the common defense and security of the United States.

Conversion facility means any facility for the transformation from one uranium chemical species to another, including conversion of uranium ore concentrates to uranium trioxide (UO3), conversion of UO3 to uranium dioxide (UO2), conversion of uranium oxides to uranium tetrafluoride (UF4) or uranium hexafluoride (UF6), conversion of UF4 to UF6, conversion of UF6 to UF4, conversion of UF4 to uranium metal, and conversion of uranium fluorides to UO2.

Depleted uranium means uranium having a percentage of uranium-235 less than the naturally occurring distribution of uranium-235 found in natural uranium (less than 0.711 weight percent uranium-235). It is obtained from spent (used) fuel elements or as byproduct tails or residues from uranium isotope separation.

Deuterium means deuterium and any deuterium compound, including heavy water, in which the ratio of deuterium atoms to hydrogen atoms exceeds 1:5000; and *deuterium for nuclear end use* means deuterium and any deuterium compound, including heavy water, in which the ratio of deuterium atoms to hydrogen atoms exceeds 1:5000, that is intended for use in a nuclear reactor. Export of deuterium and deuterium compounds, including heavy water, for non-nuclear end use is regulated by the Department of Commerce.

Discrete source means a radionuclide that has been processed so that its concentration within a material has been purposely increased for use for commercial, medical, or research activities.

Disposal means permanent isolation of radioactive material from the surrounding environment.

Dual-use means equipment and materials that may be used in nuclear or non-nuclear applications.

Effective kilograms of special nuclear material means:

(1) For plutonium and uranium-233, their weight in kilograms;

(2) For uranium enriched 1 percent or greater in the isotope uranium-235, its element weight in kilograms multiplied by the square of its enrichment expressed as a decimal weight fraction; and

(3) For uranium enriched below 1 percent in the isotope uranium-235, its element weight in kilograms multiplied by 0.0001.

Embargoed means that no nuclear material or equipment can be exported to certain countries under an NRC general license. Exports to embargoed countries must be pursuant to a specific license issued by the NRC and require Executive Branch review pursuant to §110.41.

Exceptional circumstances means, with respect to exports from the United States of radioactive material listed in Table 1 of Appendix P of this part:

(1) Cases of considerable health or medical need as acknowledged by the U.S. Government and the government of the importing country;

(2) Cases where there is an imminent radiological hazard or security threat presented by one or more radioactive sources; and

(3) Cases in which the exporting facility or U.S. Government maintains control of the radioactive material throughout the period the material is outside of the U.S. and removes the material at the conclusion of this period.

Executive Branch means the Departments of State, Energy, Defense and Commerce.

Export means to physically transfer nuclear equipment or material to a person or an international organization in a foreign country, except DOE distributions as authorized in Section 111 of the Atomic Energy Act or Section 110 of the International Security and Development Cooperation Act of 1980.

General license means an export or import license effective without the filing of a specific application with the Commission or the issuance of licensing documents to a particular person. A general license is a type of license issued through rulemaking by the NRC and is not an exemption from the requirements in this part. A general license does not relieve a person from complying with other applicable NRC, Federal, and State requirements.

Heels means small quantities of natural, depleted or low-enriched uranium (to a maximum of 20 percent), in the form of uranium hexafluoride (UF6) left in emptied transport cylinders being returned to suppliers after delivery of the product.

High-enriched uranium means uranium enriched to 20 percent or greater in the isotope uranium-235.

IAEA means the International Atomic Energy Agency.

Import means import into the United States.

Individual shipment means a shipment consisting of one lot of freight tendered to a carrier by one consignor at one place at one time for delivery to one consignee on one bill of lading. This lot may consist of:

(1) Only one item or

(2) A number of containers all listed on the same set of shipping documents. This one lot of freight or ''distinct'' shipment can be transported on the same carrier with other distinct shipments containing the same items as long as each shipment is covered by separate sets of shipping documents.

The phrase *introduced into a hearing* means the introduction or incorporation of testimony or documentary matter into the record of a hearing.

License means a general or specific export or import license issued pursuant to this part.

Licensee means a person authorized by a specific or a general license to export or import nuclear equipment or material pursuant to this part.

Low-enriched uranium means uranium enriched below 20 percent in the isotope uranium-235.

Low-level waste compact, as used in this part, means a compact entered into by two or more States pursuant to the Low-Level Radioactive Waste Policy Amendments Act of 1985.

Management means storage, packaging, or treatment of radioactive waste.

Medical isotope, for the purposes of §110.42(a)(9), includes molybdenum-99, iodine-131, xenon-133, and other radioactive materials used to produce a radiopharmaceutical for diagnostic or therapeutic procedures or for research and development.

Natural uranium means uranium as found in nature, containing about 0.711 percent of uranium-235, 99.283 percent of uranium-238, and a trace (0.006 percent) of uranium-234.

NPT means the Treaty on the Non-Proliferation of Nuclear Weapons (TIAS 6839).

Non-nuclear weapon State means any State not a nuclear weapon State as defined in the Treaty on the Non-Proliferation of Nuclear Weapons. *Nuclear weapon state* means any State which has manufactured and exploded a nuclear weapon or other nuclear explosive device prior to January 1, 1967 (China, France, Russia, United Kingdom, United States).

Non-Proliferation Act means the Nuclear Non-Proliferation Act of 1978 (Pub. L. 95–242).

NRC Public Document Room means the facility at One White Flint North, 11555 Rockville Pike (first floor), Rockville, Maryland, where certain public records of the NRC that were made available for public inspection in paper or microfiche prior to the implementation of the NRC Agencywide Documents Access and Management System, commonly referred to as ADAMS, will remain available for public inspection. It is also the place where NRC makes computer terminals available to access the Publicly Available Records System (PARS) component of ADAMS on the NRC Web site, *http://www.nrc.gov*, and where copies can be viewed or ordered for a fee as set forth in §9.35 of this chapter. The facility is staffed with reference librarians to assist the public in identifying and locating documents and in using the NRC Website and ADAMS. The NRC Public Document Room is open from 7:45 a.m. to 4:15 p.m., Monday through Friday, except on Federal holidays. Reference service and access to documents may also be requested by telephone (301–415–4737 or 800–397–4209) between 8:00 a.m. and 4:00 p.m., or by e-mail (*PDR.Resource@nrc.gov*), facsimile (301–415–3548), or letter (NRC Public Document Room, One White Flint North, 11555 Rockville Pike (first floor), Rockville, Maryland 20852–2738).

NRC records means any documentary material made by, in the possession of, or under the control of the Commission under Federal law or in connection with the transaction of public business as evidence of any of the Commission's activities.

NRC Web site, *http://www.nrc.gov*, is the Internet uniform resource locator name for the Internet address of the Web site where NRC will ordinarily make available its public records for inspection.

Nuclear grade graphite for nuclear end use means graphite having a purity level better than (*i.e.*, less than) 5 parts per million boron equivalent, as measured according to ASTM standard C1233–98 and intended for use in a nuclear reactor. (Nuclear grade graphite for non-nuclear end use is regulated by the Department of Commerce.)

Nuclear reactor means an apparatus, other than an atomic weapon or nuclear explosive device, designed or used to sustain nuclear fission in a self-supporting chain reaction.

Nuclear reactor internals means the major structures within a reactor vessel that have one or more functions such as supporting the core, maintaining fuel alignment, directing primary coolant flow, providing radiation shields for the reactor vessel, and guiding in-core instrumentation.

Nuclear Referral List (NRL) means the nuclear-related, dual-use commodities on the Commerce Control List that are subject to the nuclear non-proliferation export licensing controls of the Department of Commerce. They are contained in 15 CFR part 774 of the Department of Commerce's Export Administration Regulations and are designated by the symbol (NP) as the reason for control.

Nuclear Suppliers Group (NSG) is a group of nuclear supplier countries which seeks to contribute to the non-proliferation of nuclear weapons through the implementation of Guidelines for nuclear exports and nuclear-related exports.

Obligations means the commitments undertaken by the U.S. Government or by foreign governments or groups of nations with respect to imports or exports of nuclear material (except byproduct material) and equipment listed in §§110.8 and 110.9. Imports and exports of material or equipment subject to these commitments involve conditions placed on the transfer of the material or equipment, such as peaceful end-use assurances, prior consent for retransfer, and exchanges of information on the import or export. The U.S. Government informs the licensee of obligations attached to material or equipment being imported into the United States and approves changes to those obligations.

Packaging means one or more receptacles and wrappers and their contents, excluding any special nuclear material, source material or byproduct material, but including absorbent material, spacing structures, thermal insulation, radiation shielding, devices for cooling

and for absorbing mechanical shock, external fittings, neutron moderators, nonfissile neutron absorbers and other supplementary equipment.

Participant means a person, identified in a hearing notice or other Commission order, who takes part in a hearing conducted by the Commission under this part, including any person to whom the Commission grants a hearing or leave to intervene in an export or import licensing hearing, either as a matter of right or as a matter of discretion.

Particle accelerator means any machine capable of accelerating electrons, protons, deuterons, or other charged particles in a vacuum and of discharging the resultant particulate or other radiation into a medium at energies usually in excess of 1 megaelectron volt. For purposes of this definition, ''accelerator'' is an equivalent term.

Person means any individual, corporation, partnership, firm, association, trust, estate, public or private institution, group, Government agency, other than the Commission or the Department of Energy, except that the Department of Energy shall be considered a person within the meaning of the regulations in this part to the extent that its activities are subject to the licensing and related regulatory authority of the Commission pursuant to section 111 of the Atomic Energy Act; any State or political subdivision of, or any political entity within a State, any foreign government or nation or any political subdivision of any such government or nation, or other entity; and any legal successor, representative, agent, or agency of the foregoing.

Physical security or *Physical protection* means measures to reasonably ensure that source or special nuclear material will only be used for authorized purposes and to prevent theft or sabotage.

Production facility means any nuclear reactor or plant specially designed or used to produce special nuclear material through the irradiation of source material or special nuclear material, the chemical reprocessing of irradiated source or special nuclear material, or the separation of isotopes, other than a uranium enrichment facility for purposes of import.

Public health and safety means the public health and safety of the United States.

Radioactive material means source, byproduct, or special nuclear material.

Radioactive waste, for the purposes of this part, means any material that contains or is contaminated with source, byproduct, or special nuclear material that by its possession would require a specific radioactive material license in accordance with this Chapter and is imported or exported for the purposes of disposal in a land disposal facility as defined in 10 CFR part 61, a disposal area as defined in Appendix A to 10 CFR part 40, or an equivalent facility; or recycling, waste treatment or other waste management process that generates radioactive material for disposal in a land disposal facility as defined in 10 CFR part 61, a disposal area as defined in Appendix A to 10 CFR part 40, or an equivalent facility. Radioactive waste does not include radioactive material that is—

(1) Of U.S. origin and contained in a sealed source, or device containing a sealed source, that is being returned to a manufacturer, distributor or other entity which is authorized to receive and possess the sealed source or the device containing a sealed source;

(2) A contaminant on any non-radioactive material (including service tools and protective clothing) used in a nuclear facility (an NRC- or Agreement State-licensed facility (or equivalent facility) or activity authorized to possess or use radioactive material), if the material is being shipped solely for recovery and beneficial reuse of the non-radioactive material in a nuclear facility and not for waste management purposes or disposal;

(3) Exempted from regulation by the Nuclear Regulatory Commission or equivalent Agreement State regulations;

(4) Generated or used in a U.S. Government waste research and development testing program under international arrangements;

(5) Being returned by or for the U.S. Government or military to a facility that is authorized to possess the material; or

(6) Imported solely for the purposes of recycling and not for waste management or disposal where there is a market for the recycled material and evidence of a contract or business agreement can be produced upon request by the NRC.

NOTE: The definition of *radioactive waste* in this part does not include spent or irradiated fuel.

Radiopharmaceutical, for the purposes of §110.42(a)(9), means a radioactive isotope that contains byproduct material combined with chemical or biological material and is designed to accumulate temporarily in a part of the body for therapeutic purposes or for enabling the production of a useful image for use in a diagnosis of a medical condition.

Recipient country, for the purposes of §110.42(a)(9), means Canada, Belgium, France, Germany, and the Netherlands.

Restricted destinations means countries that are listed in §110.29 based on recommendations from the Executive Branch. These countries may receive exports of certain materials and quantities under a general license, but some exports to restricted destinations will require issuance of a specific license by the NRC including Executive Branch review pursuant to §110.41.

Retransfer means the transport from one foreign country to another of nuclear equipment or nuclear material previously exported from the United States, or of special nuclear material produced through the use of source material or special nuclear material previously exported from the United States.

Sealed source means any special nuclear material or byproduct material encased in a capsule designed to prevent leakage or escape of that nuclear material.

Secretary means the Secretary of the Commission.

Source material means:

(1) Natural or depleted uranium, or thorium, other than special nuclear material; or

(2) Ores that contain by weight 0.05 percent or more of uranium, thorium or depleted uranium.

Special nuclear material means plutonium, uranium-233, or uranium enriched above 0.711 percent by weight in the isotope uranium-235.

Specific activity means the radioactivity of a radionuclide per unit mass of that nuclide, expressed in the SI unit of terabecquerels per gram (TBq/g). Values of specific activity are found in Appendix A to part 71 of this chapter.

Specific license means an export or import license document issued to a named person and authorizing the export or import of specified nuclear equipment or materials based upon the review and approval of an NRC Form 7 application filed pursuant to this part and other related submittals in support of the application.

Storage means the temporary holding of radioactive material.

Target means material subjected to irradiation in an accelerator or nuclear reactor to induce a reaction or produce nuclear material.

Transfer means the transfer of possession from one person to another person.

Transport means the physical movement of material from one location to another.

Treatment means any method, technique, or process, including storage for radioactive decay, designed to change the physical, chemical or biological characteristics or composition of any radioactive material.

Tritium means not only tritium but also includes compounds and mixtures containing tritium in which the ratio of tritium to hydrogen by atoms exceeds one part in 1,000.

United States, when used in a geographical sense, includes Puerto Rico and all territories and possessions of the United States.

Uranium enrichment facility means:

(1) Any facility used for separating the isotopes of uranium or enriching uranium in the isotope 235, except laboratory scale facilities designed or used for experimental or analytical purposes only; or

(2) Any equipment or device, or important component part especially designed for such equipment or device, capable of separating the isotopes of uranium or enriching uranium in the isotope 235.

Utilization facility means:

(1) Any nuclear reactor, other than one that is a production facility and

(2) Any of the following major components of a nuclear reactor:

(i) Reactor pressure vessel (designed to contain the core of a nuclear reactor);

(ii) Reactor primary coolant pump or circulator;

(iii) ''On-line'' reactor fuel charging and discharging machine; and

(iv) Complete reactor control rod system.

(3) A utilization facility does not include the steam turbine generator portion of a nuclear power plant.

[43 FR 21691, May 19, 1978]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting § 110.2, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at *www.govinfo.gov*.

§ 110.3 Interpretations.

Except as authorized by the Commission in writing, no interpretation of the meaning of the regulations in this part other than a written interpretation by the Commission's General Counsel is binding upon the Commission.

EFFECTIVE DATE NOTE: At 90 FR 55633, Dec. 3, 2025, § 110.3 was amended, effective January 8, 2026.

§ 110.4 Communications.

Except where otherwise specified in this part, all communications and reports concerning the regulations in this part should be addressed to the Deputy Director of the NRC's Office of International Programs, either by telephone to 301-287-9057; by mail to the U.S. Nuclear Regulatory Commission, Washington, DC 20555–0001; by hand delivery to the NRC's offices at 11555 Rockville Pike, Rockville, Maryland; or, where practicable, by electronic submission, for example, via Electronic Information Exchange, or CD-ROM. Electronic submissions must be made in a manner that enables the NRC to receive, read, authenticate, distribute, and archive the submission, and process and retrieve it a single page at a time. Detailed guidance on making electronic submissions can be obtained by visiting the NRC's Web site at *http://www.nrc.gov/site-help/e-submittals.html;* by e-mail to *MSHD.Resource@nrc.gov;* or by writing the Office of the Chief Information Officer, U.S. Nuclear Regulatory Commission, Washington, DC 20555–0001. The guidance discusses, among other topics, the formats the NRC can accept, the use of electronic signatures, and the treatment of nonpublic information.

[68 FR 58824, Oct. 10, 2003, as amended at 74 FR 62686, Dec. 1, 2009; 80 FR 74982, Dec. 1, 2015; 83 FR 58466, Nov. 20, 2018]

§ 110.5 Licensing requirements.

Except as provided under subpart B of this part, no person may export any nuclear equipment or material listed in § 110.8 and § 110.9, or import any nuclear equipment or material listed in § 110.9a, unless authorized by a general or specific license issued under this part.

[56 FR 24684, May 31, 1991, as amended at 58 FR 13002, Mar. 9, 1993]

§ 110.6 Retransfers.

(a) Retransfer of any nuclear equipment or material listed in §§ 110.8 and 110.9 (except byproduct material), including special nuclear material produced through the use of equipment, source material, or special nuclear material bearing obligations to the United States pursuant to an agreement for cooperation, requires authorization by the Department of Energy, unless the export to the new destination is authorized by the NRC under a specific or general license or an exemption from licensing requirements. See definition of ''obligations'' in § 110.2.

(b) Requests for authority to retransfer are processed by the Department of Energy, National Nuclear Security Administration, Office of Nonproliferation and Arms Control, Washington, DC 20585.

[75 FR 44087, July 28, 2010, as amended at 83 FR 58466, Nov. 20, 2018]

§ 110.7 Information collection requirements: OMB approval.

(a) The Nuclear Regulatory Commission has submitted the information collection requirements contained in this part to the Office of Management and Budget (OMB) for approval as required by the Paperwork Reduction

Act (44 U.S.C. 3501 *et seq.*). The NRC may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. OMB has approved the information collection requirements contained in this part under control numbers 3150–0036.

(b) The approved information requirements contained in this part appear in §§ 110.7a, 110.10, 110.27, 110.32, 110.50, 110.52, 110.53, and 110.54.

(c) This part contains information collection requirements in addition to those approved under the control number specified in paragraph (a) of this section. The information collection requirements contained in §§ 110.19, 110.20, 110.21, 110.22, 110.23, 110.31, 110.32, and 110.51, and NRC Form 7 are approved under control number 3150–0027.

[62 FR 52190, Oct. 6, 1997, as amended at 65 FR 70290, Nov. 22, 2000; 67 FR 67101, Nov. 4, 2002; 71 FR 19104, Apr. 13, 2006; 75 FR 44087, July 28, 2010; 76 FR 72087, Nov. 22, 2011; 85 FR 65664, Oct. 16, 2020]

§ 110.7a Completeness and accuracy of information.

(a) Information provided to the Commission by an applicant for a license or by a licensee or information required by statute or by the Commission's regulations, orders, or license conditions to be maintained by the applicant or the licensee shall be complete and accurate in all material respects.

(b) Each licensee or applicant for a license shall notify the Commission 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 paragraph if the applicant or licensee fails to notify the Commission 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 shall be provided to the Administrator of the appropriate Regional Office within two working days of identifying the information. This requirement is not applicable to information which is already required to be provided to the Commission by other reporting or updating requirements.

[52 FR 49374, Dec. 31, 1987, as amended at 75 FR 44087, July 28, 2010]

§ 110.7b Deliberate misconduct.

(a) Any licensee, applicant for a license, employee of a licensee or applicant; or any contractor (including a supplier or consultant), subcontractor, employee of a contractor or subcontractor of any licensee or applicant for a license, who knowingly provides to any licensee, applicant, contractor, or subcontractor, any components, equipment, materials, or other goods or services that relate to a licensee's or applicant's activities in this part, may not:

(1) Engage in deliberate misconduct that causes or would have caused, if not detected, a licensee or applicant to be in violation of any rule, regulation, or order; or any term, condition, or limitation of any license issued by the Commission; or

(2) Deliberately submit to the NRC, a licensee, an applicant, or a licensee's or applicant's contractor or subcontractor, information that the person submitting the information knows to be incomplete or inaccurate in some respect material to the NRC.

(b) A person who violates paragraph (a)(1) or (a)(2) of this section may be subject to enforcement action in accordance with the procedures in 10 CFR part 2, subpart B.

(c) For the purposes of paragraph (a)(1) of this section, deliberate misconduct by a person means an intentional act or omission that the person knows:

(1) Would cause a licensee or applicant to be in violation of any rule, regulation, or order; or any term, condition, or limitation, of any license issued by the Commission; or

(2) Constitutes a violation of a requirement, procedure, instruction, contract, purchase order, or policy of a licensee, applicant, contractor, or subcontractor.

[63 FR 1900, Jan. 13, 1998]

§ 110.8 List of nuclear facilities and equipment under NRC export licensing authority.

(a) Nuclear reactors and especially designed or prepared equipment and components for nuclear reactors. (See Appendix A to this part.)

(b) Plants for the separation of isotopes of uranium (source material or special nuclear material) including gas centrifuge plants, gaseous diffusion plants, aerodynamic enrichment plants, chemical exchange or ion exchange enrichment plants, laser based enrichment plants, plasma separation enrichment plants, electromagnetic enrichment plants, and especially designed or prepared equipment, other than analytical instruments, for the separation of isotopes of uranium. (See appendices to this part for lists of: gas centrifuge equipment—Appendix B; gaseous diffusion equipment—Appendix C; aerodynamic enrichment equipment—Appendix D; chemical exchange or ion exchange enrichment equipment—Appendix E; laser based enrichment equipment—Appendix F; plasma separation enrichment equipment—Appendix G; and electromagnetic enrichment equipment—Appendix H.)

(c) Plants for the separation of the isotopes of lithium and especially designed or prepared assemblies and components for these plants. (See Appendix N to this part.)

(d) Plants for the reprocessing of irradiated nuclear reactor fuel elements and especially designed or prepared assemblies and components for these plants. (See Appendix I to this part.)

(e) Plants for the fabrication of nuclear reactor fuel elements and especially designed or prepared assemblies and components for these plants. (See Appendix O to this part.)

(f) Plants for the conversion of uranium and plutonium and especially designed or prepared assemblies and components for these plants. (See Appendix J to this part.)

(g) Plants for the production, separation, or purification of heavy water, deuterium, and deuterium compounds and especially designed or prepared assemblies and components for these plants. (See Appendix K to this part.)

(h) Plants for the production of special nuclear material using accelerator-driven subcritical assembly systems capable of continuous operation above 5 MW thermal.

(i) Other nuclear-related commodities are under the export licensing authority of the Department of Commerce.

[61 FR 35602, July 8, 1996, as amended at 65 FR 70290, Nov. 22, 2000; 86 FR 43404, Aug. 9, 2021]

§ 110.9 List of Nuclear Material under NRC export licensing authority.

(a) Special Nuclear Material.

(b) Source Material.

(c) Byproduct Material.

(d) Deuterium for nuclear end use.

(e) Nuclear grade graphite for nuclear end use.

[55 FR 30450, July 26, 1990, as amended at 70 FR 41939, July 21, 2005; 86 FR 55479, Oct. 6, 2021]

§ 110.9a List of nuclear equipment and material under NRC import licensing authority.

(a) Production and utilization facilities.

(b) Special nuclear material.

(c) Source material.

(d) Byproduct material.

[49 FR 47198, Dec. 3, 1984. Redesignated at 55 FR 30450, July 26, 1990, and amended at 57 FR 18393, Apr. 30, 1992; 58 FR 13003, Mar. 9, 1993]

Subpart B—Exemptions

§ 110.10 General.

(a) In response to a request or on its own initiative, the Commission may grant an exemption from the regulations in this part, if it determines that the exemption:

(1) Is authorized by law;

(2) Is not inimical to the common defense and security; and

(3) Does not constitute an unreasonable risk to the public health and safety.

(b) An exemption from statutory licensing requirements, as authorized by sections 57d, 62, and 81 of the Atomic Energy Act, will be granted only after coordination with the Executive Branch.

(c) The granting of an exemption does not relieve any person from complying with the regulations of other

U.S. Federal and/or State government agencies applicable to exports or imports under their authority.

[49 FR 47198, Dec. 3, 1984, as amended at 58 FR 13003, Mar. 9, 1993; 65 FR 70290, Nov. 22, 2000; 75 FR 44087, July 28, 2010]

§ 110.11 Export of IAEA safeguards samples.

(a) A person is exempt from the requirements for a license to export special nuclear, source, and byproduct material set forth in sections 53, 54d, 64, 81 and 82 of the Atomic Energy Act and from the regulations in this part to the extent that the person exports special nuclear, source, or byproduct material in IAEA safeguards samples. The samples must be exported in accordance with §75.8 of this chapter, or a comparable U.S. Department of Energy order, and:

(1) For special nuclear material, be in quantities not exceeding a combined total of 100 grams of contained plutonium, uranium-233, and uranium-235 per facility per year;

(2) For source material, be in quantities not exceeding 5 kilograms per facility per year; and

(3) For byproduct material, be in quantities not exceeding the values in §30.71 of this chapter per shipment.

(b) This exemption does not relieve any person from complying with parts 71 or 73 of this chapter or any Commission order under section 201(a) of the Energy Reorganization Act of 1974 (42 U.S.C. 5841(a)).

[77 FR 27114, May 9, 2012]

Subpart C—Licenses

SOURCE: 49 FR 47198, Dec. 3, 1984, unless otherwise noted.

§ 110.19 Types of licenses.

Licenses for the export and import of nuclear equipment and material in this part consist of general licenses and specific licenses. A general license is effective without the filing of an application with the Commission or the issuance of licensing documents to a particular person. A specific license is issued to a named person and is effective upon approval by the Commission of an application filed pursuant to the regulations in this part and issuance of licensing documents to the applicant.

[75 FR 44087, July 28, 2010]

§ 110.20 General license information.

(a) A person may use an NRC general license as authority to export or import nuclear equipment or material, if the nuclear equipment or material to be exported or imported is covered by the NRC general licenses described in §§110.21 through 110.27. If an export or import is not covered by the NRC general licenses described in §§110.21 through 110.27, a person must file an application with the Commission for a specific license in accordance with §§110.31 through 110.32.

(b) In response to a petition or on its own initiative, the Commission may issue a general license for export or import if it determines that any exports or imports made under the general license will not be inimical to the common defense and security or constitute an unreasonable risk to the public health and safety and otherwise meet applicable statutory requirements. A general license is issued as a regulation after a rulemaking proceeding under subpart K of this part. Issuance of a general license is coordinated with the Executive Branch.

(c) A general license does not relieve a person from complying with the regulations of other Government agencies applicable to exports or imports under their authority.

(d) A general license for export may not be used if the exporter knows, or has reason to believe, that the material will be used in any illegal activity or any activity related to isotope separation, chemical reprocessing, heavy water production or the fabrication of nuclear fuel containing plutonium, unless these activities are generically authorized under an appropriate agreement for cooperation.

(e) A person who uses an NRC general license as the authority to export or import may cite on the shipping documents the section of this part which authorizes the described export or import under general license, as a means of expediting U.S. Customs and Border Protection's processing of the shipment.

(f) As specified in §§110.21 through 110.26, 110.28, 110.29, and 110.30 only certain countries are eligible recipients of equipment or material under NRC general licenses to export. The Commission will closely monitor these countries and may at any time remove a country from a general license in response to significant adverse developments in the country involved. A key factor in this regard is the nonproliferation credentials of the importing country.

[49 FR 47198, Dec. 3, 1984, as amended at 58 FR 13003, Mar. 9, 1993; 59 FR 48997, Sept. 26, 1994; 60 FR 37563, July 21, 1995; 75 FR 44087, July 28, 2010; 86 FR 43404, Aug. 9, 2021]

§ 110.21 General license for the export of special nuclear material.

(a) Except as provided in paragraph (d) of this section, a general license is issued to any person to export the following to any country not listed in §110.28:

(1) Low-enriched uranium as residual contamination (17.5 parts per million or less) in any item or substance.

(2) Plutonium containing 80 percent or more by weight of plutonium-238 in cardiac pacemakers.

(3) Special nuclear material, other than plutonium-236 and plutonium-238, in sensing components in instruments, if no more than 3 grams of enriched uranium or 0.1 gram of plutonium or uranium-233 are contained in each sensing component.

(4) Plutonium–236 and plutonium–238 when contained in a device, or a source for use in a device, in quantities of less than 3.7×10^{-3} TBq (100 millicuries) of alpha activity (189 micrograms plutonium–236, 5.88 milligrams plutonium–238) per device or source.

(b) Except as provided in paragraph (d) of this section, a general license is issued to any person to export the following to any country not listed in §110.28 or §110.29:

(1) Special nuclear material, other than plutonium-236 and plutonium-238, in individual shipments of 0.001 effective kilogram or less (e.g., 1.0 gram of plutonium, uranium–233 or uranium–235, or 10 kilograms of 1 percent enriched uranium), not to exceed 0.1 effective kilogram per calendar year to any one country.

(2) Special nuclear material in fuel elements as replacements for damaged or defective unirradiated fuel elements previously exported under a specific license, subject to the same terms as the original export license and the condition that the replaced fuel elements must be returned to the United States within a reasonable time period.

(3) Uranium, enriched to less than 20 percent in uranium–235, in the form of uranium hexafluoride (UF6) heels in cylinders being returned to suppliers in EURATOM or the United Kingdom.

(c) Except as provided in paragraph (d) of this section, a general license is issued to any person to export plutonium-236 or plutonium-238 to any country listed in §110.30 in individual shipments of 1 gram or less, not to exceed 100 grams per calendar year to any one country.

(d) The general licenses in paragraphs (a), (b), and (c) of this section do not authorize the export of special nuclear material in radioactive waste.

[49 FR 47198, Dec. 3, 1984, as amended at 58 FR 13003, Mar. 9, 1993; 59 FR 48997, Sept. 26, 1994; 60 FR 37563, July 21, 1995; 65 FR 70290, Nov. 22, 2000; 70 FR 46066, Aug. 9, 2005; 75 FR 44087, July 28, 2010; 85 FR 86795, Dec. 31, 2020]

§ 110.22 General license for the export of source material.

(a) Except as provided in paragraph (e) of this section, a general license is issued to any person to export the following to any country not listed in §110.28:

(1) Uranium or thorium, other than uranium–230, uranium–232, thorium–227, and thorium–228, in any substance in concentrations of less than 0.05 percent by weight.

(2) Thorium, other than thorium–227 and thorium–228, in incandescent gas mantles or in alloys in concentrations of 5 percent or less.

(3) Thorium–227, thorium–228, uranium–230, and uranium–232 when contained in a device, or a source for use in a device, in quantities of less than 3.7×10^{-3} TBq (100 millicuries) of alpha activity (3.12 micrograms thorium-227, 122 micrograms thorium-228, 3.7 micrograms uranium–230, 4.7 milligrams uranium-232) per device or source.

(4) A general license is issued to any person to export uranium, enriched to less than 20 percent in U–235, in the form of UF6 heels in cylinders being returned to suppliers in EURATOM or the United Kingdom.

(b) Except as provided in paragraph (e) of this section, a general license is issued to any person to export uranium or thorium, other than uranium-230, uranium-232, thorium-227, or thorium-228, in individual shipments of 10 kilograms or less to any country not listed in §110.28 or §110.29, not to exceed 1,000 kilograms per calendar year to any one country or 500 kilograms per calendar year to any one country when the uranium or thorium is Canadian-obligated.

(c) Except as provided in paragraph (e) of this section, a general license is issued to any person to export uranium or thorium, other than uranium–230, uranium–232, thorium–227, or thorium–228, in individual shipments of 1 kilogram or less to any country listed in §110.29, not to exceed 100 kilograms per calendar year to any one country.

(d) Except as provided in paragraph (e) of this section, a general license is issued to any person to export uranium–230, uranium–232, thorium–227, or thorium–228 in individual shipments of 10 kilograms or less to any country listed in §110.30, not to exceed 1,000 kilograms per calendar year to any one country or 500 kilograms per calendar year to any one country when the uranium or thorium is Canadian-obligated.

(e) Paragraphs (a), (b), (c), and (d) of this section do not authorize the export under general license of source material in radioactive waste.

[75 FR 44088, July 28, 2010, as amended at 77 FR 27114, May 9, 2012; 87 FR 68032, Nov. 14, 2022]

§ 110.23 General license for the export of byproduct material.

(a) A general license is issued to any person to export byproduct material (see Appendix L to this part) to any country not listed in §110.28 and subject to the following limitations:

(1) The general license in this section does not authorize the export of byproduct material in the form of radioactive waste.

(2) The general license in this section does not authorize the export of the following radionuclides:

Americium–242m
Californium–249
Californium–251
Curium–245
Curium–247

(3) For byproduct materials listed in Table 1 of Appendix P to this part, individual shipments under a general license for export must be less than the terabecquerel (TBq) values specified in Category 2 of Table 1 unless a more restrictive requirement applies.

(4) The general license authorizes exports of the following radionuclides when contained in a device, or a source for use in a device, in quantities less than 3.7×10^{-3} TBq (100 millicuries) of alpha activity per device or source, unless the export is to a country listed in §110.30:

Actinium–225
Actinium–227
Californium–248
Californium–250
Californium–252
Californium–253
Californium–254
Curium–240
Curium–241
Curium–242
Curium–243
Curium–244
Einsteinium–252
Einsteinium–253
Einsteinium–254
Einsteinium–255
Fermium–257
Gadolinium–148
Mendelevium–258
Neptunium–235
Polonium–208
Polonium–209
Polonium–210
Radium–223

(5)(i) For americium–241, exports under the general license to a country listed in §110.29 must not exceed 3.7×10^{-2} TBq (one curie) per shipment.

(ii) For americium–241, exports under the general license to a country listed in §110.29 that exceed 3.7×10^{-2} TBq (one curie) per shipment, must be contained in industrial process control equipment or petroleum exploration equipment in quantities not exceeding 0.60 TBq (16 curies) per device and not exceeding 7.4 TBq/calendar year (200 curies/calendar year) to any one country.

(iii) All exports of americium are subject to the reporting requirements listed in § 110.54(b).

(6) For neptunium–235 and –237, exports under the general license must not exceed one gram for individual shipment and must not exceed a cumulative total of 10 grams per calendar year to any one country. All exports of neptunium are subject to the reporting requirements listed in § 110.54(b).

(7) For polonium–210, exports under the general license, when contained in static eliminators, must not exceed 3.7 TBq (100 curies) per individual shipment.

(8)(i) For tritium in any dispersed form (e.g., luminescent light sources and paint, accelerator targets, calibration standards, labeled compounds), exports under the general license must not exceed 0.37 TBq (10 curies (1.03 milligrams)) per item, not to exceed 37 TBq (1,000 curies (103 milligrams)) per shipment, or 370 TBq (10,000 curies (1.03 grams)) per calendar year to any one country.

(ii) For tritium in any dispersed form (e.g., luminescent light sources and paint, accelerator targets, calibration standards, labeled compounds), exports under the general license to the countries listed in § 110.30 must not exceed the quantity of 1.48 TBq (40 curies (4.12 milligrams)) per item, not to exceed 37 TBq (1,000 curies (103 milligrams)) per shipment or 370 TBq (10,000 curies (1.03 grams)) per calendar year to any one country.

(iii) For tritium in luminescent safety devices installed in an aircraft, exports under the general license must not exceed 1.48 TBq (40 curies (4.12 milligrams)) per light source.

(iv) The general license in this section does not authorize the export of tritium for recovery or recycle purposes.

(b) [Reserved]

[75 FR 44088, July 28, 2010, as amended at 82 FR 52826, Nov. 15, 2017]

§ 110.24 General license for the export of deuterium for nuclear end use.

(a) A general license is issued to any person to export to any country not listed in § 110.28 or § 110.29:

(1) Deuterium and deuterium compounds (other than heavy water) for nuclear end use in individual shipments of 10 kilograms or less, not to exceed 200 kilograms per calendar year to any one country; and

(2) Heavy water for nuclear end use in individual shipments of 50 kilograms or less, not to exceed 1,000 kilograms per calendar year to any one country.

(b) A general license is issued to any person to export to any country listed in § 110.29:

(1) Deuterium and deuterium compounds (other than heavy water) for nuclear end use in individual shipments of 1 kilogram or less, not to exceed 5 kilograms per calendar year to any one country listed in § 110.29; and

(2) Heavy water for nuclear end use in individual shipment of 5 kilograms or less, not to exceed 25 kilograms per calendar year to any one country listed in § 110.29.

[86 FR 55479, Oct. 6, 2021]

§ 110.25 [Reserved]

§ 110.26 General license for the export of nuclear reactor components.

(a) A general license is issued to any person to export to a destination listed in paragraph (b) of this section any nuclear reactor component of U.S. origin described in paragraphs (5) through (11) of appendix A to this part if—

(1) The component will be used in a light or heavy water-moderated power or research reactor; or

(2) The component is in semi-fabricated form and will be undergoing final fabrication or repair in those countries for either subsequent return to the United States for use in a nuclear power or research reactor in the United States or in one of the destinations listed in paragraph (b) of this section.

(b) The export of nuclear reactor components under the general license established in paragraph (a) of this section is approved to the following destinations:

Austria	Finland
Belgium	France
Bulgaria	Germany
Canada	Greece
Cyprus	Hungary
Czech Republic	Indonesia
Denmark	Ireland
Estonia	Italy

Japan	Republic of Korea
Latvia	Romania
Lithuania	Slovak Republic
Luxembourg	Slovenia
Malta	Spain
Netherlands	Sweden
New Zealand	Switzerland
Philippines	Taiwan
Poland	United Kingdom
Portugal	

(c) This general license does not authorize the export of components, in final or semi-fabricated form, for research reactors capable of continuous operation above 5 MW thermal.

(d) This general license does not authorize the export of essentially complete reactors through piecemeal exports of facility components. When individual exports of components would amount in the aggregate to export of an essentially complete nuclear reactor, a facility export license is required.

(e) All exports under paragraph (a) of this section are subject to the reporting requirements in §110.54(c).

NOTE TO §110.26: U.S. Origin includes components produced or finished in the United States, even with non-U.S. content unless the foreign content is obligated by supplier government conditions, such as a prior consent for retransfer condition.

[75 FR 44089, July 28, 2010, as amended at 79 FR 39291, July 10, 2014]

§110.27 General license for imports.

(a) Except as provided in paragraphs (b) and (c) of this section, a general license is issued to any person to import byproduct, source, or special nuclear material if the U.S. consignee is authorized to receive and possess the material under the relevant NRC or Agreement State regulations.

(b) The general license in paragraph (a) of this section does not authorize the import of more than 100 kilograms per shipment of source and/or special nuclear material in the form of irradiated fuel.

(c) Paragraph (a) of this section does not authorize the import under a general license of radioactive waste.

(d) A person importing formula quantities of strategic special nuclear material (as defined in §73.2 of this chapter) under this general license shall provide the notifications required by §73.27 and §73.72 of this chapter.

(e) A general license is issued to any person to import the major components of a utilization facility as defined in §110.2 for end-use at a utilization facility licensed by the Commission.

(f) Importers of radioactive material listed in appendix P to this part must provide the notifications required by §110.50.

[51 FR 47208, Dec. 31, 1986, as amended at 56 FR 38336, Aug. 13, 1991; 58 FR 13003, Mar. 9, 1993; 60 FR 37564, July 21, 1995; 61 FR 35602, July 8, 1996; 65 FR 70291, Nov. 22, 2000; 68 FR 31589, May 28, 2003; 70 FR 37991, July 1, 2005; 75 FR 44089, July 28, 2010; 77 FR 27114, May 9, 2012]

§110.28 Embargoed destinations.

Cuba	North Korea
Iran	Syria
Iraq	Sudan

[58 FR 13003, Mar. 9, 1993, as amended at 61 FR 35602, July 8, 1996; 65 FR 70291, Nov. 22, 2000; 70 FR 29936, May 25, 2005; 72 FR 1427, Jan. 12, 2007]

§110.29 Restricted destinations.

Afghanistan	India
Andorra	Israel
Angola	Libya
Burma (Myanmar)	Pakistan
Djibouti	South Sudan

[58 FR 13003, Mar. 9, 1993, as amended at 59 FR 48998, Sept. 26, 1994; 61 FR 35602, July 8, 1996; 70 FR 29936, May 25, 2005; 72 FR 1427, Jan. 12, 2007; 77 FR 11385, Feb. 27, 2012; 78 FR 8361, Feb. 6, 2013]

§110.30 Members of the Nuclear Suppliers Group.

Argentina	Italy
Australia	Japan
Austria	Kazakhstan
Belarus	Latvia
Belgium	Lithuania
Brazil	Luxembourg
Bulgaria	Malta
Canada	Mexico
China	Netherlands
Croatia	New Zealand
Cyprus	Norway
Czech Republic	Poland
Denmark	Portugal
Estonia	Republic of Korea
Finland	Romania
France	Russia
Germany	Serbia
Greece	Slovak Republic
Hungary	Slovenia
Iceland	South Africa
Ireland	Spain

Sweden	Ukraine
Switzerland	United Kingdom
Turkey	

[59 FR 48998, Sept. 26, 1994, as amended at 61 FR 35602, July 8, 1996; 65 FR 70291, Nov. 22, 2000; 75 FR 44089, July 28, 2010; 79 FR 39291, July 10, 2014]

§ 110.31 Application for a specific license.

(a) A person shall file an application for a specific license to export or import with the Deputy Director of the NRC's Office of International Programs, using an appropriate method listed in § 110.4.

(b) Applications for an export, import, amendment or renewal licenses or a request for an exemption from a licensing requirement under this part shall be filed on NRC Form 7.

(c) An application for a specific license to export or import or a request for an exemption from a licensing requirement must be accompanied by the appropriate fee in accordance with the fee schedules in § 170.21 and § 170.31 of this chapter. A license application will not be processed unless the specified fee is received.

(d) Each application on NRC Form 7 shall be signed by the applicant or licensee or a person duly authorized to act for and on behalf of the applicant or licensee.

(e) Each person shall provide in the license application, as appropriate, the information specified in § 110.32. The Commission also may require the submission of additional information if necessary to complete its review.

(f) An application may cover multiple shipments and destinations.

(g) The applicant shall withdraw an application when it is no longer needed. The Commission's official files retain all documents related to a withdrawn application.

[75 FR 44089, July 28, 2010]

§ 110.32 Information required in an application for a specific license/NRC Form 7.

(a) Name and address of applicant.

(b) Name and address of any other party, including the supplier of equipment or material, if different from the applicant.

(c) Country of origin of equipment or material, and any other countries that have processed the material prior to its import into the U.S.

NOTE: This is meant to include all obligations attached to the material, according to the definition of *obligations* in § 110.2. Licensees must keep records of obligations attached to material which they own or is in their possession.

(d) Names and addresses of all intermediate and ultimate consignees, other than intermediate consignees performing shipping services only.

(e) Dates of proposed first and last shipments.

(f) Description of the equipment or material including, as appropriate, the following:

(1) Maximum quantity of material in grams or kilograms (terabecquerels or TBq for byproduct material) and its chemical and physical form.

(2) For enriched uranium, the maximum weight percentage of enrichment and maximum weight of contained uranium-235.

(3) For nuclear equipment, the name of the facility and its total dollar value.

(4) For nuclear reactors, the name of the facility, its design power level and its total dollar value.

(5) For proposed exports or imports of radioactive waste, the volume, physical and chemical characteristics, route of transit of shipment, classification (as defined in § 61.55 of this chapter) if imported or exported for direct disposal at part 61 or equivalent Agreement State licensed facility, and ultimate disposition (including forms of management or treatment) of the waste.

(6) For proposed imports of radioactive waste, the industrial or other process responsible for generation of the waste, and the status of the arrangements for disposition, including pertinent documentation of these arrangements.

(7) Description of end use by all consignees in sufficient detail to permit accurate evaluation of the justification for the proposed export or import, including the need for shipment by the dates specified.

(g)(1) For proposed exports of Category 1 quantities of material listed in

Table 1 of appendix P to this part, pertinent documentation that the recipient of the material has the necessary authorization under the laws and regulations of the importing country to receive and possess the material.

(2) For proposed exports of Category 2 quantities of material listed in Table 1 of appendix P to this part, pertinent documentation that the recipient of the material has the necessary authorization under the laws and regulations of the importing country to receive and possess the material. This documentation must be provided to the NRC at least 24 hours prior to the shipment.

(3) Pertinent documentation shall consist of a copy of the recipient's authorization to receive and possess the material to be exported or a confirmation from the government of the importing country that the recipient is so authorized. The recipient authorization shall include the following information:

(i) Name of the recipient;

(ii) Recipient location and legal address or principal place of business;

(iii) Relevant radionuclides and radioactivity being imported or that the recipient is authorized to receive and possess;

(iv) Uses, if appropriate; and

(v) The expiration date of the recipient's authorization (if any).

[75 FR 44089, July 28, 2010, as amended at 82 FR 52826, Nov. 15, 2017]

Subpart D—Review of License Applications

§ 110.40 Commission review.

(a) Immediately after receipt of a license application for an export or import requiring a specific license under this part, the Commission will initiate its licensing review and, to the maximum extent feasible, will expeditiously process the application concurrently with any applicable review by the Executive Branch.

(b) The Commissioners shall review a license application for export of the following:

(1) A production or utilization facility.

(2) More than 5 effective kilograms of high-enriched uranium, plutonium or uranium-233.

(3) An export involving assistance to end uses related to isotope separation, chemical reprocessing, heavy water production, advanced reactors, or the fabrication of nuclear fuel containing plutonium, except for exports of source material or low-enriched uranium to EURATOM, the United Kingdom, or Japan for enrichment up to 5 percent in the isotope uranium–235, and those categories of exports which the Commission has approved in advance as constituting permitted incidental assistance.

(4) The initial export to a country since March 10, 1978 of source or special nuclear material for nuclear end use.

(5) An initial export to any country listed in § 110.28 or § 110.29 involving over:

(i) 10 grams of plutonium, uranium-233 or high-enriched uranium;

(ii) 1 effective kilogram of low-enriched uranium;

(iii) 250 kilograms of source material;

(iv) 250 kilograms of heavy water for nuclear end use; or

(v) 37 TBq (1,000 curies) of tritium.

(6) The export of radioactive material listed in Table 1 of Appendix P of this part involving:

(i) Exceptional circumstances in § 110.42(e); or

(ii) Category 1 quantities of material to any country listed in § 110.28.

(c) The Commission will review export and import license applications raising significant policy issues.

(d) If the Commission has not completed action on a license application within 60 days after receipt of the Executive Branch judgment, as provided for in § 110.41, or the license application when an Executive Branch judgment is not required, it will inform the applicant in writing of the reason for delay and, as appropriate, provide follow-up reports.

[75 FR 44090, July 28, 2010, as amended at 85 FR 86795, Dec. 31, 2020; 86 FR 55479, Oct. 6, 2021]

§ 110.41 Executive Branch review.

(a) An application for a license to export the following will be promptly forwarded to the Executive Branch for review:

(1) A production or utilization facility.

(2) More than one effective kilogram of high-enriched uranium or 10 grams of plutonium or uranium–233.

(3) Nuclear grade graphite for nuclear end use.

(4) More than 3.7 TBq (100 Curies) of tritium;

(5) Deuterium for nuclear end use, other than exports of deuterium to Canada;

(6) One kilogram or more of source or special nuclear material to be exported under the US-IAEA Agreement for Cooperation.

(7) An export involving assistance to end uses related to isotope separation, chemical reprocessing, heavy water production, advanced reactors, or the fabrication of nuclear fuel containing plutonium, except for exports of source material or low-enriched uranium to EURATOM, the United Kingdom, or Japan for enrichment up to 5 percent in the isotope uranium–235, and those categories of exports approved in advance by the Executive Branch as constituting permitted incidental assistance.

(8) The initial export of nuclear material or equipment to a foreign reactor.

(9) An export involving radioactive waste.

(10) An export to any country listed in §110.28 or §110.29.

(11) An export raising significant policy issues or subject to special limitations as determined by the Commission or the Executive Branch, including exports of radioactive material listed in Table 1 of appendix P to this part involving exceptional circumstances in §110.42(e).

(b) The Executive Branch will be requested to:

(1) Provide its judgment as to whether the proposed export would be inimical to the common defense and security, along with supporting rationale and information.

(2) Where applicable, confirm that the proposed export would be under the terms of an agreement for cooperation; and

(3) Address the extent to which the export criteria in §110.42 are met, if applicable, and the extent to which the recipient country or group of countries has adhered to the provisions of any applicable agreement for cooperation.

(c) The Commission may request the Executive Branch to address specific concerns and provide additional data and recommendations as necessary.

[43 FR 21641, May 19, 1978, as amended at 49 FR 47200, Dec. 3, 1984; 58 FR 13004, Mar. 9, 1993; 60 FR 37564, July 21, 1995; 61 FR 35602, July 8, 1996; 70 FR 41939, July 21, 2005; 70 FR 37992, July 1, 2005; 70 FR 46066, Aug. 9, 2005; 75 FR 44090, July 28, 2010; 85 FR 86795, Dec. 31, 2020; 86 FR 55479, Oct. 6, 2021]

§110.42 Export licensing criteria.

(a) The review of license applications for export for peaceful nuclear uses of production or utilization facilities[1] or for export for peaceful nuclear uses of special nuclear or source material requiring a specific license under this part is governed by the following criteria:

(1) IAEA safeguards as required by Article III (2) of the NPT will be applied with respect to any such facilities or material proposed to be exported, to any such material or facilities previously exported and subject to the applicable agreement for cooperation, and to any special nuclear material used in or produced through the use thereof.

(2) No such material or facilities proposed to be exported or previously exported and subject to the applicable agreement for cooperation, and no special nuclear material produced through the use of such material or facilities, will be used for any nuclear explosive device or for research on or development of any nuclear explosive device.

(3) Adequate physical security measures will be maintained with respect to such material or facilities proposed to be exported and to any special nuclear

[1] Export of nuclear reactors, reactor pressure vessels, reactor primary coolant pumps and circulators, ''on-line'' reactor fuel charging and discharging machines, and complete reactor control rod systems, as specified in paragraphs (1) through (4) of appendix A to this part, are subject to the export licensing criteria in §110.42(a). Exports of nuclear reactor components, as specified in paragraphs (5) through (11) of appendix A to this part, when exported separately from the items described in paragraphs (1) through (4) of appendix A to this part, are subject to the export licensing criteria in §110.42(b).

material used in or produced through the use thereof. Physical security measures will be deemed adequate if such measures provide a level of protection equivalent to that set forth in § 110.44.

(4) No such material or facilities proposed to be exported, and no special nuclear material produced through the use of such material, will be retransferred to the jurisdiction of any other country or group of countries unless the prior approval of the United States is obtained for such retransfer.

(5) No such material proposed to be exported and no special nuclear material produced through the use of such material will be reprocessed, and no irradiated fuel elements containing such material removed from a reactor will be altered in form or content, unless the prior approval of the United States is obtained for such reprocessing or alteration.

(6) With respect to exports of such material or facilities to nonnuclear weapon states, IAEA safeguards will be maintained with respect to all peaceful activities in, under the jurisdiction of, or carried out under the control of such state at the time of export. This criterion will not be applied if the Commission has been notified by the President in writing that failure to approve an export because this criterion has not been met would be seriously prejudicial to the achievement of United States nonproliferation objectives or otherwise jeopardize the common defense and security, in which case the provisions of section 128 of the Atomic Energy Act regarding Congressional review will apply.

(7) The proposed export of a facility or of more than 0.003 effective kilograms of special nuclear material, other than plutonium containing 80 percent or more by weight of plutonium-238, would be under the terms of an agreement for cooperation.

(8) The proposed export is not inimical to the common defense and security and, in the case of facility exports, does not constitute an unreasonable risk to the public health and safety in the United States.

(9)(i) Except as provided in paragraph (a)(9)(ii) of this section, with respect to exports of high-enriched uranium to be used as a fuel or target in a nuclear research or test reactor, the Commission determines that:

(A) There is no alternative nuclear reactor fuel or target enriched to less than 20 percent in the isotope U–235 that can be used in that reactor;

(B) The proposed recipient of the uranium has provided assurances that, whenever an alternative nuclear reactor fuel or target can be used in that reactor, it will use that alternative fuel or target in lieu of highly-enriched uranium; and

(C) The United States Government is actively developing an alternative nuclear reactor fuel or target that can be used in that reactor.

(ii) With regard to a Recipient Country, the Commission may issue a license authorizing the export of high-enriched uranium for medical isotope production, including shipment to and use at intermediate and ultimate consignees, if the Commission determines that:

(A) The Recipient Country that supplies an assurance letter to the United States Government in connection with the consideration by the Commission of the export license application has informed the United States Government that any intermediate consignees and the ultimate consignee specified in the export license application are required to use the high-enriched uranium solely for the production of medical isotopes; and

(B) The high-enriched uranium will be irradiated only in a reactor in the Recipient Country that—

(*1*) Uses an alternative nuclear fuel; or

(*2*) Is the subject of an agreement with the United States Government to convert to an alternative nuclear reactor fuel when alternative nuclear reactor fuel can be used in the reactor.

(iii) A fuel or target ''can be used'' in a nuclear research or test reactor if—

(A) The fuel or target has been qualified by the Reduced Enrichment Research and Test Reactor Program of the Department of Energy; and

(B) Use of the fuel or target will permit the large majority of ongoing and planned experiments and isotope production to be conducted in the reactor

without a large percentage increase in the total cost of operating the reactor.

(b) The review of license applications for the export of nuclear equipment, other than a production or utilization facility, and for deuterium for nuclear end use and nuclear grade graphite for nuclear end use is governed by the following criteria:

(1) IAEA safeguards as required by Article III (2) of the NPT will be applied with respect to such equipment or material.

(2) No such equipment or material will be used for any nuclear explosive device or for research on or development of any nuclear explosive device.

(3) No such equipment or material will be retransferred to the jurisdiction of any other country or group of countries without the prior consent of the United States.

(4) The proposed export is not inimical to the common defense and security.

(c) Except where paragraph (d) is applicable, the review of license applications for export of byproduct material or for export of source material for non-nuclear end uses requiring a specific license under this part is governed by the criterion that the proposed export is not inimical to the common defense and security.

(d) The review of license applications for the export of radioactive waste requiring a specific license under this part is governed by the following criteria:

(1) The proposed export is not inimical to the common defense and security.

(2) The receiving country, after being advised of the information required by §110.32(f)(5), finds that it has the administrative and technical capacity and regulatory structure to manage and dispose of the waste and consents to the receipt of the radioactive waste. In the case of radioactive waste containing a nuclear material to which paragraph (a) or (b) of this section is applicable, the criteria in this paragraph (d) shall be in addition to the criteria provided in paragraph (a) or (b) of this section.

(e) In making its findings under paragraphs (a)(8) and (c) of this section for proposed exports of radioactive material listed in Appendix P to this part, the NRC shall consider:

(1) Whether the foreign recipient is authorized based on the authorization or confirmation required by §110.32(g) to receive and possess the material under the laws and regulations of the importing country;

(2) Whether the importing country has the appropriate technical and administrative capability, resources and regulatory structure to manage the material in a safe and secure manner;

(3) For proposed exports of Category 1 amounts of radioactive material listed in Table 1 of Appendix P to this part, whether the government of the importing country provides consent to the United States Government for the import of the material;

(4) In cases where the importing country does not have the technical and administrative capability described in paragraph (e)(2) of this section, and in cases where there is insufficient evidence of the recipient's authorization to receive and possess the material to be exported, described in paragraph (e)(1) of this section, whether exceptional circumstances exist, and if so, whether the export should be licensed in light of those exceptional circumstances and the risks, if any, to the common defense and security of the proposed export;

(5) For proposed exports under exceptional circumstances of Category 1 or Category 2 amounts of radioactive material listed in Table 1 of Appendix P to this part, whether the government of the importing country provides consent to the United States Government for the import of the material;

(6) For proposed exports of radioactive material listed in Table 1 of Appendix P to this part under the exceptional circumstance in which there is a considerable health or medical need as acknowledged by the U.S. Government and the importing country, whether the United States and the importing country have, to the extent practicable, made arrangements for the safe and secure management of the radioactive sources during and at the end of their useful life;

(7) Based upon the available information, whether the foreign recipient has

engaged in clandestine or illegal procurement of radioactive material listed in Table 1 of Appendix P to the part;

(8) Based upon available information, whether an import or export authorization for radioactive material listed in Table 1 of Appendix P to this part has been denied to the recipient or importing country, or whether the recipient or importing country has diverted any import or export of radioactive material previously authorized; and

(9) Based upon available information, whether there is a risk of diversion or malicious acts involving radioactive material in Table 1 of Appendix P to this part.

[49 FR 47200, Dec. 3, 1984, as amended at 55 FR 34519, Aug. 23, 1990; 58 FR 13004, Mar. 9, 1993; 58 FR 57964, Oct. 28, 1993; 60 FR 37564, July 21, 1995; 70 FR 37992, July 1, 2005; 70 FR 41939, July 21, 2005; 70 FR 46066, Aug. 9, 2005; 71 FR 20339, Apr. 20, 2006; 71 FR 40003, July 14, 2006; 79 FR 39291, July 10, 2014; 84 FR 63569, Nov. 18, 2019; 86 FR 55479, Oct. 6, 2021]

§ 110.43 Import licensing criteria.

The review of license applications for imports requiring a specific license under this part is governed by the following criteria:

(a) The proposed import is not inimical to the common defense and security.

(b) The proposed import does not constitute an unreasonable risk to the public health and safety.

(c) Any applicable requirements of subpart A of part 51 of this chapter are satisfied.

(d) With respect to the import of radioactive waste, an appropriate facility has agreed to accept and is authorized to possess the waste for management or disposal as confirmed by NRC consultations with, as applicable, the Agreement State in which the facility is located and low-level waste compact commission(s).

[60 FR 37565, July 21, 1995, as amended at 70 FR 37992, July 1, 2005; 75 FR 44090, July 28, 2010]

§ 110.44 Physical security standards.

(a) Physical security measures in recipient countries must provide protection at least comparable to the recommendations in the current version of IAEA publication, ''Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities'' (INFCIRC/225/Revision 5), January 2011, which is incorporated by reference in this part. This incorporation by reference was approved by the Director of the Office of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Notice of any changes made to the material incorporated by reference will be published in the FEDERAL REGISTER. Copies of INFCIRC/225/Revision 5 may be obtained from the Marketing and Sales Unit, Publishing Section, IAEA, Vienna International Centre, P.O. Box 100, 1400 Vienna Austria; Fax: 43 1 2600 29302; telephone: 43 1 2600 22417; email: *sales.publications@iaea.org*; Web site: *http://www.iaea.org/books*. You may inspect a copy at the NRC Library, 11545 Rockville Pike, Rockville, Maryland 20852–2738, telephone: 301–415–4737 or 1–800–397–4209, between 8:30 a.m. and 4:15 p.m.; or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to: *http://www.archives.gov/federal-register/cfr/ibr-locations.html*.

(b) Commission determinations on the adequacy of physical security measures are based on:

(1) Receipt by the appropriate U.S. Executive Branch Agency of written assurances from the relevant recipient country government that physical security measures providing protection at least comparable to the recommendations set forth in INFCIRC/225/Revision 5.

(2) Information obtained through country visits, information exchanges, or other sources. Determinations are made on a country-wide basis and are subject to continuing review. Appendix M to this part describes the different categories of nuclear material to which physical security measures are applied.

[75 FR 44090, July 28, 2010, as amended at 79 FR 39291, July 10, 2014]

§ 110.45 Issuance or denial of licenses.

(a) The Commission will issue an export license if it has been notified by the State Department that it is the judgment of the Executive Branch that

the proposed export will not be inimical to the common defense and security, and:

(1) Finds, based upon a reasonable judgment of the assurances provided and other information available to the Federal government, that the applicable criteria in §110.42, or their equivalent, are met.

(2) Finds that there are no material changed circumstances associated with an export license application (except for byproduct material applications) from those existing at the time of issuance of a prior license to export to the same country, if the prior license was issued under the provisions of paragraph (a)(1) of this section.

(b) The Commission will issue an import license if it finds that:

(1) The proposed import will not be inimical to the common defense and security;

(2) The proposed import will not constitute an unreasonable risk to the public health and safety;

(3) The requirements of subpart A of part 51 of this chapter (to the extent applicable to the proposed import) have been satisfied; and

(4) With respect to a proposed import of radioactive waste, an appropriate facility has agreed to accept and is authorized to posses the waste for management or disposal as confirmed by NRC consultations with, as applicable, the Agreement State(s) in which the facility is located and the low-level waste compact commission(s).

(c) With respect to a proposed import of radioactive material listed in Table 1 of Appendix P to this part:

(1) If the Commission authorizes a proposed import of Category 1 or Category 2 amounts of radioactive material, it will take appropriate steps to ensure that a copy of the recipient authorization, or confirmation by the U.S. Government that the recipient is authorized to receive and possess the source or sources to be exported, is provided to the Government of the exporting country or to the exporting facility.

(2) If the Commission authorizes a proposed import of Category 1 amounts of radioactive material, it will take appropriate steps to ensure that a copy of the consent of the United States Government to the import is provided to the government of the exporting country in cases where it is requested by such government.

(d) If, after receiving the Executive Branch judgment that the issuance of a proposed export license will not be inimical to the common defense and security, the Commission does not issue the proposed license on a timely basis because it is unable to make the statutory determinations required under the Atomic Energy Act, the Commission will publicly issue a decision to that effect and will submit the license application to the President. The Commission's decision will include an explanation of the basis for the decision and any dissenting or separate views. The provisions in this paragraph do not apply to Commission decisions regarding applications for specific licenses to export byproduct material, including radioactive material listed in Table 1 of appendix P to this part, or radioactive waste.

(e) The Commission will deny: (1) Any export license application for which the Executive Branch judgment does not recommend approval; (2) any byproduct material export license application for which the Commission is unable to make the finding in paragraph (a)(1) of this section; or (3) any import license application for which the Commission is unable to make the finding in paragraph (b) of this section. The applicant will be notified in writing of the reason for denial.

[49 FR 47201, Dec. 3, 1984. Redesignated and amended at 60 FR 37565, July 21, 1995; 70 FR 37992, July 1, 2005; 75 FR 44091, July 28, 2010]

§110.46 Conduct resulting in termination of nuclear exports.

(a) Except as provided in paragraph (c) of this section, no license will be issued to export nuclear equipment or material, other than byproduct material, to any non-nuclear weapon state that is found by the President to have, after March 10, 1978:

(1) Detonated a nuclear explosive device;

(2) Terminated or abrogated IAEA safeguards;

(3) Materially violated an IAEA safeguards agreement; or

(4) Engaged in activities involving source or special nuclear material and having direct significance for the manufacture or acquisition of nuclear explosive devices, and failed to take steps which represent sufficient progress toward terminating such activities.

(b) Except as provided in paragraph (c) of this section, no license will be issued to export nuclear equipment or material, other than byproduct material, to any country or group of countries that is found by the President to have, after March 10, 1978:

(1) Materially violated an agreement for cooperation with the United States or the terms of any other agreement under which nuclear equipment or material has been exported;

(2) Assisted, encouraged or induced any non-nuclear weapon state to engage in activities involving source or special nuclear material and having direct significance for the manufacture or acquistion of nuclear explosive devices, and failed to take steps which represent sufficient progress toward terminating such assistance, encouragement or inducement; or

(3) Entered into an agreement for the transfer of reprocessing equipment, materials or technology to the sovereign control of a non-nuclear weapon state, except in connection with an international fuel cycle evaluation in which the United States is a participant or pursuant to an international agreement or understanding to which the United States subscribes.

(c) Under section 129 of the Atomic Energy Act, the President may waive the requirement for the termination of exports to a country described in paragraph (a) or (b) of this section after determining in writing that the cessation of exports would seriously prejudice the achievement of United States nonproliferation objectives or otherwise jeopardize the common defense and security. If the President makes this determination, the Commission will issue licenses to export to that country, if other applicable statutory provisions are met.

[43 FR 21641, May 19, 1978, as amended at 49 FR 47202, Dec. 3, 1984. Redesignated at 60 FR 37565, July 21, 1995]

Subpart E—License Terms and Related Provisions

§ 110.50 Terms.

(a) *General and specific licenses.* (1) Each license is subject to all applicable provisions of the Atomic Energy Act and other applicable law and to all applicable rules, regulations, decisions and orders of the Commission.

(2) Each license is subject to amendment, suspension, revocation or incorporation of separate conditions when required by amendments of the Atomic Energy Act or other applicable law, or by other rules, regulations, decisions or orders issued in accordance with the terms of the Atomic Energy Act or other applicable law.

(3) A licensee authorized to export or import nuclear material is responsible for compliance with applicable requirements of this chapter, unless a domestic licensee of the Commission has assumed that responsibility and the Commission has been so notified.

(4) Each license authorizes export or import only and does not authorize any person to receive title to, acquire, receive, possess, deliver, use, transport or transfer any nuclear equipment or material subject to this part.

(5) Each license issued by the NRC for the export or import of nuclear material authorizes only the export or import of that nuclear material and accompanying packaging, fuel element, hardware, or other associated devices or products.

(6) No nuclear equipment license confers authority to export or import nuclear material.

(7) Each nuclear equipment export license authorizes the export of only those items required for use in the foreign nuclear installation for which the items are intended.

(8) A licensee shall not proceed to export or import and shall notify the Commission promptly if he knows or has reason to believe that the packaging requirements of part 71 of this chapter have not been met.

(b) *Specific licenses.* (1) Each specific license will have an expiration date.

(2) A licensee may export or import only for the purpose(s) and/or enduse(s) stated in the specific export or import license issued by NRC.

(3) Unless a license specifically authorizes the export of certain foreign-obligated nuclear material or equipment, a licensee may not ship such material or equipment until:

(i) The licensee has requested and the Commission has issued an amendment to the license authorizing such shipment; or

(ii) The licensee has given at least 40 days advance notice of the intended shipment in writing to the Deputy Director, Office of International Programs (OIP); and

(iii) The Deputy Director, OIP has:

(A) Obtained confirmation, through either the Department of Energy or State, that the foreign government in question has given its consent to the intended shipment pursuant to its agreement for cooperation with the United States; and

(B) Communicated this in writing to the licensee.

(c) *Advanced notification.* (1) A licensee authorized to export or import the radioactive material listed in Appendix P to this part is responsible for notifying NRC and, in cases of exports, the government of the importing country in advance of each shipment. A list of points of contact in importing countries is available at NRC's Office of International Programs Web site, accessible on the NRC Public Web site at *http://www.nrc.gov*.

(2) The NRC's office responsible for receiving advance notifications for all export and import shipments is the NRC Headquarters Operations Center. Notifications to the NRC Headquarters Operations Center are to be submitted by email (preferred method) or faxed using the contact information specified in appendix A to 10 CFR part 73 of this chapter. In the subject line of the email or on the fax cover page include ''10 CFR 110.50(c) Notification.'' To contact the NRC Operations Center, use the same email address or call the telephone number in appendix A to 10 CFR part 73. For questions or concerns on submitting these advance notifications to the NRC, please contact the Office of International Programs at 301–287–9056.

(3) Notifications may be electronic or in writing on business stationery, and must contain or be accompanied by the information which follows.

(i) For export notifications:

(A) 10 CFR part 110 export license number and expiration date;

(B) Name of the individual and licensee making the notification, address, and telephone number;

(C) Foreign recipient name, address, and end use location(s) (if different than recipient's address);

(D) Radionuclides and activity level in TBq, both for single and aggregate shipments;

(E) Make, model and serial number, for any Category 1 and 2 sealed sources, if available;

(F) End use in the importing country, if known;

(G) Shipment date; and

(H) A copy of the foreign recipient's authorization or confirmation of that authorization from the government of the importing country as required by §110.32(g) unless the authorization has already been provided to the NRC.

(ii) For import notifications:

(A) Name of individual and licensee making the notification, address, and telephone number;

(B) Recipient name, location, and address (if different than above);

(C) Name, location, address, contact name and telephone number for exporting facility;

(D) Radionuclides and activity level in TBq, both for single and aggregate shipments;

(E) Make, model and serial number, radionuclide, and activity level for any Category 1 and 2 sealed sources, if available;

(F) End use in the U.S.;

(G) Shipment date from exporting facility and estimated arrival date at the end use location; and

(H) NRC or Agreement State license number to possess the import in the U.S. and expiration date.

(4) Export notifications must be received by the NRC at least 7 days in advance of each shipment, to the extent practical, but in no case less than 24 hours in advance of each shipment. Import notifications must be received by the NRC at least 7 days in advance of each shipment.

(5) Advance notifications containing the above information must be controlled, handled, and transmitted in accordance with §2.390 of this chapter

and other applicable NRC requirements governing protection of sensitive information.

(d) A specific license may be transferred, disposed of or assigned to another person only with the approval of the Commission by license amendment.

[75 FR 44091, July 28, 2010, as amended at 85 FR 65664, Oct. 16, 2020; 86 FR 43404, Aug. 9, 2021]

§ 110.51 Amendment and renewal of licenses.

(a) *Amendments.* (1) Applications for amendment of a specific license shall be filed on NRC Form 7 in accordance with §§ 110.31 and 110.32 and shall specify the respects in which the licensee desires the license to be amended and the grounds for such amendment.

(2) An amendment is not required for:

(i) Changes in monetary value (but not amount or quantity);

(ii) Changes in the names and/or mailing addresses within the same countries of the intermediate or ultimate consignees listed on the license; or

(iii) The addition of intermediate consignees in any of the importing countries specified in the license (for a nuclear equipment license only).

(b) *Renewals.* (1) Applications for renewal of a specific license shall be filed on NRC Form 7 in accordance with §§ 110.31 and 110.32.

(2) If an application to renew a license is submitted 30 days or more before the license expires, the license remains valid until the Commission acts on the renewal application. An expired license is not renewable.

(c) *General.* In considering an application by a licensee to renew or amend a license, the Commission will apply, as appropriate, the same procedures and criteria it uses for initial license applications.

[75 FR 44092, July 28, 2010]

§ 110.52 Revocation, suspension, and modification.

(a) A license may be revoked, suspended, or modified for a condition which would warrant denial of the original license application.

(b) The Commission may require further information from a licensee to determine whether a license should be revoked, suspended, or modified.

(c) Except when the common defense and security or public health and safety requires otherwise, no license will be revoked, suspended, or modified before the licensee is informed in writing of the grounds for such action and afforded the opportunity to reply and be heard under procedures patterned on those in subpart I.

[43 FR 21641, May 19, 1978, as amended at 62 FR 59277, Nov. 3, 1997]

§ 110.53 United States address, records, and inspections.

(a) Each licensee (general or specific) shall have an office in the United States where papers may be served and where records required by the Commission will be maintained.

(b)(1) Each license applicant or licensee (general or specific) shall maintain records concerning his exports or imports. The licensee shall retain these records for five years after each export or import except that byproduct material records must be retained for three years after the date of each export or import shipment.

(2) Records which must be maintained pursuant to this part may be the original or a reproduced copy or microform if such reproduced copy or microform is duly authenticated by authorized personnel and the microform is capable of producing a clear and legible copy after storage for the period specified by Commission regulations. The record may also be stored in electronic media with the capability for producing legible, accurate, and complete records during the required retention period. Records such as letters, drawings, specifications, must include all pertinent information such as stamps, initials, and signatures. The licensee shall maintain adequate safeguards against tampering with and loss of records.

(c) Each licensee shall permit the Commission to inspect his records, premises, and activities pertaining to his exports and imports when necessary to fulfill the requirements of the Atomic Energy Act.

[43 FR 21641, May 19, 1978, as amended at 53 FR 19263, May 27, 1988; 75 FR 44092, July 28, 2010]

§ 110.54 Reporting requirements.

(a)(1) Reports of exports of nuclear facilities and equipment, nuclear grade graphite for nuclear end use, and deuterium for nuclear end use shipped during the previous quarter must be submitted by licensees making exports under the general license or specific license of this part by January 15, April 15, July 15, and October 15 of each year on DOC/NRC Forms AP–M or AP–13, and associated forms. The reports must contain information on all nuclear facilities, equipment, and non-nuclear materials (nuclear grade graphite for nuclear end use and deuterium for nuclear end use) listed in Annex II of the Additional Protocol.

(2) These required reports must be sent via facsimile to (202) 482–1731, emailed to *aprp@bis.doc.gov*, or hand-delivered or submitted by courier to the Bureau of Industry and Security, in hard copy, to the following address: Treaty Compliance Division, Bureau of Industry and Security, U.S. Department of Commerce, Attn: AP Reports, 14th Street and Pennsylvania Avenue, NW., Room 4515, Washington, DC 20230. Telephone: (202) 482–1001.

(b) Persons making exports under the general license established by § 110.23(a) or under a specific license shall submit by February 1 of each year one copy of a report of all americium and neptunium shipments during the previous calendar year. This report shall be submitted to the Deputy Director, Office of International Programs at the address provided in § 110.4 or by electronic submission at *110.23reports@nrc.gov*. The report must include:

(1) A description of the material, including quantity in TBq and gram;

(2) Approximate shipment dates; and

(3) A list of recipient countries, end users, and intended use keyed to the items shipped.

(c) Persons making exports under the general license established by § 110.26(a) shall submit by February 1 of each year one copy of a report of all components shipped during the previous calendar year. This report shall be submitted to the Deputy Director, Office of International Programs at the address provided in § 110.4 or by electronic submission at *110.26reports@nrc.gov*. This report must include:

(1) A description of the components keyed to the categories listed in appendix A to this part.

(2) Approximate shipment dates.

(3) A list of recipient countries and end users keyed to the items shipped.

[75 FR 44092, July 28, 2010, as amended at 77 FR 27114, May 9, 2012; 86 FR 55479, Oct. 6, 2021; 88 FR 80950, Nov. 21, 2023]

Subpart F—Violations and Enforcement

§ 110.60 Violations.

(a) The Commission may obtain an injunction or other court order to prevent a violation of the provisions of—

(1) The Atomic Energy Act;

(2) Title II of the Energy Reorganization Act of 1974; or

(3) A regulation or order pursuant to those Acts.

(b) The Commission may obtain a court order for the payment of a civil penalty imposed under section 234 of the Atomic Energy Act:

(1) For violations of:

(i) Sections 53, 57, 62, 63, 81, 82, 101, 103, 104, 107, or 109 of the Atomic Energy Act;

(ii) Section 206 of the Energy Reorganization Act;

(iii) Any rule, regulation, or order issued pursuant to the sections specified in paragraph (b)(1)(i) of this section;

(iv) Any term, condition, or limitation of any license issued under the sections specified in paragraph (b)(1)(i) of this section.

(2) For any violation for which a license may be revoked under section 186 of the Atomic Energy Act.

[75 FR 44092, July 28, 2010]

§ 110.61 Notice of violation.

(a) Before instituting any enforcement action the Commission will serve on the licensee written notice of violation, except as provided in paragraph (d).

(b) The notice will state the alleged violation; require the licensee to respond in writing, within 20 days or other specified time; and may also require the licensee to state the corrective steps taken or to be taken and the

date when full compliance will be achieved.

(c) The notice may provide that, if an adequate and timely reply is not received, an order to show cause may be issued pursuant to §110.62 or a proceeding instituted to impose a civil penalty pursuant to §110.64.

(d) The notice may be omitted and an order to show cause issued when the Commission determines that the violation is willful or that the public health, safety, or interest so requires.

§ 110.62 Order to show cause.

(a) In response to an alleged violation, described in §110.60, the Commission may institute a proceeding to revoke, suspend, or modify a license by issuing an order to show cause:

(1) Stating the alleged violation and proposed enforcement action; and

(2) Informing the licensee of his right, within 20 days or other specified time, to file a written answer and demand a hearing.

(b) An answer consenting to the proposed enforcement action shall constitute a waiver by the licensee of a hearing and of all rights to seek further Commission or judicial review.

(c) The order to show cause may be omitted and an order issued to revoke, suspend, or modify the license in cases where the Commission determines that the violation is willful or that the public health, safety, or interest so requires.

§ 110.63 Order for revocation, suspension, or modification.

(a) In response to an alleged violation described in §110.60, the Commission may revoke, suspend, or modify a license by issuing an order:

(1) Stating the violation and the effective date of the proposed enforcement action; and

(2) Informing the licensee of his right, within 20 days or other specified time, to file a written answer and demand a hearing.

(b) If an answer is not filed within the time specified, the enforcement action will become effective and permanent as proposed.

(c) If a timely answer is filed, the Commission, after considering the answer, will issue an order dismissing the proceeding, staying the effectiveness of the order or taking other appropriate action.

(d) The order may be made effective immediately, with reasons stated, pending further hearing and order, when the Commission determines that the violation is willful or that the public health, safety, or interest so requires.

§ 110.64 Civil penalty.

(a) In response to a violation, the Commission may institute a proceeding to impose a civil penalty under section 234 of the Atomic Energy Act by issuing a notice to the licensee:

(1) Stating the alleged violation and the amount of the proposed penalty;

(2) Informing the licensee of his right, within 20 days or other specified time, to file a written answer; and

(3) Advising that a delinquent payment for a subsequently imposed penalty may be referred to the Attorney General for collection pursuant to section 234c. of the Atomic Energy Act.

(b) If an answer is not filed within the time specified, the Commission will issue an order imposing the proposed penalty.

(c) If a timely answer is filed, the Commission, after considering the answer, will issue an order dismissing the proceeding or imposing a penalty subject to any required hearing.

(d) If an order imposing a civil penalty is issued, the licensee may request a hearing within 20 days or other specified time.

(e) Except when the matter has been referred to the Attorney General for collection, payment of penalties shall be made in U.S. funds using the electronic payment methods accepted at *www.Pay.gov*.

(f) An enforcement action to impose a civil penalty will not itself revoke, modify, or suspend any license under this part.

[43 FR 21641, May 19, 1978, as amended at 62 FR 27495, May 20, 1997; 89 FR 51810, June 20, 2024]

§ 110.65 Settlement and compromise.

At any time after issuance of an order for any enforcement action under

this subpart, an agreement may be entered into for settlement of the proceeding or compromise of a penalty. Upon approval by the Commission, or presiding officer if a hearing has been requested, the terms of the settlement or compromise will be embodied in the order disposing of the enforcement action.

§ 110.66 Enforcement hearing.

(a) If the licensee demands a hearing, the Commission will issue an order specifying the time and place.

(b) A hearing pursuant to this subpart will be conducted under the procedures in subpart G of part 2 of this chapter.

[43 FR 21641, May 19, 1978, as amended at 75 FR 44093, July 28, 2010]

§ 110.67 Criminal penalties.

(a) Section 223 of the Atomic Energy Act provides for criminal sanctions for willful violation of, attempted violation of, or conspiracy to violate, any regulation issued under sections 161b., 161i., or 161o. of the Atomic Energy Act. For purposes of section 223, all the regulations in 10 CFR part 110 are issued under one or more of sections 161b, 161i, or 161o, except for the sections listed in paragraph (b) of this section.

(b) The regulations in part 110 that are not issued under sections 161b, 161i, or 161o for the purposes of section 223 are as follows: §§ 110.1, 110.2, 110.3, 110.4, 110.7, 110.10, 110.11, 110.30, 110.31, 110.32, 110.40, 110.41, 110.42, 110.43, 110.44, 110.45, 110.46, 110.51, 110.52, 110.60, 110.61, 110.62, 110.63, 110.64, 110.65, 110.66, 110.67, 110.70, 110.71, 110.72, 110.73, 110.80, 110.81, 110.82, 110.83, 110.84, 110.85, 110.86, 110.87, 110.88, 110.89, 110.90, 110.91, 110.100, 110.101, 110.102, 110.103, 110.104, 110.105, 110.106, 110.107, 110.108, 110.109, 110.110, 110.111, 110.112, 110.113, 110.120, 110.122, 110.124, 110.130, 110.131, 110.132, 110.133, 110.134, and 110.135.

[57 FR 55080, Nov. 24, 1992; 57 FR 62605, Dec. 31, 1992, as amended at 60 FR 37565, July 21, 1995; 75 FR 44093, July 28, 2010]

Subpart G—Public Notification and Availability of Documents and Records

§ 110.70 Public notice of receipt of an application.

(a) The Commission will notice the receipt of each license application, including applications for amendment or renewal, for an export or import for which a specific license is required by making a copy available at the NRC Web site, *http://www.nrc.gov*.

(b) The Commission will also publish in the FEDERAL REGISTER a notice of receipt of each license application, including applications for amendment or renewal, to export the following:

(1) A production or utilization facility.

(2) Five effective kilograms or more of plutonium, high-enriched uranium or uranium-233.

(3) 10,000 kilograms or more of heavy water for nuclear end use. (Note: Does not apply to exports of heavy water to Canada for nuclear end use.)

(4) Nuclear grade graphite for nuclear end use.

(5) Radioactive waste.

(c) The Commission will also publish in the FEDERAL REGISTER a notice of receipt of a license application, including applications for amendment or renewal, for an import of radioactive waste for which a specific license is required.

[75 FR 44093, July 28, 2010, as amended at 86 FR 55479, Oct. 6, 2021]

§ 110.71 Notice of withdrawal of an application.

The Commission will notice the withdrawal of an application by making a copy available at the NRC Web site, *http://www.nrc.gov*.

[64 FR 48955, Sept. 9, 1999]

§ 110.72 Public availability of documents.

Unless exempt from disclosure under part 9 of this chapter, the following documents pertaining to each license and license application for an import or export requiring a specific license under this part will be made available at the NRC Web site, *http://*

www.nrc.gov, and/or at the NRC Public Document Room:

(a) The license application and any requests for amendments;

(b) Commission correspondence with the applicant or licensee;

(c) FEDERAL REGISTER notices;

(d) The Commission letter requesting Executive Branch views;

(e) Correspondence from the State Department with Executive Branch views;

(f) Correspondence from foreign governments and international organizations;

(g) Filings pursuant to subpart I and Commission and Executive Branch responses, if any;

(h) If a hearing is held, the hearing record and decision;

(i) A statement of staff conclusions; and

(j) The license, requests for license amendments and amendments.

[43 FR 21641, May 19, 1978, as amended at 60 FR 37565, July 21, 1995; 64 FR 48955, Sept. 9, 1999]

§ 110.73 Availability of NRC records.

(a) Commission records under this part will be made available to the public only in accordance with part 9 of this chapter.

(b) Proprietary information provided under this part may be protected under Part 9 and § 2.390(b), (c), and (d) of this chapter.

[43 FR 21641, May 19, 1978, as amended at 69 FR 2281, Jan. 14, 2004]

Subpart H—Public Participation Procedures Concerning License Applications

§ 110.80 Basis for hearings.

The procedures in this part will constitute the exclusive basis for hearings on export and import license applications.

[75 FR 44093, July 28, 2010]

§ 110.81 Written comments.

(a) The Commission encourages written comments from the public regarding export and import license applications. The Commission will consider and, if appropriate, respond to these comments.

(b) These comments should be submitted within 30 days after public notice of receipt of the application on the NRC Web site or in the FEDERAL REGISTER and addressed to the Secretary, U.S. Nuclear Regulatory Commission, Washington, DC 20555–0001, Attention: Rulemakings and Adjudications Staff.

(c) The Commission will provide the applicant with a copy of the comments and, if appropriate, a reasonable opportunity for response.

[43 FR 21641, May 19, 1978, as amended at 62 FR 27495, May 20, 1997; 75 FR 44093, July 28, 2010]

§ 110.82 Hearing request or intervention petition.

(a) A person may request a hearing or petition for leave to intervene on a license application for an import or export requiring a specific license.

(b) Hearing requests and intervention petitions must:

(1) State the name, address and telephone number of the requestor or petitioner;

(2) Set forth the issues sought to be raised;

(3) Explain why a hearing or an intervention would be in the public interest and how a hearing or intervention would assist the Commission in making the determinations required by § 110.45.

(4) Specify, when a person asserts that his interest may be affected, both the facts pertaining to his interest and how it may be affected, with particular reference to the factors in § 110.84.

(c) Hearing requests and intervention petitions will be considered timely only if filed not later than:

(1) 30 days after notice of receipt in the FEDERAL REGISTER, for those applications published in the FEDERAL REGISTER;

(2) 30 days after publication of notice on the NRC Web site at *http://www.nrc.gov;*

(3) 30 days after notice of receipt in the Public Document Room; or

(4) Such other time as may be provided by the Commission.

[43 FR 21641, May 19, 1978, as amended at 49 FR 47202, Dec. 3, 1984; 60 FR 37565, July 21, 1995; 60 FR 55183, Oct. 30, 1995; 65 FR 70291, Nov. 22, 2000; 75 FR 44093, July 28, 2010]

§ 110.83 Answers and replies.

(a) Unless otherwise specified by the Commission, an answer to a hearing request or intervention petition may be filed within 30 days after the request or petition has been served.

(b) Unless otherwise specified by the Commission, a reply to an answer may be filed within 10 days after all timely answers have been filed.

(c) Answers and replies should address the factors in § 110.84.

[43 FR 21641, May 19, 1978, as amended at 49 FR 47203, Dec. 3, 1984]

§ 110.84 Commission action on a hearing request or intervention petition.

(a) In an export licensing proceeding, or in an import licensing proceeding in which a hearing request or intervention petition does not assert or establish an interest which may be affected, the Commission will consider:

(1) Whether a hearing would be in the public interest; and

(2) Whether a hearing would assist the Commission in making the statutory determinations required by the Atomic Energy Act.

(b) If a hearing request or intervention petition asserts an interest which may be affected, the Commission will consider:

(1) The nature of the alleged interest;

(2) How that interest relates to issuance or denial; and

(3) The possible effect of any order on that interest, including whether the relief requested is within the Commission's authority, and, if so, whether granting relief would redress the alleged injury.

(c) Untimely hearing requests or intervention petitions may be denied unless good cause for failure to file on time is established. In reviewing untimely requests or petitions, the Commission will also consider:

(1) The availability of other means by which the requestor's or petitioner's interest, if any, will be protected or represented by other participants in a hearing; and

(2) The extent to which the issues will be broadened or action on the application delayed.

(d) Before granting or denying a hearing request or intervention petition, the Commission will review the Executive Branch's views on the license application and may request further information from the petitioner, requester, the Commission staff, the Executive Branch or others.

(e) The Commission will deny a request or petition that pertains solely to matters outside its jurisdiction.

(f) If an issue has been adequately explored in a previous licensing hearing conducted pursuant to this part, a request for a new hearing in connection with that issue will be denied unless:

(1) A hearing request or intervention petition establishes that an interest may be affected; or

(2) The Commission determines that changed circumstances or new information warrant a new hearing.

(g) After consideration of the factors covered by paragraphs (a) through (f), the Commission will issue a notice or order granting or denying a hearing request or intervention petition. Upon the affirmative vote of two Commissioners a hearing will be ordered. A notice granting a hearing will be published in the FEDERAL REGISTER and will specify whether the hearing will be oral or consist of written comments. A denial notice will set forth the reasons for denial.

[43 FR 21641, May 19, 1978, as amended at 49 FR 47203, Dec. 3, 1984]

§ 110.85 Notice of hearing consisting of written comments.

(a) A notice of hearing consisting of written comments will:

(1) State the issues to be considered;

(2) Provide the names and addresses of participants;

(3) Specify the time limits for participants and others to submit written views and respond to any written comments; and

(4) State any other instructions the Commission deems appropriate.

(b) The Secretary will give notice of any hearing under this section and § 110.86 to any person who so requests.

§ 110.86 Notice of oral hearing.

(a) A notice of oral hearing will:

(1) State the time, place and issues to be considered;

(2) Provide names and addresses of participants;

(3) Designate the presiding officer;

(4) Specify the time limit for participants and others to indicate whether they wish to present views; and

(5) State any other instructions the Commission deems appropriate.

(b) If the Commission is not the presiding officer, the notice of oral hearing will also state:

(1) When the jurisdiction of the presiding officer commences and terminates;

(2) The powers of the presiding officer; and

(3) Instructions to the presiding officer to certify promptly the completed hearing record to the Commission without preliminary decision or findings, unless the Commission directs otherwise.

§ 110.87 Conditions in a notice or order.

(a) A notice or order granting a hearing or permitting intervention may restrict irrelevant or duplicative testimony, or require common interests to be represented by a single spokesman.

(b) If a participant's interests do not extend to all the issues in the hearing, the notice or order may limit his participation accordingly.

(c) Unless authorized by the Commission, the granting of participation will not broaden the hearing issues.

§ 110.88 Authority of the Secretary.

The Secretary is authorized to prescribe time schedules and other procedural arrangements, when not covered by this part, and rule on related procedural requests.

§ 110.89 Filing and service.

(a) Hearing requests, intervention petitions, answers, replies and accompanying documents must be filed with the Commission by delivery or by mail to the Secretary, U.S. Nuclear Regulatory Commission, Washington, DC 20555–0001, Attention: Rulemakings and Adjudications Staff or via the E-Filing system, following the procedure set forth in 10 CFR 2.302. Filing by mail is complete upon deposit in the mail. Filing via the E-Filing system is completed by following the requirements described in 10 CFR 2.302(d).

(b) All filing and Commission notices and orders must be served upon the applicant; the General Counsel, U.S. Nuclear Regulatory Commission, Washington, DC 20555; the Executive Secretary, Department of State, Washington, DC 20520; and participants if any. Hearing requests, intervention petitions, and answers and replies must be served by the person filing those pleadings.

(c) Service is completed by:

(1) Delivering the paper to the person; or leaving it in his office with someone in charge; or, if there is no one in charge, leaving it in a conspicuous place in the office; or, if he has no office or it is closed, leaving it at his usual place of residence with some occupant of suitable age and discretion;

(2) Following the requirements for E-Filing in 10 CFR 2.305;

(3) Depositing it in the United States mail, express mail, or expedited delivery service, properly stamped and addressed; or

(4) Any other manner authorized by law, when service cannot be made as provided in paragraphs (c)(1) through (3) of this section.

(d) Proof of service, stating the name and address of the person served and the manner and date of service, shall be shown, and may be made by:

(1) Written acknowledgment of the person served or an authorized representative;

(2) The certificate or affidavit of the person making the service; or

(3) Following the requirements for E-Filing in 10 CFR 2.305.

(e) The Commission may make special provisions for service when circumstances warrant.

[72 FR 49154, Aug. 28, 2007]

§ 110.90 Computation of time.

(a) In computing any period of time, the day of the act, event, or default after which the designated period of time begins to run is not included. The last day of the period so computed is included unless it is a Saturday or Sunday, a Federal legal holiday at the place where the action or event is to occur, or a day upon which, because of an emergency closure of the Federal government in Washington, DC, NRC Headquarters does not open for business, in which event the period runs

until the end of the next day that is not a Saturday, Sunday, holiday, or emergency closure.

(b) In time periods of less than seven (7) days, intermediate Saturdays, Sundays, Federal legal holidays, and emergency closures are not counted.

(c) Whenever an action is required within a prescribed period by a document served under § 110.89 of this part, no additional time is added to the prescribed period except as set forth in 10 CFR 2.306(b).

(d) To be considered timely, a document must be served:

(1) By 5 p.m. Eastern Time for a document served in person or by expedited service; and

(2) By 11:59 p.m. Eastern Time for a document served by the E-Filing system.

[72 FR 49154, Aug. 28, 2007]

§ 110.91 Commission consultations.

The Commission may consult at any time on a license application with the staff, the Executive Branch or other persons.

[49 FR 47203, Dec. 3, 1984]

Subpart I—Hearings

§ 110.100 Public hearings.

Hearings under this part will be public unless the Commission directs otherwise.

§ 110.101 Filing and service.

Filing and service of hearing documents shall be pursuant to § 110.89.

§ 110.102 Hearing docket.

For each hearing, the Secretary will maintain a docket which will include the hearing transcript, exhibits and all papers filed or issued pursuant to the hearing.

§ 110.103 Acceptance of hearing documents.

(a) Each document filed or issued must be clearly legible and bear the docket number, license application number, and hearing title.

(b) Each document shall be filed in one original and signed by the participant or their authorized representative, with their address and date of signature indicated. The signature is a representation that the document is submitted with full authority, the signer knows its contents, and that, to the best of his knowledge, the statements made in it are true.

(c) Filings submitted using the E-filing system must follow the requirements outlined in 10 CFR 2.304.

(d) A document not meeting the requirements of this section may be returned with an explanation for nonacceptance and, if so, will not be docketed.

[72 FR 49154, Aug. 28, 2007]

§ 110.104 Presiding officer.

(a) The full Commission will ordinarily be the presiding officer at a hearing under this part. However, the Commission may provide in a hearing notice that one or more Commissioners, or any other person as provided by law, will preside.

(b) A participant may submit a written motion for the disqualification of any person presiding. The motion shall be supported by affidavit setting forth the alleged grounds for disqualification. If the presiding officer does not grant the motion or the person does not disqualify himself, the Commission will decide the matter.

(c) If any presiding officer designated by the Commission deems himself disqualified, he shall withdraw by notice on the record after notifying the Commission.

(d) If a presiding officer becomes unavailable, the Commission will designate a replacement.

(e) Any motion concerning the designation of a replacement presiding officer shall be made within 5 days after the designation.

(f) Unless otherwise ordered by the Commission, the jurisdiction of a presiding officer other than the Commission commences as designated in the hearing notice and terminates upon certification of the hearing record to the Commission, or when the presiding officer is disqualified.

§ 110.105 Responsibility and power of the presiding officer in an oral hearing.

(a) The presiding officer in any oral hearing shall conduct a fair hearing,

develop a record that will contribute to informed decisionmaking, and, within the framework of the Commission's orders, have the power necessary to achieve these ends, including the power to:

(1) Take action to avoid unnecessary delay and maintain order;

(2) Dispose of procedural requests;

(3) Question participants and witnesses, and entertain suggestions as to questions which may be asked of participants and witnessess;

(4) Order consolidation of participants;

(5) Establish the order of presentation;

(6) Hold conferences before or during the hearing;

(7) Establish reasonable time limits;

(8) Limit the number of witnesses; and

(9) Strike or reject duplicative or irrelevant presentations.

(b) Where the Commission itself does not preside:

(1) The presiding officer may certify questions or refer rulings to the Commission for decision;

(2) Any hearing order may be modified by the Commission; and

(3) The presiding officer will certify the completed hearing record to the Commission, which may then issue its opinion on the hearing or provide that additional testimony be presented.

§ 110.106 Participation in a hearing.

(a) Unless otherwise limited by this part or by the Commission, participants in a hearing may submit:

(1) Initial and concluding written statements of position on the issues;

(2) Written questions to the presiding officer; and

(3) Written responses and rebuttal testimony to the statements of other participants.

(b) Participants in an oral hearing may also submit oral statements, questions, responses and rebuttal testimony.

(c) A participant in an import licensing hearing establishing that his interest may be affected, may be accorded additional procedural rights under subpart G of part 2 with respect to resolution of domestic factual issues regarding the public health, safety and environment of the United States, and the protection of the United States public against domestic theft, diversion or sabotage, to the extent that such issues are separable from the nondomestic issues associated with the license application.

§ 110.107 Presentation of testimony in an oral hearing.

(a) All direct testimony in an oral hearing shall be filed no later than 7 days before the hearing or as otherwise ordered or allowed.

(b) Written testimony will be received into evidence in exhibit form.

(c) Unless proscribed under §110.87, members of groups which are designated as participants may testify in their individual capacities.

(d) Participants may present their own witnesses.

(e) Testimony by the Commission and the Executive Branch will be presented only by persons officially designated for that purpose.

(f) Participants and witnesses will be questioned orally or in writing and only by the presiding officer. Questions may be addressed to individuals or to panels of participants or witnesses.

(g) The presiding officer may accept written testimony from a person unable to appear at the hearing, and may request him to respond to questions.

(h) No subpoenas will be granted at the request of participants for attendance and testimony of participants or witnesses or the production of evidence.

§ 110.108 Appearance in an oral hearing.

(a) A participant may appear in a hearing on his own behalf or be represented by an authorized representative.

(b) A person appearing shall file a written notice stating his name, address and telephone number, and if an authorized representative, the basis of his eligibility and the name and address of the participant on whose behalf he appears.

(c) A person may be excluded from a hearing for disorderly, dilatory or contemptuous conduct, provided he is informed of the grounds and given an opportunity to respond.

§ 110.109 Motions and requests.

(a) Motions and requests shall be addressed to the presiding officer, and, if written, also filed with the Secretary and served on other participants.

(b) Other participants may respond to the motion or request. Responses to written motions or requests shall be filed within 5 days after service.

(c) When the Commission does not preside, in response to a motion or request, the presiding officer may refer a ruling or certify a question to the Commission for decision and notify the participants.

(d) Unless otherwise ordered by the Commission, a motion or request, or the certification of a question or referral of a ruling, shall not stay or extend any aspect of the hearing.

§ 110.110 Default.

When a participant fails to act within a specified time, the presiding officer may consider him in default, issue an appropriate ruling and proceed without further notice to the defaulting participant.

§ 110.111 Waiver of a rule or regulation.

(a) A participant may petition that a Commission rule or regulation be waived with respect to the license application under consideration.

(b) The sole ground for a waiver shall be that, because of special circumstances concerning the subject of the hearing, application of a rule or regulation would not serve the purposes for which it was adopted.

(c) Waiver petition shall specify why application of the rule or regulation would not serve the purposes for which it was adopted.

(d) Other participants may, within 10 days, file a response to a waiver petition.

(e) When the Commission does not preside, the presiding officer will certify the waiver petition to the Commission, which, in response, will grant or deny the waiver or direct any further proceedings.

(f) Regardless of whether a waiver is granted or denied, a separate petition for rulemaking may be filed pursuant to subpart K of this part.

[43 FR 21641, May 19, 1978, as amended at 62 FR 59277, Nov. 3, 1997]

§ 110.112 Reporter and transcript for an oral hearing.

(a) A reporter designated by the Commission will record an oral hearing and prepare the official hearing transcript.

(b) Except for any portions containing classified information, Restricted Data, Safeguards Information, proprietary information, or other sensitive unclassified information, transcripts will be made available at the NRC Web site, *http://www.nrc.gov*, and/or at the NRC Public Document Room.

(c) Corrections of the official transcript may be made only as specified by the Secretary.

[43 FR 21641, May 19, 1978, as amended at 64 FR 48955, Sept. 9, 1999; 75 FR 44093, July 28, 2010]

§ 110.113 Commission action.

(a) Upon completion of a hearing, the Commission will issue a written opinion including its decision on the license application, the reasons for the decision and any dissenting views.

(b) While the Commission will consider fully the hearing record, the licensing decision will be based on all relevant information, including information which might go beyond that in the hearing record.

(c) If the Commission considers information not in the hearing record in reaching its licensing decision, the hearing participants will be informed and, if not classified or otherwise privileged, the information will be made available at the NRC Web site, *http://www.nrc.gov*, and furnished to the participants.

(d) The Commission may issue a license before completion of a hearing if it finds that:

(1) Prompt issuance is required in the public interest, particularly the common defense and security; and

(2) A participant establishing that his interest may be affected has been provided a fair opportunity to present his views.

(e) The Commission may:

(1) Defer any hearing;

(2) Consolidate applications for hearing;

(3) Narrow or broaden the hearing issues; and

(4) Take other action, as appropriate.

[43 FR 21641, May 19, 1978, as amended at 64 FR 48955, Sept. 9, 1999]

Subpart J—Special Procedures for Classified Information in Hearings

§ 110.120 Purpose and scope.

(a) This subpart contains special procedures concerning access to, and introduction of, classified information into hearings under this part.

(b) These procedures do not in any way apply to classified information exchanged between the Executive Branch and the Commission not introduced into a hearing. Such information will be declassified to the maximum extent feasible. The public statements of the Commission staff and Executive Branch will, to the extent consistent with classification requirements, reflect consideration of any such classified information.

§ 110.121 Security clearances and access to classified information.

(a) No person without a security clearance will have access to classified information.

(b) Only the Commission will act upon an application for access to classified information.

(c) To the extent practicable, applications for access to classified information shall describe the information to which access is desired and its level of classification (confidential, secret or other); the reasons for requesting access; the names of individuals for whom access is requested; and the reasons why access is requested for those individuals.

(d) The Commission will consider requests for appropriate security clearances in reasonable numbers; conduct its review and grant or deny these in accordance with part 10 of this chapter; and make a reasonable charge to cover costs.

(e) The Commission will not grant security clearances for access to classified information, unless it determines that the available unclassified information is inadequate on the subject matter involved.

(f) When an application demonstrates that access to classified information not introduced into a hearing may be needed to prepare a participant's position on the hearing issues, the Commission may issue an order granting access to this information to the participant, his authorized representative or other persons. Access will be subject to the conditions in paragraphs (e) and (j) and will not be granted unless required security clearances have been obtained.

(g) Once classified information has been introduced into a hearing, the Commission will grant access to a participant, his authorized representative or such other persons as the Commission determines may be needed by the participant to prepare his position on the hearing issues. Access will be subject to the conditions in paragraphs (e) and (j) of this section and will not be granted unless required security clearances have been obtained.

(h) For good cause, the Commission may postpone action upon an application for access to classified information.

(i) The Commission will grant access to classified information only up to the level for which the persons described in paragraphs (f) and (g) of this section are cleared and only upon an adequate commitment by them not to disclose such information subject to penalties as provided by law.

(j) The Commission will not in any circumstances grant access to classified information:

(1) Unless it determines that the grant is not inimical to the common defense and security; and

(2) Which it has received from another Government agency, without the prior consent of the originating agency.

(k) Upon completion of a hearing, the Commission will terminate all security clearances granted pursuant to the hearing and may require the disposal of classified information to which access has been granted or the observance of other procedures to safeguard this information.

§ 110.122 Classification assistance.

On the request of any hearing participant or the presiding officer (if other than the Commission), the Commission will designate a representative to advise and assist the presiding officer or the participants with respect to security classification of information and the protective requirements to be observed.

§ 110.123 Notice of intent to introduce classified information.

(a) A participant shall seek the required security clearances, where necessary, and file with the Secretary a notice of intent to introduce classified information into a hearing at the earliest possible time after the notice of hearing.

(b) If a participant has not filed a notice of intent in accordance with this section, he may introduce classified information only if he gives to the other participants and the Commission prompt written notice of intent and only as permitted by the Commission when it determines that the public interest will not be prejudiced.

(c) The notice of intent shall be unclassified and, to the extent consistent with classification requirements, state:

(1) The subject matter of the classified information, which it is anticipated will be involved;

(2) The highest level of classification of the information (confidential, secret or other);

(3) When it is anticipated that the information would be introduced; and

(4) The relevance and materiality of the information to the hearing issues.

§ 110.124 Rearrangement or suspension of a hearing.

When a participant gives notice of intent to introduce classified information and other participants do not have the required security clearances, subject to § 110.121, the Commission may:

(a) Suspend or rearrange the normal order of the hearing to give other participants an opportunity to obtain the required security clearances with minimum delay in the conduct of the hearing; or

(b) Take such other action as it determines to be in the public interest.

§ 110.125 Unclassified statements required.

(a) It is the obligation of hearing participants to introduce information in unclassified form wherever possible, and to declassify, to the maximum extent feasible, any classified information introduced into the hearing. This obligation rests on each participant whether or not any other participant has the required security clearances.

(b) When classified information is offered for introduction into a hearing:

(1) The participant offering it shall, to the extent consistent with classification requirements, submit to the presiding officer and other participants an unclassified statement describing the substance of the classified information as accurately and completely as possible;

(2) In accordance with procedures agreed upon by the participants or prescribed by the presiding officer, and after notice to all participants and opportunity to be heard on the notice, the presiding officer will determine whether an unclassified statement may be substituted for the classified information in the hearing record without prejudice to the interest of any participant or the public;

(3) If the Commission determines that the unclassified statement (together with such unclassified modifications as it finds are necessary or appropriate to protect the interest of other participants and the public) adequately sets forth information in the classified matter which is relevant and material to the issues in the hearing, it will direct that the classified matter be excluded from the record of the hearing; and

(4) The Commission may postpone any of the procedures in this section until all other evidence has been received. However, a participant shall not postpone service of any unclassified statement required in this section.

§ 110.126 Protection of classified information.

Nothing in this subpart shall relieve any person from safeguarding classified information as required by law and rules, regulations or orders of any Government agency.

Subpart K—Rulemaking

§ 110.130 Initiation of rulemaking.

The Commission may initiate action to amend the regulations in this part on its own initiative or in response to a petition.

§ 110.131 Petition for rulemaking.

(a) A petition for rulemaking should be addressed to the Secretary of the Commission, for the attention of the Secretary's Rulemakings and Adjudications Staff. The petition should be sent using an appropriate method listed in §110.4.

(b) The petition shall state the basis for the requested amendment.

(c) The petition may request the Commission to suspend all or part of any licensing proceeding under this part pending disposition of the petition.

(d) The Secretary will assign a docket number to the petition, place a copy in the Public Document Room and notice its receipt in the FEDERAL REGISTER.

(e) Publication may be limited by order of the Commission to the extent required by section 181 of the Atomic Energy Act.

[43 FR 21641, May 19, 1978, as amended at 63 FR 15744, Apr. 1, 1998; 68 FR 58824, Oct. 10, 2003]

§ 110.132 Commission action on a petition.

(a) The Commission may grant or deny the petition in whole or in part.

(b) If the petition is granted, a notice of proposed rulemaking or a notice of rulemaking will be published in the FEDERAL REGISTER.

(c) If the petition is denied, the petitioner will be informed of the grounds.

(d) Commission action on a petition will normally follow, whenever appropriate, receipt and evaluation of Executive Branch views.

(e) The Commission, in exercising the discretion authorized by section 4(a)(1) of the Administrative Procedure Act (5 U.S.C. 553(a)(1)), will decide what, if any, public rulemaking procedures will be followed.

§ 110.133 Notice of proposed rulemaking.

(a) When the Commission proposes to amend the regulations in this part, it will normally publish a notice of proposed rulemaking in the FEDERAL REGISTER.

(b) A notice of proposed rulemaking will include:

(1) The authority for the proposed rule;

(2) The substance and purpose of the proposed rule;

(3) Directions for public participation;

(4) The time and place of any public hearing; and

(5) If a hearing is to be held by other than the Commission, designating of a presiding officer and instructions for the conduct of the hearing.

(c) A notice of proposed rulemaking will be published not less than 15 days before any hearing, unless the Commission for good cause provides otherwise in the notice.

§ 110.134 Public participation.

(a) The Commission may hold an oral hearing on a proposed rule or permit any person to participate in a rulemaking proceeding through the submission of written comments.

(b) When it is in the public interest and is authorized by law, public rulemaking procedures may be omitted and a notice of rulemaking published pursuant to §110.135.

§ 110.135 Notice of rulemaking.

(a) Upon approval of an amendment, the Commission will publish in the FEDERAL REGISTER a notice of rulemaking which includes a statement of its basis and purpose, effective date and, where appropriate, any significant variations from the amendment as proposed in any notice of proposed rulemaking.

(b) The effective date of an amendment will normally be no earlier than 30 days after publication of the notice of rulemaking, unless the Commission for good cause provides otherwise in the notice.

APPENDIX A TO PART 110—ILLUSTRATIVE LIST OF NUCLEAR REACTOR EQUIPMENT UNDER NRC EXPORT LICENSING AUTHORITY

NOTE: A nuclear reactor basically includes the items within or attached directly to the reactor vessel, the equipment which controls the level of power in the core, and the components which normally contain or come in direct contact with or control the primary coolant of the reactor core.

(1) Reactor pressure vessels, *i.e.*, metal vessels, as complete units or major shop-fabricated parts, especially designed or prepared to contain the core of a nuclear reactor and capable of withstanding the operating pressure of the primary coolant.

(2) On-line (e.g., CANDU) reactor fuel charging and discharging machines, *i.e.*, manipulative equipment especially designed for inserting or removing fuel in an operating nuclear reactor.

(3) Complete reactor control rod system, *i.e.*, rods especially designed or prepared for the control of the reaction rate in a nuclear reactor, including the neutron absorbing part and the support or suspension structures therefor.

(4) Reactor primary coolant pumps or circulators, *i.e.*, pumps or circulators especially designed or prepared for circulating the primary coolant in a nuclear reactor.

(5) Reactor pressure tubes, *i.e.*, tubes especially designed or prepared to contain both fuel elements and the primary coolant in a nuclear reactor.

(6) Zirconium tubes, *i.e.*, zirconium metal and alloys in the form of tubes or assemblies of tubes especially designed or prepared for use as fuel cladding in a nuclear reactor.

(7) Reactor internals, e.g., core support structures, control and rod guide tubes, fuel channels, calandria tubes, thermal shields, baffles, core grid plates, and diffuser plates especially designed or prepared for use in a nuclear reactor.

(8) Reactor control rod drive mechanisms, including detection and measuring equipment to determine neutron flux levels within the core of a nuclear reactor.

(9) Heat exchangers, e.g., steam generators especially designed or prepared for the primary, or intermediate, coolant circuit of a nuclear reactor or heat exchangers especially designed or prepared for use in the primary coolant circuit of a nuclear reactor.

(10) External thermal shields especially designed or prepared for use in a nuclear reactor for reduction of heat loss and also for containment vessel protection.

(11) Any other components especially designed or prepared for use in a nuclear reactor or in any of the components described in this appendix.

[79 FR 39291, July 10, 2014]

APPENDIX B TO PART 110—ILLUSTRATIVE LIST OF GAS CENTRIFUGE ENRICHMENT PLANT COMPONENTS UNDER NRC'S EXPORT LICENSING AUTHORITY

1. *Assemblies and components especially designed or prepared for use in gas centrifuges.*

NOTE: The gas centrifuge normally consists of a thin-walled cylinder(s) of between 75 mm and 650 mm diameter contained in a vacuum environment and spun at high peripheral speed (of the order of 300 m/per second and more) with the central axis vertical. In order to achieve high speed, the materials of construction for the rotating rotor assembly, and hence its individual components, have to be manufactured to very close tolerances in order to minimize the unbalance. In contrast to other centrifuges, the gas centrifuge for uranium enrichment is characterized by having within the rotor chamber a rotating disc-shaped baffle(s) and a stationary tube arrangement for feeding and extracting uranium hexafluoride (UF_6) gas and featuring at least three separate channels of which two are connected to scoops extending from the rotor axis towards the periphery of the rotor chamber. Also contained within the vacuum environment are a number of critical items which do not rotate and which, although they are especially designed, are not difficult to fabricate nor are they fabricated out of unique materials. A centrifuge facility, however, requires a large number of these components so that quantities can provide an important indication of end use.

1.1 Rotating Components

(a) Complete Rotor Assemblies: Thin-walled cylinders, or a number of interconnected thin-walled cylinders, manufactured from one of the high strength-to-density ratio materials described in the footnote to this section.

If interconnected, the cylinders are joined together by flexible bellows or rings as described in §1.1(c) of this appendix. The rotor is fitted with an internal baffle(s) and end caps, as described in §1.1(d) and (e) of this appendix, if in final form. However, the complete assembly may be delivered only partly assembled.

(b) Rotor Tubes: Especially designed or prepared thin-walled cylinders with thickness of 12 mm or less, a diameter of between 75 mm and 650 mm, and manufactured from one of the high strength-to-density ratio materials described in the footnote to this section.

(c) Rings or Bellows: Components especially designed or prepared to give localized support to the rotor tube or to join together a number of rotor tubes. The bellows in a short cylinder of wall thickness 3 mm or less, a diameter of between 75 mm and 650

mm, having a convolute, and manufactured from one of the high strength-to-density ratio materials described in the footnote to this section.

(d) Baffles: Disc shaped components of between 75 mm and 650 mm diameter especially designed or prepared to be mounted inside the centrifuge rotor tube, in order to isolate the take-off chamber from the main separation chamber and, in some cases, to assist the UF_6 gas circulation within the main separation chamber of the rotor tube, and manufactured from one of the high strength-to-density ratio materials described in the footnote to this section.

(e) Top Caps/Bottom Caps: Disc shaped components of between 75 mm and 650 mm diameter especially designed or prepared to fit to the ends of the rotor tube, and so contain the UF_6 within the rotor tube, and in some cases to support, retain or contain as an integrated part, an element of the upper bearing (top cap) or to carry the rotating elements of the motor and lower bearing (bottom cap), and manufactured from one of the high strength-to-density ratio materials described in the footnote to this section.

Footnote

The materials used for centrifuge rotating components include the following:

(a) Maraging steel capable of an ultimate tensile strength of 1.95 GPa or more.

(b) Aluminum alloys capable of an ultimate tensile strength of 0.46 GPa or more.

(c) Filamentary materials suitable for use in composite structures and having a specific modulus of 3.18×10^6 m or greater and a specific ultimate tensile strength of 7.62×10^4 m or greater.

(''Specific Modulus'' is the Young's modulus in N/m^2 divided by the specific weight inN/m^3 when measured at a temperature of 23 ±20 °C and a relative humidity of 50 ±5 percent. ''Specific tensile strength'' is the ultimate tensile strength in N/m^2 divided by the specific weight in N/m^3 when measured at a temperature of 23 ±20 °C and a relative humidity of 50 ±5 percent.)

1.2 Static Components

(a) Magnetic Suspension Bearings: 1. Especially designed or prepared bearing assemblies consisting of an annular magnet suspended within a housing containing a damping medium. The housing will be manufactured from a UF_6 resistant material (see footnote to §2 of this appendix). The magnet couples with a pole piece or a second magnet fitted to the top cap described in §1.1(e) of this appendix. The magnet may be ring-shaped with a relation between outer and inner diameter smaller or equal to 1.6:1. The magnet may be in a form having an initial permeability of 0.15 Henry/meter or more, or a remanence of 98.5 percent or more, or an energy product of greater than 80,000 joules/m^3. In addition to the usual material properties, it is a prerequisite that the deviation of the magnetic axes from the geometrical axes is limited to very small tolerances (lower than 0.1 mm) or that homogeneity of the material of the magnet is specially called for.

2. Active magnetic bearings especially designed or prepared for use with gas centrifuges. These bearings usually have the following characteristics:

(i) Designed to keep centred a rotor spinning at 600 Hz or more; and

(ii) Associated to a reliable electrical power supply and/or to an uninterruptible power supply (UPS) unit in order to function for more than 1 hour.

(b) Bearings/Dampers: Especially designed or prepared bearings comprising a pivot/cup assembly mounted on a damper. The pivot is normally a hardened steel shaft polished into a hemisphere at one end with a means of attachment to the bottom cap described in §1.1(e) of this appendix at the other. The shaft may, however, have a hydrodynamic bearing attached. The cup is pellet-shaped with hemispherical indentation in one surface. These components are often supplied separately to the damper.

(c) Molecular Pumps: Especially designed or prepared cylinders having internally machined or extruded helical grooves and internally machined bores. Typical dimensions are as follows: 75 mm to 650 mm internal diameter, 10 mm or more wall thickness, with a length equal to or greater than the diameter. The grooves are typically rectangular in cross-section and 2 mm or more in depth.

(d) Motor Stators: Especially designed or prepared ring shaped stators for high speed multi-phase alternating current (AC) hysteresis (or reluctance) motors for synchronous operation within a vacuum at a frequency of 600 Hz or greater and a power of 40 volts amps or greater. The stators may consist of multi-phase windings on a laminated low loss iron core comprised of thin layers typically 2.0 mm thick or less.

(e) Centrifuge housing/recipients: Components especially designed or prepared to contain the rotor tube assembly of a gas centrifuge. The housing consists of a rigid cylinder of wall thickness up to 30 mm with precision machined ends to locate the bearings and with one or more flanges for mounting. The machined ends are parallel to each other and perpendicular to the cylinder's longitudinal axis to within 0.05 degrees or less. The housing may also be a honeycomb type structure to accommodate several rotor tubes.

(f) Scoops: Especially designed or prepared tubes for the extraction of UF_6 gas from within the rotor tube by a Pitot tube action (that is, with an aperture facing into the circumferential gas flow within the rotor tube,

for example by bending the end of a radially disposed tube) and capable of being fixed to the central gas extraction system.

2. *Especially designed or prepared auxiliary systems, equipment, and components for gas centrifuge enrichment plants.*

NOTE: The auxiliary systems, equipment, and components for a gas centrifuge enrichment plant are the systems of the plant needed to feed UF_6 to the centrifuges to link the individual centrifuges to each other to form cascades (or stages) to allow for progressively higher enrichments and to extract the product and tails of UF_6 from the centrifuges, together with the equipment required to drive the centrifuges or to control the plant.

Normally UF_6 is evaporated from the solid using heated autoclaves and is distributed in gaseous form to the centrifuges by way of cascade header pipework. The ''product'' and ''tails'' of UF_6 gaseous streams flowing from the centrifuges are also passed by way of cascade header pipework to cold traps (operating at about 203 K (−70 °C)) where they are condensed prior to onward transfer into suitable containers for transportation or storage. Because an enrichment plant consists of many thousands of centrifuges arranged in cascades, there are many kilometers of cascade header pipework incorporating thousands of welds with a substantial amount of repetition of layout. The equipment, component and piping systems are fabricated to very high vacuum and cleanliness standards.

Some of the items listed below either come into direct contact with the UF_6 process gas or directly control the centrifuges and the passage of the gas from centrifuge to centrifuge and cascade to cascade. Materials resistant to corrosion by UF_6 include copper, copper alloys, stainless steel, aluminum, aluminum oxide, aluminum alloys, nickel or alloys containing 60 percent or more nickel, and fluorinated hydrocarbon polymers.

(a) Feed Systems/Product and Tails Withdrawal Systems: Especially designed or prepared process systems or equipment for enrichment plants made of or protected by materials resistant to corrosion by UF_6 including:

1. Feed autoclaves, ovens, or systems used for passing UF_6 to the enrichment process.

2. Desublimers, cold traps, or pumps used to remove UF_6 from the enrichment process for subsequent transfer upon heating.

3. Solidification or liquefaction stations used to remove UF_6 from the enrichment process by compressing and converting UF_6 to a liquid or solid form.

4. ''Product'' and ''tails'' stations used for transferring UF_6 into containers.

(b) Machine Header Piping Systems: Especially designed or prepared piping systems and header systems for handling UF_6 within the centrifuge cascades.

This piping network is normally of the ''triple'' header system with each centrifuge connected to each of the headers. There is therefore a substantial amount of repetition in its form. It is wholly made of or protected by UF_6 resistant materials (see Note to this section) and is fabricated to very high vacuum and cleanliness standards.

(c) Special shut-off and control valves:

1. Shut-off valves especially designed or prepared to act on the feed, ''product'' or ''tails'' UF_6 gaseous streams of an individual gas centrifuge.

2. Bellows-sealed valves, manual or automated, shut-off or control, made of or protected by materials resistant to corrosion by UF_6, with an inside diameter of 10 to 160 mm, especially designed or prepared for use in main or auxiliary systems of gas centrifuge enrichment plants.

Typical especially designed or prepared valves include bellow-sealed valves, fast acting closure-types, fast acting valves, and others.

(d) UF_6 Mass Spectrometers/Ion Sources: Especially designed or prepared mass spectrometers capable of taking on-line samples from UF_6 gas streams and having all of the following:

1. Capable of measuring ions of 320 atomic mass units or greater and having a resolution of better than 1 part in 320.

2. Ion sources constructed of or protected by nickel, nickel-copper alloys with a nickel content of 60 percent or more by weight, or nickel-chrome alloys.

3. Electron bombardment ionization sources.

4. Having a collector system suitable for isotope analysis.

(e) Frequency Changers: Frequency changers (also known as converters or inverters) especially designed or prepared to supply motor stators as defined under §1.2(d) of this appendix, or parts, components, and subassemblies of such frequency changers having all of the following characteristics:

1. A multiphase output of 600 Hz or greater; and

2. High stability (with frequency control better than 0.2 percent).

(f) Any other components especially designed or prepared for use in a gas centrifuge enrichment plant or in any of the components described in this appendix.

[79 FR 39291, July 10, 2014]

APPENDIX C TO PART 110—ILLUSTRATIVE LIST OF GASEOUS DIFFUSION ENRICHMENT PLANT ASSEMBLIES AND COMPONENTS UNDER NRC EXPORT LICENSING AUTHORITY

NOTE: In the gaseous diffusion method of uranium isotope separation, the main technological assembly is a special porous gaseous diffusion barrier, heat exchanger for cooling the gas (which is heated by the process of compression), seal valves and control valves, and pipelines. Inasmuch as gaseous diffusion technology uses uranium hexafluoride (UF_6), all equipment, pipeline and instrumentation surfaces (that come in contact with the gas) must be made of materials that remain stable in contact with UF_6. A gaseous diffusion facility requires a number of these assemblies, so that quantities can provide an important indication of end use.

The auxiliary systems, equipment, and components for gaseous diffusion enrichment plants are the systems of plant needed to feed UF_6 to the gaseous diffusion assembly to link the individual assemblies to each other to form cascades (or stages) to allow for progressively higher enrichments and to extract the ''product'' and ''tails'' UF_6 from the diffusion cascades. Because of the high inertial properties of diffusion cascades, any interruption in their operation, and especially their shut-down, leads to serious consequences. Therefore, a strict and constant maintenance of vacuum in all technological systems, automatic protection for accidents, and precise automated regulation of the gas flow is of importance in a gaseous diffusion plant. All this leads to a need to equip the plant with a large number of special measuring, regulating, and controlling systems.

Normally UF_6 is evaporated from cylinders placed within autoclaves and is distributed in gaseous form to the entry point by way of cascade header pipework. The ''product'' and ''tails'' UF_6 gaseous streams flowing from exit points are passed by way of cascade header pipework to either cold traps or to compression stations where the UF_6 gas is liquified prior to onward transfer into suitable containers for transportation or storage. Because a gaseous diffusion enrichment plant consists of a large number of gaseous diffusion assemblies arranged in cascades, there are many kilometers of cascade header pipework, incorporating thousands of welds with substantial amounts of repetition of layout. The equipment, components, and piping systems are fabricated to very high vacuum and cleanliness standards.

The items listed below either come into direct contact with the UF_6 process gas or directly control the flow within the cascade. All surfaces which come into contact with the process gas are wholly made of, or lined with, UF_6-resistant materials. For the purposes of this appendix, the materials resistant to corrosion by UF_6 include copper, copper alloys, stainless steel, aluminum, aluminum oxide, aluminum alloys, nickel or alloys containing 60 percent or more nickel and fluorinated hydrocarbon polymers.

1. Assemblies and components especially designed or prepared for use in gaseous diffusion enrichment.

1.1 Gaseous Diffusion Barriers and Barrier Materials

(a) Especially designed or prepared thin, porous filters, with a pore size of 10–100 nm, a thickness of 5 mm or less, and for tubular forms, a diameter of 25 mm or less, made of metallic, polymer or ceramic materials resistant to corrosion by UF_6 (See Note in §2 of this appendix).

(b) Especially prepared compounds or powders for the manufacture of such filters. Such compounds and powders include nickel or alloys containing 60 percent or more nickel, aluminum oxide, or UF_6-resistant fully fluorinated hydrocarbon polymers having a purity of 99.9 percent by weight or more, a particle size less than 10 μm, and a high degree of particle size uniformity, which are especially prepared for the manufacture of gaseous diffusion barriers.

1.2 Diffuser Housings

Especially designed or prepared hermetically sealed vessels for containing the gaseous diffusion barrier, made of or protected by UF_6-resistant materials (See Note in §2 of this appendix).

1.3 Compressors and Gas Blowers

Especially designed or prepared compressors or gas blowers with a suction volume capacity of 1 m^3 per minute or more of UF_6, and with a discharge pressure of up to 500 kPa, designed for long-term operation in the UF_6 environment, as well as separate assemblies of such compressors and gas blowers. These compressors and gas blowers have a pressure ratio of 10:1 or less and are made of, or protected by, materials resistant to UF_6 (See Note in §2 of this appendix).

1.4 Rotary Shaft Seals

Especially designed or prepared vacuum seals, with seal feed and seal exhaust connections, for sealing the shaft connecting the compressor or the gas blower rotor with the driver motor so as to ensure a reliable seal against in-leaking of air into the inner chamber of the compressor or gas blower which is filled with UF_6. Such seals are normally designed for a buffer gas in-leakage rate of less than 1000 cm^3 per minute.

1.5 Heat Exchangers for Cooling UF_6

Especially designed or prepared heat exchangers made of or protected by UF_6 resistant materials (see Note to §2 of this appendix) and intended for a leakage pressure change rate of less than 10 Pa per hour under a pressure difference of 100 kPa.

2. Auxiliary systems, equipment, and components especially designed or prepared for use in gaseous diffusion enrichment.

NOTE: The items listed below either come into direct contact with the UF_6 process gas or directly control the flow within the cascade. Materials resistant to corrosion by UF_6 include copper, copper alloys, stainless steel, aluminum, aluminum oxide, aluminum alloys, nickel or alloys containing 60 percent or more nickel, and fluorinated hydrocarbon polymers.

2.1 Feed Systems/Product and Tails Withdrawal Systems

Especially designed or prepared process systems or equipment for enrichment plants made of, or protected by, materials resistant to corrosion by UF_6, including:

(1) Feed autoclaves, ovens, or systems used for passing UF_6 to the enrichment process;

(2) Desublimers, cold traps, or pumps used to remove UF_6 from the enrichment process for subsequent transfer upon heating;

(3) Solidification or liquefaction stations used to remove UF_6 from the enrichment process by compressing and converting UF_6 to a liquid or solid form;

(4) ''Product'' or ''tails'' stations used for transferring UF_6 into containers.

2.2 Header Piping Systems

Especially designed or prepared piping systems and header systems for handling UF_6 within the gaseous diffusion cascades. This piping network is normally of the ''double'' header system with each cell connected to each of the headers.

2.3 Vacuum Systems

(a) Especially designed or prepared vacuum manifolds, vacuum headers and vacuum pumps having a suction capacity of 5 m^3 per minute or more.

(b) Vacuum pumps especially designed for service in UF_6-bearing atmospheres made of, or protected by, materials resistant to corrosion by UF_6 (See Note to this section). These pumps may be either rotary or positive displacement, may have fluorocarbon seals, and may have special working fluids present.

2.4 Special Shut-Off and Control Valves

Especially designed or prepared bellows-sealed valves, manual or automated, shut-off or control valves, made of, or protected by, materials resistant to corrosion by UF_6, for installation in main and auxiliary systems of gaseous diffusion enrichment plants.

2.5 UF_6 Mass Spectrometers/Ion Sources

Especially designed or prepared mass spectrometers capable of taking on-line samples from UF_6 gas streams and having all of the following:

(a) Capable of measuring ions of 320 atomic mass units or greater and having a resolution of better than 1 part in 320;

(b) ion sources constructed of or protected by nickel, nickel-copper alloys with a nickel content of 60 percent or more by weight, or nickel-chrome alloys;

(c) electron bombardment ionization sources; and

(d) having a collector system suitable for isotopic analysis.

3. Any other components especially designed or prepared for use in a gaseous diffusion enrichment plant or in any of the components described in this appendix.

[79 FR 39293, July 10, 2014]

APPENDIX D TO PART 110—ILLUSTRATIVE LIST OF AERODYNAMIC ENRICHMENT PLANT EQUIPMENT AND COMPONENTS UNDER NRC EXPORT LICENSING AUTHORITY

NOTE: In aerodynamic enrichment processes, a mixture of gaseous UF_6 and light gas (hydrogen or helium) is compressed and then passed through separating elements wherein isotopic separation is accomplished by the generation of high centrifugal forces over a curved-wall geometry. Two processes of this type have been successfully developed: The separation nozzle process and the vortex tube process. For both processes, the main components of a separation stage included cylindrical vessels housing the special separation elements (nozzles or vortex tubes), gas compressors, and heat exchangers to remove the heat of compression. An aerodynamic plant requires a number of these stages, so that quantities can provide an important indication of end use. Because aerodynamic processes use UF_6, all equipment, pipeline and instrumentation surfaces (that come in contact with the gas) must be made of, or protected by, materials that remain stable in contact with UF_6. All surfaces which come into contact with the process gas are made of, or protected by, UF_6-resistant materials; including copper, copper alloys, stainless steel, aluminum, aluminum oxide, aluminum alloys, nickel or alloys containing 60 percent or more nickel by weight, and fluorinated hydrocarbon polymers.

The following items either come into direct contact with the UF_6 process gas or directly control the flow within the cascade:

(1) Separation nozzles and assemblies.

Especially designed or prepared separation nozzles and assemblies thereof. The separation nozzles consist of slit-shaped, curved channels having a radius of curvature less than 1 mm, resistant to corrosion by UF_6 and having a knife-edge within the nozzle that separates the gas flowing through the nozzle into two fractions.

(2) Vortex tubes and assemblies.

Especially designed or prepared vortex tubes and assemblies thereof. The vortex tubes are cylindrical or tapered, made of, or protected by, materials resistant to corrosion by UF_6, and with one or more tangential inlets. The tubes may be equipped with nozzle-type appendages at either or both ends.

The feed gas enters the vortex tube tangentially at one end or through swirl vanes or at numerous tangential positions along the periphery of the tube.

(3) Compressors and gas blowers.

Especially designed or prepared compressors or gas blowers made of, or protected by, materials resistant to corrosion by the UF_6/carrier gas (hydrogen or helium) mixture.

(4) Rotary shaft seals.

Especially designed or prepared rotary shaft seals, with seal feed and seal exhaust connections, for sealing the shaft connecting the compressor rotor or the gas blower rotor with the driver motor to ensure a reliable seal against out-leakage of process gas or in-leakage of air or seal gas into the inner chamber of the compressor or gas blower which is filled with a UF_6/carrier gas mixture.

(5) Heat exchangers for gas cooling.

Especially designed or prepared heat exchangers, made of, or protected by, materials resistant to corrosion by UF_6.

(6) Separation element housings.

Especially designed or prepared separation element housings, made of, or protected by, materials resistant to corrosion by UF_6, for containing vortex tubes or separation nozzles.

(7) Feed systems/product and tails withdrawal systems.

Especially designed or prepared process systems or equipment for enrichment plants made of, or protected by, materials resistant to corrosion by UF_6, including:

(i) Feed autoclaves, ovens, or systems used for passing UF_6 to the enrichment process;

(ii) Desublimers (or cold traps) used to remove UF_6 from the enrichment process for subsequent transfer upon heating;

(iii) Solidification or liquefaction stations used to remove UF_6 from the enrichment process by compressing and converting UF_6 to a liquid or solid form; and

(iv) ''Product'' or ''tails'' stations used for transferring UF_6 into containers.

(8) Header piping systems.

Especially designed or prepared header piping systems, made of or protected by materials resistant to corrosion by UF_6, for handling UF_6 within the aerodynamic cascades. The piping network is normally of the ''double'' header design with each stage or group of stages connected to each of the headers.

(9) Vacuum systems and pumps.

(i) Especially designed or prepared vacuum systems consisting of vacuum manifolds, vacuum headers and vacuum pumps, and designed for service in UF_6-bearing atmospheres.

(ii) Especially designed or prepared vacuum pumps for service in UF_6-bearing atmospheres and made of, or protected by, materials resistant to corrosion by UF_6. These pumps may use fluorocarbon seals and special working fluids.

(10) Special shut-off and control valves.

Especially designed or prepared bellows-sealed valves, manual or automated, shut-off or control valves made of, or protected by, materials resistant to corrosion by UF_6 with a diameter of 40 mm or greater for installation in main and auxiliary systems of aerodynamic enrichment plants.

(11) UF_6 mass spectrometers/ion sources.

Especially designed or prepared mass spectrometers capable of taking on-line samples from UF_6 gas streams and having all of the following:

(i) Capable of measuring ions of 320 atomic mass units or greater and having a resolution of better than 1 part in 320;

(ii) Ion sources constructed of or protected by nickel, nickel-copper alloys with a nickel content of 60 percent or more by weight, or nickel-chrome alloys;

(iii) Electron bombardment ionization sources; and

(iv) Collector system suitable for isotopic analysis.

(12) UF_6/carrier gas separation systems.

Especially designed or prepared process systems for separating UF_6 from carrier gas (hydrogen or helium).

These systems are designed to reduce the UF_6 content in the carrier gas to 1 ppm or less and may incorporate equipment such as:

(i) Cryogenic heat exchangers and cryoseparators capable of temperatures of 153 K (–120 °C) or less;

(ii) Cryogenic refrigeration units capable of temperatures of 153 K (–120 °C) or less;

(iii) Separation nozzle or vortex tube units for the separation of UF_6 from carrier gas; or

(iv) UF6 cold traps capable of freezing out UF_6.

(13) Any other components especially designed or prepared for use in an aerodynamic enrichment plant or in any of the components described in this appendix.

[79 FR 39294, July 10, 2014]

APPENDIX E TO PART 110—ILLUSTRATIVE LIST OF CHEMICAL EXCHANGE OR ION EXCHANGE ENRICHMENT PLANT EQUIPMENT AND COMPONENTS UNDER NRC EXPORT LICENSING AUTHORITY

NOTE: The slight difference in mass between the isotopes of uranium causes small changes in chemical reaction equilibria that can be used as a basis for separation of the isotopes. Two processes have been successfully developed: Liquid-liquid chemical exchange and solid-liquid ion exchange.

A. In the liquid-liquid chemical exchange process, immiscible liquid phases (aqueous and organic) are countercurrently contacted to give the cascading effect of thousands of separation stages. The aqueous phase consists of uranium chloride in hydrochloric acid solution; the organic phase consists of an extractant containing uranium chloride in an organic solvent. The contactors employed in the separation cascade can be liquid-liquid exchange columns (such as pulsed columns with sieve plates) or liquid centrifugal contactors. Chemical conversions (oxidation and reduction) are required at both ends of the separation cascade in order to provide for the reflux requirements at each end. A major design concern is to avoid contamination of the process streams with certain metal ions. Plastic, plastic-lined (including use of fluorocarbon polymers) and/or glass-lined columns and piping are therefore used.

(1) Liquid-liquid exchange columns.

Countercurrent liquid-liquid exchange columns having mechanical power input especially designed or prepared for uranium enrichment using the chemical exchange process. For corrosion resistance to concentrated hydrochloric acid solutions, these columns and their internals are normally made of, or protected by, suitable plastic materials (such as fluorinated hydrocarbon polymers) or glass. The stage residence time of the columns is normally designed to be 30 seconds or less.

(2) Liquid-liquid centrifugal contactors.

Especially designed or prepared for uranium enrichment using the chemical exchange process. These contactors use rotation to achieve dispersion of the organic and aqueous streams and then centrifugal force to separate the phases. For corrosion resistance to concentrated hydrochloric acid solutions, the contactors are normally made of, or protected by, suitable plastic materials (such as fluorinated hydrocarbon polymers) or glass. The stage residence time of the centrifugal contactors is designed to be short (30 seconds or less).

(3) Uranium reduction systems and equipment.

(i) Especially designed or prepared electrochemical reduction cells to reduce uranium from one valence state to another for uranium enrichment using the chemical exchange process. The cell materials in contact with process solutions must be corrosion resistant to concentrated hydrochloric acid solutions.

The cell cathodic compartment must be designed to prevent re-oxidation of uranium to its higher valence state. To keep the uranium in the cathodic compartment, the cell may have an impervious diaphragm membrane constructed of special cation exchange material. The cathode consists of a suitable solid conductor such as graphite.

These systems consist of solvent extraction equipment for stripping the U^{+4} from the organic stream into an aqueous solution, evaporation and/or other equipment to accomplish solution pH adjustment and control, and pumps or other transfer devices for feeding to the electrochemical reduction cells. A major design concern is to avoid contamination of the aqueous stream with certain metal ions. For those parts in contact with the process stream, the system is constructed of equipment made of, or protected by, materials such as glass, fluorocarbon polymers, polyphenyl sulfate, polyether sulfone, and resin-impregnated graphite.

(ii) Especially designed or prepared systems at the product end of the cascade for taking the U^{+4} out of the organic stream, adjusting the acid concentration, and feeding to the electrochemical reduction cells.

These systems consist of solvent extraction equipment for stripping the U^{+4} from the organic stream into an aqueous solution, evaporation and/or other equipment to accomplish solution pH adjustment and control, and pumps or other transfer devices for feeding to the electrochemical reduction cells. A major design concern is to avoid contamination of the aqueous stream with certain metal ions. For those parts in contact with the process stream, the system is constructed of equipment made of, or protected by, materials such as glass, fluorocarbon polymers, polyphenyl sulfate, polyether sulfone, and resin-impregnated graphite.

(4) Feed preparation systems.

Especially designed or prepared systems for producing high-purity uranium chloride feed solutions for chemical exchange uranium isotope separation plants.

These systems consist of dissolution, solvent extraction and/or ion exchange equipment for purification and electrolytic cells for reducing the uranium U^{+6} or U^{+4} to U^{+3}. These systems produce uranium chloride solutions having only a few parts per million of metallic impurities such as chromium, iron, vanadium, molybdenum, and other bivalent or higher multi-valent cations. Materials of construction for portions of the system processing high-purity U^{+3} include glass, fluorinated hydrocarbon polymers,

polyphenyl sulfate or polyether sulfone plastic-lined and resin-impregnated graphite.

(5) Uranium oxidation systems.

Especially designed or prepared systems for oxidation of U^{+3} to U^{+4} for return to the uranium isotope separation cascade in the chemical exchange enrichment process.

These systems may incorporate equipment such as:

(i) Equipment for contacting chlorine and oxygen with the aqueous effluent from the isotope separation equipment and extracting the resultant U^{+4} into the stripped organic stream returning from the product end of the cascade; and

(ii) Equipment that separates water from hydrochloric acid so that the water and the concentrated hydrochloric acid may be reintroduced to the process at the proper locations.

B. In the solid-liquid ion-exchange process, enrichment is accomplished by uranium adsorption/desorption on a special, fast-acting, ion-exchange resin or adsorbent. A solution of uranium in hydrochloric acid and other chemical agents is passed through cylindrical enrichment columns containing packed beds of the adsorbent. For a continuous process, a reflux system is necessary to release the uranium from the adsorbent back in the liquid flow so that ''product'' and ''tails'' can be collected. This is accomplished with the use of suitable reduction/oxidation chemical agents that are fully regenerated in separate external circuits and that may be partially regenerated within the isotopic separation columns themselves. The presence of hot concentrated hydrochloric acid solutions in the process requires that the equipment be made of, or protected by, special corrosion-resistant materials.

(1) Fast reacting ion exchange resins/adsorbents.

Especially designed or prepared for uranium enrichment using the ion exchange process, including porous macroreticular resins, and/or pellicular structures in which the active chemical exchange groups are limited to a coating on the surface of an inactive porous support structure, and other composite structures in any suitable form including particles or fibers. These ion exchange resins/adsorbents have diameters of 0.2 mm or less and must be chemically resistant to concentrated hydrochloric acid solutions as well as physically strong enough so as not to degrade in the exchange columns. The resins/adsorbents are especially designed to achieve very fast uranium isotope exchange kinetics (exchange rate half-time of less than 10 seconds) and are capable of operating at a temperature in the range of 373 K (100 °C) to 473 K (200 °C).

(2) Ion exchange columns.

Cylindrical columns greater than 1000 mm in diameter for containing and supporting packed beds of ion exchange resin/adsorbent, especially designed or prepared for uranium enrichment using the ion exchange process. These columns are made of, or protected by, materials (such as titanium or fluorocarbon plastics) resistant to corrosion by concentrated hydrochloric acid solutions and are capable of operating at a temperature in the range of 373 K (100 °C) to 473 K (200 °C) and pressures above 0.7 MPa.

(3) Ion exchange reflux systems.

(i) Especially designed or prepared chemical or electrochemical reduction systems for regeneration of the chemical reducing agent(s) used in ion exchange uranium enrichment cascades.

The ion exchange enrichment process may use, for example, trivalent titanium (Ti^{+3}) as a reducing cation in which case the reduction system would regenerate Ti^{+3} by reducing Ti^{+4}.

(ii) Especially designed or prepared chemical or electrochemical oxidation systems for regeneration of the chemical oxidizing agent(s) used in ion exchange uranium enrichment cascades.

The ion exchange enrichment process may use, for example, trivalent iron (Fe^{+3}) as an oxidant in which case the oxidation system would regenerate Fe^{+3} by oxidizing Fe^{+2}.

C. Any other components especially designed or prepared for use in a chemical exchange or ion exchange enrichment plant or in any of the components described in this appendix.

[79 FR 39295, July 10, 2014]

Appendix F to Part 110—Illustrative List of Laser-Based Enrichment Plant Equipment and Components Under NRC Export Licensing Authority

Note: Present systems for enrichment processes using lasers fall into two categories: The process medium is atomic uranium vapor and the process medium is the vapor of a uranium compound, sometimes mixed with another gas or gases. Common nomenclature for these processes include: First category-atomic vapor laser isotope separation; and second category-molecular laser isotope separation including chemical reaction by isotope selective laser activation. The systems, equipment, and components for laser enrichment plants include: (a) Devices to feed uranium-metal vapor for selective photo-ionization or devices to feed the vapor of a uranium compound (for selective photo-dissociation or selective excitation/activation); (b) devices to collect enriched and depleted uranium metal as ''product'' and ''tails'' in the first category, and devices to collect enriched and depleted uranium compounds as ''product'' and ''tails'' in the second category; (c) process

laser systems to selectively excite the uranium-235 species; and (d) feed preparation and product conversion equipment. The complexity of the spectroscopy of uranium atoms and compounds may require incorporation of a number of available laser and laser optics technologies.

All surfaces that come into direct contact with the uranium or UF_6 are wholly made of, or protected by, corrosion-resistant materials. For laser-based enrichment items, the materials resistant to corrosion by the vapor or liquid of uranium metal or uranium alloys include yttria-coated graphite and tantalum; and the materials resistant to corrosion by UF_6 include copper, copper alloys, stainless steel, aluminum, aluminum oxide, aluminum alloys, nickel or alloys containing 60 percent or more nickel by weight, and fluorinated hydrocarbon polymers. Many of the following items come into direct contact with uranium metal vapor or liquid or with process gas consisting of UF_6 or a mixture of UF_6 and other gases:

(1) Uranium vaporization systems (atomic vapor based methods).

Especially designed or prepared uranium metal vaporization systems for use in laser enrichment.

These systems may contain electron beam guns and are designed to achieve a delivered power (1 kW or greater) on the target sufficient to generate uranium metal vapour at a rate required for the laser enrichment function.

(2) Liquid or vapor uranium metal handling systems and components (atomic vapor based methods).

Especially designed or prepared systems for handling molten uranium, molten uranium alloys, or uranium metal vapor.

The liquid uranium metal handling systems may consist of crucibles and cooling equipment for the crucibles. The crucibles and other system parts that come into contact with molten uranium, molten uranium alloys, or uranium metal vapor are made of, or protected by, materials of suitable corrosion and heat resistance, such as tantalum, yttria-coated graphite, graphite coated with other rare earth oxides, or mixtures thereof.

(3) Uranium metal ''product'' and ''tails'' collector assemblies (atomic vapor based methods).

Especially designed or prepared ''product'' and ''tails'' collector assemblies for uranium metal in liquid or solid form.

Components for these assemblies are made of or protected by materials resistant to the heat and corrosion of uranium metal vapor or liquid, such as yttria-coated graphite or tantalum, and may include pipes, valves, fittings, ''gutters,'' feed-throughs, heat exchangers and collector plates for magnetic, electrostatic, or other separation methods.

(4) Separator module housings (atomic vapor based methods).

Especially designed or prepared cylindrical or rectangular vessels for containing the uranium metal vapor source, the electron beam gun, and the ''product'' and ''tails'' collectors. These housings have multiplicity of ports for electrical and water feedthroughs, laser beam windows, vacuum pump connections, and instrumentation diagnostics and monitoring with opening and closure provisions to allow refurbishment of internal components.

(5) Supersonic expansion nozzles (molecular based methods).

Especially designed or prepared supersonic expansion nozzles for cooling mixtures of UF_6 and carrier gas to 150 K (−123 °C) or less which are corrosion resistant to UF_6.

(6) ''Product'' or ''tails'' collectors (molecular based methods).

Especially designed or prepared components or devices for collecting uranium product material or uranium tails material following illumination with laser light.

In one example of molecular laser isotope separation, the product collectors serve to collect enriched uranium pentafluoride (UF_5) solid material. The product collectors may consist of filter, impact, or cyclone-type collectors, or combinations thereof, and must be corrosion resistant to the UF_5/UF_6 environment.

(7) UF_6/carrier gas compressors (molecular based methods).

Especially designed or prepared compressors for UF_6/carrier gas mixtures, designed for long term operation in a UF_6 environment. Components of these compressors that come into contact with process gas are made of, or protected by, materials resistant to UF_6 corrosion.

(8) Rotary shaft seals (molecular based methods).

Especially designed or prepared rotary shaft seals, with seal feed and seal exhaust connections, for sealing the shaft connecting the compressor rotor with the driver motor to ensure a reliable seal against out-leakage of process gas or in-leakage of air or seal gas into the inner chamber of the compressor which is filled with a UF_6/carrier gas mixture.

(9) Fluorination systems (molecular based methods).

Especially designed or prepared systems for fluorinating UF_5 (solid) to UF_6 (gas).

These systems are designed to fluorinate the collected UF_5 powder to UF_6 for subsequent collection in product containers or for transfer as feed for additional enrichment. In one approach, the fluorination reaction may be accomplished within the isotope separation system to react and recover directly off the ''product'' collectors. In another approach, the UF_5 powder may be removed/transferred from the ''product'' collectors into a suitable reaction vessel (e.g., fluidized-bed reactor, screw reactor or flame

tower) for fluorination. In both approaches, equipment is used for storage and transfer of fluorine (or other suitable fluorinating agents) and for collection and transfer of UF_6.

(10) UF_6 mass spectrometers/ion sources (molecular based methods).

Especially designed or prepared mass spectrometers capable of taking on-line samples from UF_6 gas streams and having all of the following characteristics:

(i) Capable of measuring ions of 320 atomic mass units or greater and having a resolution of better than 1 part in 320;

(ii) Ion sources constructed of or protected by nickel, nickel-copper alloys with a nickel content of 60 percent or more by weight, or nickel-chrome alloys;

(iii) Electron bombardment ionization sources; and

(iv) Collector system suitable for isotopic analysis.

(11) Feed systems/product and tails withdrawal systems (molecular based methods).

Especially designed or prepared process systems or equipment for enrichment plants made of or protected by materials resistant to corrosion by UF_6, including:

(i) Feed autoclaves, ovens, or systems used for passing UF_6 to the enrichment process;

(ii) Desublimers (or cold traps) used to remove UF_6 from the enrichment process for subsequent transfer upon heating;

(iii) Solidification or liquefaction stations used to remove UF_6 from the enrichment process by compressing and converting UF_6 to a liquid or solid; and

(iv) ''Product'' or ''tails'' stations used to transfer UF_6 into containers.

(12) UF_6/carrier gas separation systems (molecular based methods).

Especially designed or prepared process systems for separating UF_6 from carrier gas.

These systems may incorporate equipment such as:

(i) Cryogenic heat exchangers or cryoseparators capable of temperatures of 153 K (−120 °C) or less;

(ii) Cryogenic refrigeration units capable of temperatures of 153 K (−120 °C) or less; or

(iii) UF_6 cold traps capable of freezing out UF_6.

(13) Lasers or Laser systems.

Especially designed or prepared for the separation of uranium isotopes.

The laser system typically contains both optical and electronic components for the management of the laser beam (or beams) and the transmission to the isotope separation chamber. The laser system for atomic vapor based methods usually consists of tunable dye lasers pumped by another type of laser (e.g., copper vapor lasers or certain solid-state lasers). The laser system for molecular based methods may consist of CO_2 lasers or excimer lasers and a multi-pass optical cell. Lasers or laser systems for both methods require spectrum frequency stabilization for operation over extended periods of time.

(14) Any other components especially designed or prepared for use in a laser-based enrichment plant or in any of the components described in this appendix.

[79 FR 39296, July 10, 2014]

Appendix G to Part 110—Illustrative List of Plasma Separation Enrichment Plant Equipment and Components Under NRC Export Licensing Authority

Note: In the plasma separation process, a plasma of uranium ions passes through an electric field tuned to the ^{235}U ion resonance frequency so that they preferentially absorb energy and increase the diameter of their corkscrew-like orbits. Ions with a large-diameter path are trapped to produce a product enriched in ^{235}U. The plasma, made by ionizing uranium vapor, is contained in a vacuum chamber with a high-strength magnetic field produced by a superconducting magnet. The main technological systems of the process include the uranium plasma generation system, the separator module with superconducting magnet, and metal removal systems for the collection of ''product'' and ''tails.''

(1) Microwave power sources and antennae.

Especially designed or prepared microwave power sources and antennae for producing or accelerating ions having the following characteristics: Greater than 30 GHz frequency and greater than 50 kW mean power output for ion production.

(2) Ion excitation coils.

Especially designed or prepared radio frequency ion excitation coils for frequencies of more than 100 kHz and capable of handling more than 40 kW mean power.

(3) Uranium plasma generation systems.

Especially designed or prepared systems for the generation of uranium plasma for use in plasma separation plants.

(4) Uranium metal ''product'' and ''tails'' collector assemblies.

Especially designed or prepared ''product'' and ''tails'' collector assemblies for uranium metal in solid form. These collector assemblies are made of, or protected by, materials resistant to the heat and corrosion of uranium metal vapor, such as yttria-coated graphite or tantalum.

(5) Separator module housings.

Especially designed or prepared cylindrical vessels for use in plasma separation enrichment plants for containing the uranium plasma source, radio-frequency drive coil, and the ''product'' and ''tails'' collectors.

These housings have a multiplicity of ports for electrical feed-throughs, diffusion pump connections, and instrumentation

diagnostics and monitoring. They have provisions for opening and closure to allow for refurbishment of internal components and are constructed of a suitable non-magnetic material such as stainless steel.

(6) Any other components especially designed or prepared for use in a plasma separation enrichment plant or in any of the components described in this appendix.

[79 FR 39297, July 10, 2014]

APPENDIX H TO PART 110—ILLUSTRATIVE LIST OF ELECTROMAGNETIC ENRICHMENT PLANT EQUIPMENT AND COMPONENTS UNDER NRC EXPORT LICENSING AUTHORITY

NOTE: In the electromagnetic process, uranium metal ions produced by ionization of a salt feed material (typically UCL4) are accelerated and passed through a magnetic field that has the effect of causing the ions of different isotopes to follow different paths. The major components of an electromagnetic isotope separator include: a magnetic field for ion-beam diversion/separation of the isotopes, an ion source with its acceleration system, and a collection system for the separated ions. Auxiliary systems for the process include the magnet power supply system, the ion source high-voltage power supply system, the vacuum system, and extensive chemical handling systems for recovery of product and cleaning/recycling of components.

(1) Electromagnetic isotope separators.

Especially designed or prepared for the separation of uranium isotopes, and equipment and components therefor, including:

(i) Ion Sources—especially designed or prepared single or multiple uranium ion sources consisting of a vapor source, ionizer, and beam accelerator, constructed of materials such as graphite, stainless steel, or copper, and capable of providing a total ion beam current of 50 mA or greater;

(ii) Ion collectors—collector plates consisting of two or more slits and pockets especially designed or prepared for collection of enriched and depleted uranium ion beams and constructed of materials such as graphite or stainless steel;

(iii) Vacuum housings—especially designed or prepared vacuum housings for uranium electromagnetic separators, constructed of suitable non-magnetic materials such as stainless steel and designed for operation at pressures of 0.1 Pa or lower.

The housings are specially designed to contain the ion sources, collector plates and water-cooled liners and have provision for diffusion pump connections and opening and closure for removal and reinstallation of these components; and

(iv) Magnet pole pieces—especially designed or prepared magnet pole pieces having a diameter greater than 2 m used to maintain a constant magnetic field within an electromagnetic isotope separator and to transfer the magnetic field between adjoining separators.

(2) High voltage power supplies.

Especially designed or prepared high-voltage power supplies for ion sources, having all of the following characteristics:

(i) Capable of continuous operation;

(ii) Output voltage of 20,000 V or greater;

(iii) Output current of 1 A or greater; and

(iv) Voltage regulation of better than 0.01% over an 8 hour time period.

(3) Magnet power supplies.

Especially designed or prepared high-power, direct current magnet power supplies having all of the following characteristics:

(i) Capable of continuously producing a current output of 500 A or greater at a voltage of 100 V or greater; and

(ii) A current or voltage regulation better than 0.01% over an 8 hour time period.

(4) Any other components especially designed or prepared for use in an electromagnetic enrichment plant or in any of the components described in this appendix.

[61 FR 35606, July 8, 1996, as amended at 79 FR 39297, July 10, 2014]

APPENDIX I TO PART 110—ILLUSTRATIVE LIST OF REPROCESSING PLANT COMPONENTS UNDER NRC EXPORT LICENSING AUTHORITY

NOTE: Reprocessing irradiated nuclear fuel separates plutonium and uranium from intensely radioactive fission products and other transuranic elements. Different technical processes can accomplish this separation. However, over the years Purex has become the most commonly used and accepted process. Purex involves the dissolution of irradiated nuclear fuel in nitric acid, followed by separation of the uranium, plutonium, and fission products by solvent extraction using a mixture of tributyl phosphate in an organic diluent.

Purex facilities have process functions similar to each other, including: Irradiated fuel element chopping, fuel dissolution, solvent extraction, and process liquor storage. There may also be equipment for thermal denitration of uranium nitrate, conversion of plutonium nitrate to oxide metal, and treatment of fission product waste liquor to a form suitable for long term storage or disposal. However, the specific type and configuration of the equipment performing these functions may differ between Purex facilities for several reasons, including the type and quantity of irradiated nuclear fuel to be reprocessed and the intended disposition of the recovered materials, and the safety and maintenance philosophy incorporated into the design of the facility. A plant for

the reprocessing of irradiated fuel elements includes the equipment and components which normally come in direct contact with and directly control the irradiated fuel and the major nuclear material and fission product processing streams.

(1) Irradiated fuel element decladding equipment and chopping machines.

Remotely operated equipment especially designed or prepared for use in a reprocessing plant and intended to expose or prepare the irradiated nuclear fuel assemblies, bundles, or rods for processing. This equipment cuts, chops, shears, or otherwise breaches the cladding of the fuel to expose the irradiated nuclear material for processing or prepares the fuel for processing. Especially designed cutting shears are most commonly employed, although advanced equipment, such as lasers, peeling machines, or other techniques, may be used. Decladding involves removing the cladding of the irradiated nuclear fuel prior to its dissolution.

(2) Dissolvers.

Dissolver vessels or dissolvers employing mechanical devices especially designed or prepared for use in a reprocessing plant, intended for dissolution of irradiated nuclear fuel and which are capable of withstanding hot, highly corrosive liquid, and which can be remotely loaded, operated and maintained.

Dissolvers normally receive the solid, irradiated nuclear fuel. Nuclear fuels with cladding made of material including zirconium, stainless steel, or alloys of such materials must be decladded and/or sheared or chopped prior to being charged to the dissolver to allow the acid to reach the fuel matrix. The irradiated nuclear fuel is typically dissolved in strong mineral acids, such as nitric acid, and any undissolved cladding removed. While certain design features, such as small diameter, annular, or slab tanks may be used to ensure criticality safety, they are not a necessity. Administrative controls, such as small batch size or low fissile material content, may be used instead. Dissolver vessels and dissolvers employing mechanical devices are normally fabricated of material such as low carbon stainless steel, titanium or zirconium, or other high-quality materials. Dissolvers may include systems for the removal of cladding or cladding waste and systems for the control and treatment of radioactive off-gases. These dissolvers may have features for remote placement since they are normally loaded, operated, and maintained behind thick shielding.

(3) Solvent extractors and solvent extraction equipment.

Especially designed or prepared solvent extractors such as packed or pulse columns, mixer settlers, or centrifugal contactors for use in a plant for the reprocessing of irradiated fuel. Solvent extractors must be resistant to the corrosive effect of nitric acid. Solvent extractors are normally fabricated to extremely high standards (including special welding and inspection and quality assurance and quality control techniques) out of low carbon stainless steels, titanium, zirconium, or other high quality materials.

Solvent extractors both receive the solution of irradiated fuel from the dissolvers and the organic solution which separates the uranium, plutonium, and fission products. Solvent extraction equipment is normally designed to meet strict operating parameters, such as long operating lifetimes with no maintenance requirements or adaptability to easy replacement, simplicity of operation and control, and flexibility for variations in process conditions.

(4) Chemical holding or storage vessels.

Especially designed or prepared holding or storage vessels for use in a plant for the reprocessing of irradiated fuel. The holding or storage vessels must be resistant to the corrosive effect of nitric acid. The holding or storage vessels are normally fabricated of materials such as low carbon stainless steels, titanium or zirconium, or other high quality materials. Holding or storage vessels may be designed for remote operation and maintenance and may have the following features for control of nuclear criticality:

(i) Walls or internal structures with a boron equivalent of at least 2 percent, or

(ii) A maximum diameter of 175 mm (7 in) for cylindrical vessels, or

(iii) A maximum width of 75 mm (3 in) for either a slab or annular vessel.

(5) Neutron measurement systems for process control.

Neutron measurement systems especially designed or prepared for integration and use with automated process control systems in a plant for the reprocessing of irradiated fuel elements. These systems involve the capability of active and passive neutron measurement and discrimination in order to determine the fissile material quantity and composition. The complete system is composed of a neutron generator, a neutron detector, amplifiers, and signal processing electronics.

The scope of this entry does not include neutron detection and measurement instruments that are designed for nuclear material accountancy and safeguarding or any other application not related to integration and use with automated process control systems in a plant for the reprocessing of irradiated fuel elements.

(6) Plutonium nitrate to plutonium oxide conversion systems. Complete systems especially designed or prepared for the conversion of plutonium nitrate to plutonium oxide, in particular adapted so as to avoid criticality and radiation effects and to minimize toxicity hazards.

(7) Plutonium metal production systems. Complete systems especially designed or prepared for the production of plutonium metal,

in particular adapted so as to avoid criticality and radiation effects and to minimize toxicity hazards.

(8) Process control instrumentation specially designed or prepared for monitoring or controlling the processing of material in a reprocessing plant.

(9) Any other components especially designed or prepared for use in a reprocessing plant or in any of the components described in this appendix.

[79 FR 39297, July 10, 2014, as amended at 86 FR 40142, July 27, 2021]

APPENDIX J TO PART 110—ILLUSTRATIVE LIST OF URANIUM CONVERSION PLANT EQUIPMENT AND PLUTONIUM CONVERSION PLANT EQUIPMENT UNDER NRC EXPORT LICENSING AUTHORITY

NOTE: Uranium conversion plants and systems may perform one or more transformations from one uranium chemical species to another, including: conversion of uranium ore concentrates to UO3, conversion of UO3 to UO2, conversion of uranium oxides to UF4 or UF6, conversion of UF4 to UF6, conversion of UF6 to UF4, conversion of UF4 to uranium metal, and conversion of uranium fluorides to UO2. Many key equipment items for uranium conversion plants are common to several segments of the chemical process industry, including furnaces, rotary kilns, fluidized bed reactors, flame tower reactors, liquid centrifuges, distillation columns and liquid-liquid extraction columns. However, few of the items are available ''off-the-shelf''; most would be prepared according to customer requirements and specifications. Some require special design and construction considerations to address the corrosive properties of the chemicals handled (HF, F2, CLF3, and uranium fluorides). In all of the uranium conversion processes, equipment which individually is not especially designed or prepared for uranium conversion can be assembled into systems which are especially designed or prepared for uranium conversion.

(a) Uranium Conversion Plant Equipment.

(1) Especially designed or prepared systems for the conversion of uranium ore concentrates to UO3.

Conversion of uranium ore concentrates to UO3 can be performed by first dissolving the ore in nitric acid and extracting purified uranyl nitrate using a solvent such as tributyl phosphate. Next, the uranyl nitrate is converted to UO3 either by concentration and denitration or by neutralization with gaseous ammonia to produce ammonium diuranate with subsequent filtering, drying, and calcining.

(2) Especially designed or prepared systems for the conversion of UO3 to UF6.

Conversion of UO3 to UF6 can be performed directly by fluorination. The process requires a source of fluorine gas or chlorine trifluoride.

(3) Especially Designed or Prepared Systems for the conversion of UO3 to UO2.

Conversion of UO3 to UO2 can be performed through reduction of UO3 with cracked ammonia gas or hydrogen.

(4) Especially Designed or Prepared Systems for the conversion of UO2 to UF4.

Conversion of UO2 to UF4 can be performed by reacting UO2 with hydrogen fluoride gas (HF) at 300–500 °C.

(5) Especially Designed or Prepared Systems for the conversion of UF4 to UF6.

Conversion of UF4 to UF6 is performed by exothermic reaction with fluorine in a tower reactor. UF6 is condensed from the hot effluent gases by passing the effluent stream through a cold trap cooled to −10 °C. The process requires a source of fluorine gas.

(6) Especially Designed or Prepared Systems for the conversion of UF4 to U metal.

Conversion of UF4 to U metal is performed by reduction with magnesium (large batches) or calcium (small batches). The reaction is carried out at temperatures above the melting point of uranium (1130 °C).

(7) Especially designed or prepared systems for the conversion of UF6 to UO2.

Conversion of UF6 to UO2 can be performed by one of three processes. In the first, UF6 is reduced and hydrolyzed to UO2 using hydrogen and steam. In the second, UF6 is hydrolyzed by solution in water, ammonia is added to precipitate ammonium diuranate, and the diuranate is reduced to UO2 with hydrogen at 820 °C. In the third process, gaseous UF6, CO2, and NH3 are combined in water, precipitating ammonium uranyl carbonate. The ammonium uranyl carbonate is combined with steam and hydrogen at 500–600 °C to yield UO2. UF6 to UO2 conversion is often performed as the first stage of a fuel fabrication plant.

(8) Especially Designed or Prepared Systems for the conversion of UF6 to UF4. Conversion of UF6 to UF4 is performed by reduction with hydrogen.

(9) Especially designed or prepared systems for the conversion of UO_2 to UCl_4 as feed for electromagnetic enrichment.

NOTE: Plutonium conversion plants and systems may perform one or more transformations from one plutonium chemical species to another, including: conversion of plutonium nitrate to PuO_2, conversion of PuO_2 to PuF_4 and conversion of PuF_4 to plutonium metal. Plutonium conversion plants are usually associated with reprocessing facilities, but may also be associated with plutonium fuel fabrication facilities. Many of the key equipment items for plutonium conversion plants are common to several segments of the chemical process industry. For example, the types of equipment employed in

these processes may include the following items: furnaces, rotary kilns, fluidized bed reactors, flame tower reactors, liquid centrifuges, distillation columns and liquid-liquid extraction columns. Hot cells, glove boxes and remote manipulators may also be required. However, few of the items are available off-the-shelf; most would be prepared according to the requirements and specifications of the customer. Particular care is essential in designing for the special radiological, toxicity and criticality hazards associated with plutonium. In some circumstances, special design and construction considerations are required to address the corrosive properties of some of the chemicals handled (e.g., HF). Finally, it should be noted that, for all plutonium conversion processes, items of equipment which individually are not especially designed or prepared for plutonium conversion can be assembled into systems that are especially designed or prepared for use in plutonium conversion.

(b) Plutonium Conversion Plant Equipment

(1) Especially designed or prepared systems for the conversion of plutonium nitrate to oxide.

The main functions involved in this process are: process feed storage and adjustment, precipitation and solid/liquor separation, calcination, product handling, ventilation, waste management, and process control. The process systems are particularly adapted so as to avoid criticality and radiation effects and to minimize toxicity hazards. In most reprocessing facilities, this process involves the conversion of plutonium nitrate to plutonium dioxide. Other processes can involve the precipitation of plutonium oxalate or plutonium peroxide.

(2) Especially designed or prepared systems for plutonium metal production.

This process usually involves the fluorination of plutonium dioxide, normally with highly corrosive hydrogen fluoride, to produce plutonium fluoride, which is subsequently reduced using high purity calcium metal to produce metallic plutonium and a calcium fluoride slag. The main functions involved in this process are the following: fluorination (e.g., involving equipment fabricated or lined with a precious metal), metal reduction (e.g., employing ceramic crucibles), slag recovery, product handling, ventilation, waste management and process control. The process systems are particularly adapted so as to avoid criticality and radiation effects and to minimize toxicity hazards. Other processes include the fluorination of plutonium oxalate or plutonium peroxide followed by reduction to metal.

(c) Any other components especially designed or prepared for use in a uranium conversion plant or plutonium conversion plant or in any of the components described in this appendix.

[61 FR 35606, July 8, 1996, as amended at 65 FR 70291, Nov. 22, 2000; 79 FR 39298, July 10, 2014]

APPENDIX K TO PART 110—ILLUSTRATIVE LIST OF EQUIPMENT AND COMPONENTS UNDER NRC EXPORT LICENSING AUTHORITY FOR USE IN A PLANT FOR THE PRODUCTION OF HEAVY WATER, DEUTERIUM AND DEUTERIUM COMPOUNDS

NOTE: Heavy water can be produced by a variety of processes. However, two processes have proven to be commercially viable: The water-hydrogen sulphide exchange process (GS process) and the ammonia-hydrogen exchange process.

A. The GS process is based upon the exchange of hydrogen and deuterium between water and hydrogen sulphide within a series of towers which are operated with the top section cold and the bottom section hot. Water flows down the towers while the hydrogen sulphide gas circulates from the bottom to the top of the towers. A series of perforated trays are used to promote mixing between the gas and the water. Deuterium migrates to the water at low temperatures and to the hydrogen sulphide at high temperatures. Gas or water, enriched in deuterium, is removed from the first stage towers at the junction of the hot and cold sections and the process is repeated in subsequent stage towers. The product of the last stage, water enriched up to 30 percent in deuterium, is sent to a distillation unit to produce reactor grade heavy water; *i.e.*, 99.75 percent deuterium oxide.

B. The ammonia-hydrogen exchange process can extract deuterium from synthesis gas through contact with liquid ammonia in the presence of a catalyst. The synthesis gas is fed into exchange towers and then to an ammonia converter. Inside the towers the gas flows from the bottom to the top while the liquid ammonia flows from the top to the bottom. The deuterium is stripped from the hydrogen in the synthesis gas and concentrated in the ammonia. The ammonia then flows into an ammonia cracker at the bottom of the tower while the gas flows into an ammonia converter at the top. Further enrichment takes place in subsequent stages and reactor-grade heavy water is produced through final distillation. The synthesis gas feed can be provided by an ammonia plant that can be constructed in association with a heavy water ammonia-hydrogen exchange plant. The ammonia-hydrogen exchange process can also use ordinary water as a feed source of deuterium.

C.1. Much of the key equipment for heavy water production plants using either the GS process or the ammonia-hydrogen exchange process are common to several segments of the chemical and petroleum industries; particularly in small plants using the GS process. However, few items are available ''off-the-shelf.'' Both processes require the handling of large quantities of flammable, corrosive, and toxic fluids at elevated pressures. Therefore, in establishing the design and operating standards for plants and equipment using these processes, careful attention to materials selection and specifications is required to ensure long service life with high safety and reliability factors. The choice is primarily a function of economics and need. Most equipment, therefore, is prepared to customer requirements.

In both processes, equipment which individually is not especially designed or prepared for heavy water production can be assembled into especially designed or prepared systems for producing heavy water. Examples of such systems are the catalyst production system used in the ammonia-hydrogen exchange process and the water distillation systems used for the final concentration of heavy water to reactor-grade in either process.

C.2. Equipment especially designed or prepared for the production of heavy water utilizing either the water-hydrogen sulphide exchange process or the ammonia-hydrogen exchange process:

(i) Water-hydrogen Sulphide Exchange Towers.

Exchange towers with diameters of 1.5 m or greater and capable of operating at pressures greater than or equal to 2 MPa (300 psi) especially designed or prepared for heavy water production utilizing the water-hydrogen sulphide exchange process.

(ii) Blowers and Compressors.

Single stage, low head (*i.e.*, 0.2 MPa or 30 psi) centrifugal blowers or compressors for hydrogen-sulphide gas circulation (*i.e.*, gas containing more than 70 percent H2S). The blowers or compressors have a throughput capacity greater than or equal to 56 m^3/second (120,000 standard cubic feet per minute) while operating at pressures greater than or equal to 1.8 MPa (260 psi) suction and have seals designed for wet H2S service.

(iii) Ammonia-Hydrogen Exchange Towers.

Ammonia-hydrogen exchange towers greater than or equal to 35 m (114.3 ft) in height with diameters of 1.5 m (4.9 ft) to 2.5 m (8.2 ft) capable of operating at pressures greater than 15 MPa (2225 psi). The towers have at least one flanged, axial opening of the same diameter as the cylindrical part through which the tower internals can be inserted or withdrawn.

(iv) Tower Internals and Stage Pumps Used in the Ammonia-hydrogen Exchange Process.

Tower internals include especially designed stage contactors which promote intimate gas/liquid contact. Stage pumps include especially designed submersible pumps for circulation of liquid ammonia within a contacting stage internal to the stage towers.

(v) Ammonia Crackers Utilizing the Ammonia-hydrogen Exchange Process.

Ammonia crackers with operating pressures greater than or equal to 3 MPa (450 psi) especially designed or prepared for heavy water production utilizing the ammonia-hydrogen exchange process.

(vi) Ammonia Synthesis Converters or Synthesis Units.

Ammonia synthesis converters or synthesis units especially designed or prepared for heavy water production utilizing the ammonia-hydrogen exchange process.

These converters or units take synthesis gas (nitrogen and hydrogen) from an ammonia/hydrogen high-pressure exchange column (or columns), and the synthesized ammonia is returned to the exchange column (or columns).

(vii) Infrared Absorption Analyzers.

Infrared absorption analyzers capable of ''on-line'' hydrogen/deuterium ratio analysis where deuterium concentrations are equal to or greater than 90 percent.

(viii) Catalytic Burners Used in the Ammonia-hydrogen Exchange Process.

Catalytic burners for the conversion of enriched deuterium gas into heavy water especially designed or prepared for heavy water production utilizing the ammonia-hydrogen exchange process.

(ix) Complete Heavy Water Upgrade Systems or Columns.

Complete heavy water upgrade systems or columns especially designed or prepared for the upgrade of heavy water to reactor-grade deuterium concentration. These systems, which usually employ water distillation to separate heavy water from light water, are especially designed or prepared to produce reactor-grade heavy water (*i.e.*, typically 99.75 percent deuterium oxide) from heavy water feedstock of lesser concentration.

D. Any other components especially designed or prepared for use in a plant for the production of heavy water, deuterium, and deuterium compounds or in any of the components described in this appendix.

[79 FR 39298, July 10, 2014]

APPENDIX L TO PART 110—ILLUSTRATIVE LIST OF BYPRODUCT MATERIALS UNDER NRC EXPORT/IMPORT LICENSING AUTHORITY [A]

[a] Any accelerator-produced material produced, extracted, or converted for use for a commercial, medical, or research activity.

Actinium 225 (Ac 225)
Actinium 227 (Ac 227)
Actinium 228 (Ac 228)
Americium 241 (Am 241)
Americium 242m (Am 242m)
Americium 242 (Am 242)
Americium 243 (Am 243)
Antimony 124 (Sb 124)
Antimony 125 (Sb 125)
Antimony 126 (Sb 126)
Arsenic 73 (As 73)
Arsenic 74 (As 74)
Arsenic 76 (As 76)
Arsenic 77 (As 77)
Barium 131 (Ba 131)
Barium 133 (Ba 133)
Barium 140 (Ba 140)
Bismuth 207 (Bi 207)
Bismuth 210 (Bi 210)
Bromine 82 (Br 82)
Cadmium 109 (Cd 109)
Cadmium 113 (Cd 113)
Cadmium 115m (Cd 115m)
Cadmium 115 (Cd 115)
Calcium 45 (Ca 45)
Calcium 47 (Ca 47)
Californium 248 (Cf 248)
Californium 249 (Cf 249)
Californium 250 (Cf 250)
Californium 251 (Cf 251)
Californium 252 (Cf 252)
Californium 253 (Cf 253)
Californium 254 (Cf 254)
Carbon 11 (C 11)
Carbon 14 (C 14)
Cerium 141 (Ce 141)
Cerium 143 (Ce 143)
Cerium 144 (Ce 144)
Cesium 129 (Cs 129)
Cesium 131 (Cs 131)
Cesium 134m (Cs 134m)
Cesium 134 (Cs 134)
Cesium 135 (Cs 135)
Cesium 136 (Cs 136)
Cesium 137 (Cs 137)
Chlorine 36 (Cl 36)
Chlorine 38 (Cl 38)
Chromium 51 (Cr 51)
Cobalt 57 (Co 57)
Cobalt 58m (Co 58m)
Cobalt 58 (Co 58)
Cobalt 60 (Co 60)
Copper 64 (Cu 64)
Curium 240 (Cm 240)
Curium 241 (Cm 241)
Curium 242 (Cm 242)
Curium 243 (Cm 243)
Curium 244 (Cm 244)
Curium 245 (Cm 245)
Curium 247 (Cm 247)
Dysprosium 165 (Dy 165)
Dysprosium 166 (Dy 166)
Einsteinium 252 (Es 252)
Einsteinium 253 (Es 253)
Einsteinium 254 (Es 254)
Einsteinium 255 (Es 255)
Erbium 169 (Er 169)
Erbium 171 (Er 171)
Europium 152 (Eu 152)
Europium 152 9.2 h (Eu 152 9.2 h)
Europium 152 13 yr (Eu 152 13 yr)
Europium 154 (Eu 154)
Europium 155 (Eu 155)
Fermium 257 (Fm 257)
Fluorine 18 (F 18)
Gadolinium 148 (Gd 148)
Gadolinium 153 (Gd 153)
Gadolinium 159 (Gd 159)
Gallium 67 (Ga 67)
Gallium 72 (Ga 72)
Germanium 68 (Ge 68)
Germanium 71 (Ge 71)
Gold 195 (Au 195)
Gold 198 (Au 198)
Gold 199 (Au 199)
Hafnium 172 (Hf 172)
Hafnium 181 (Hf 181)
Holmium 166m (Ho 166m)
Holmium 166 (Ho 166)
Hydrogen 3 (H 3)
Indium 111 (In 111)
Indium 113m (In 113m)
Indium 114m (In 114m)
Indium 115m (In 115m)
Indium 115 (In 115)
Iodine 123 (I 123)
Iodine 125 (I 125)
Iodine 126 (I 126)
Iodine 129 (I 129)
Iodine 131 (I 131)
Iodine 132 (I 132)
Iodine 133 (I 133)
Iodine 134 (I 134)
Iodine 135 (I 135)
Iridium 192 (Ir 192)
Iridium 194 (Ir 194)
Iron 52 (Fe 52)
Iron 55 (Fe 55)
Iron 59 (Fe 59)
Krypton 85 (Kr 85)
Krypton 87 (Kr 87)
Lanthanum 140 (La 140)
Lead 210 (Pb 210)
Lutetium 177 (Lu 177)
Manganese 52 (Mn 52)
Manganese 54 (Mn 54)
Manganese 56 (Mn 56)
Mendelevium 258 (Md 258)
Mercury 197m (Hg 197m)
Mercury 197 (Hg 197)
Mercury 203 (Hg 203)
Molybdenum 99 (Mo 99)
Neodymium 147 (Nd 147)
Neodymium 149 (Nd 149)
Neptunium 235 (Np 235)
Neptunium 237 (Np 237)
Nickel 59 (Ni 59)
Nickel 63 (Ni 63)
Nickel 65 (Ni 65)
Niobium 93m (Nb 93m)
Niobium 94 (Nb 94)
Niobium 95 (Nb 95)
Niobium 97 (Nb 97)
Nitrogen 13 (N 13)
Osmium 185 (Os 185)
Osmium 191m (Os 191m)
Osmium 191 (Os 191)
Osmium 193 (Os 193)
Oxygen 15 (O 15)
Palladium 103 (Pd 103)
Palladium 109 (Pd 109)
Phosphorus 32 (P 32)
Phosphorus 33 (P 33)
Platinum 191 (Pt 191)
Platinum 193m (Pt 193m)
Platinum 193 (Pt 193)
Platinum 197m (Pt 197m)
Platinum 197 (Pt 197)
Polonium 208 (Po 208)
Polonium 209 (Po 209)
Polonium 210 (Po 210)
Potassium 42 (K 42)
Potassium 43 (K 43)
Praseodymium 142 (Pr 142)
Praseodymium 143 (Pr 143)
Promethium 145 (Pm 145)
Promethium 147 (Pm 147)
Promethium 149 (Pm 149)
Radium 223 (Ra 223)
Radium 226 (Ra 226)[b]
Rhenium 186 (Re 186)
Rhenium 188 (Re 188)
Rhodium 103m (Rh 103m)
Rhodium 105 (Rh 105)
Rubidium 81 (Rb 81)
Rubidium 86 (Rb 86)
Rubidium 87 (Rb 87)
Ruthenium 97 (Ru 97)
Ruthenium 103 (Ru 103)
Ruthenium 105 (Ru 105)
Ruthenium 106 (Ru 106)
Samarium 151 (Sm 151)
Samarium 153 (Sm 153)
Scandium 46 (Sc 46)
Scandium 47 (Sc 47)
Scandium 48 (Sc 48)
Selenium 75 (Se 75)
Silicon 31 (Si 31)
Silver 105 (Ag 105)
Silver 110m (Ag 110m)
Silver 111 (Ag 111)
Sodium 22 (Na 22)
Sodium 24 (Na 24)
Strontium 85 (Sr 85)
Strontium 89 (Sr 89)
Strontium 90 (Sr 90)
Strontium 91 (Sr 91)
Strontium 92 (Sr 92)
Sulphur 35 (S 35)
Tantalum 182 (Ta 182)
Technetium 96 (Tc 96)
Technetium 97m (Tc 97m)
Technetium 97 (Tc 97)
Technetium 99m (Tc 99m)
Technetium 99 (Tc 99)
Tellurium 125m (Te 125m)
Tellurium 127m (Te 127m)
Tellurium 127 (Te 127)
Tellurium 129m (Te 129m)
Tellurium 129 (Te 129)
Tellurium 131m (Te 131m)
Tellurium 132 (Te 132)
Terbium 160 (Tb 160)
Thallium 200 (Tl 200)

Thallium 201 (Tl 201)
Thallium 202 (Tl 202)
Thallium 204 (Tl 204)
Thulium 170 (Tm 170)
Thulium 171 (Tm 171)
Tin 113 (Sn 113)
Tin 123 (Sn 123)
Tin 125 (Sn 125)
Tin 126 (Sn 126)
Titanium 44 (Ti 44)
Tritium (H3)
Tungsten 181 (W 181)
Tungsten 185 (W 185)
Tungsten 187 (W 187)
Vanadium 48 (V 48)
Xenon 131m (Xe 131m)
Xenon 133 (Xe 133)
Xenon 135 (Xe 135)
Ytterbium 175 (Yb 175)
Yttrium 87 (Y 87)
Yttrium 88 (Y 88)
Yttrium 90 (Y 90)
Yttrium 91 (Y 91)
Yttrium 92 (Y 92)
Yttrium 93 (Y 93)
Zinc 65 (Zn 65)
Zinc 69m (Zn 69m)
Zinc 69 (Zn 69)
Zirconium 93 (Zr 93)
Zirconium 95 (Zr 95)
Zirconium 97 (Zr 97)

[b] Discrete sources of radium-226 (Ra-226).

[58 FR 13005, Mar. 9, 1993, as amended at 59 FR 48998, Sept. 26, 1994. Redesignated and amended at 61 FR 35603, 35607, July 8, 1996; 65 FR 70292, Nov. 22, 2000; 71 FR 20339, Apr. 20, 2006; 75 FR 44093, July 28, 2010]

APPENDIX M TO PART 110—CATEGORIZATION OF NUCLEAR MATERIAL [D]

[From IAEA INFCIRC/225, Rev. 1]

Material	Form	Category		
		I	II	III [e]
1. Plutonium [a]	Unirradiated [b]	2 kg or more	Less than 2 kg but more than 500 g.	500 g or less.
2. Uranium-235 [c]	Unirradiated: [b].			
	Uranium enriched to 20 pct U^{235} or more.	5 kg or more	Less than 5 kg but more than 1 kg.	1 kg or less.
	Uranium enriched to 10 pct U^{235} but less than 20 pct.		10 kg or more	Less than 10 kg.
	Uranium enriched above natural, but less than 10 pct U^{235}.			10 kg or more.
3. Uranium-233	Unirradiated [b]	2 kg or more	Less than 2 kg but more than 500 g.	500 g or less.

[a] All plutonium except that with isotopic concentration exceeding 80 pct in plutonium-238.
[b] Material not irradiated in a reactor or material irradiated in a reactor but with a radiation level equal to or less than 100 rd/h at 1 m unshielded.
[c] Natural uranium, depleted uranium, thorium and quantities of uranium enriched to less than 10% not falling into Category III should be protected in accordance with prudent management practice.
[d] Irradiated fuel should be protected as category I, II, or III nuclear material depending on the category of the fresh fuel. However, fuel which by virtue of its original fissile material content is included as category I or II before irradiation should only be reduced one category level, while the radiation level from the fuel exceeds 100 rd/h at 1 m unshielded.
[e] Physical security determinations will not be required for 15 g or less of plutonium, uranium-233 or high-enriched uranium, or for 1 kg or less of uranium with an enrichment between 10 and 20 pct in uranium-235.

(Sec. 161, as amended, Pub. L. 83-703, 68 Stat. 948 (42 U.S.C. 2201); sec. 201, as amended, Pub. L. 93-438, 88 Stat. 1243 (42 U.S.C. 5841))

[43 FR 21641, May 19, 1978. Redesignated and amended at 49 FR 47204, Dec. 3, 1984. Further redesignated at 55 FR 30450, July 26, 1990; 58 FR 13005, Mar. 9, 1993; 61 FR 35603, July 8, 1996]

APPENDIX N TO PART 110—ILLUSTRATIVE LIST OF LITHIUM ISOTOPE SEPARATION FACILITIES, PLANTS AND EQUIPMENT UNDER NRC'S EXPORT LICENSING AUTHORITY

a. Facilities or plants for the separation of lithium isotopes.

b. Equipment for the separation of lithium isotopes, such as:

(1) Packed liquid-liquid exchange columns especially designed for lithium amalgams;

(2) Mercury and/or lithium amalgam pumps;

(3) Lithium amalgam electrolysis cells;

(4) Evaporators for concentrated lithium hydroxide solution.

c. Any other components especially designed or prepared for use in a reprocessing plant or in any of the components described in this appendix.

[65 FR 70292, Nov. 22, 2000, as amended at 79 FR 39299, July 10, 2014]

APPENDIX O TO PART 110—ILLUSTRATIVE LIST OF FUEL ELEMENT FABRICATION PLANT EQUIPMENT AND COMPONENTS UNDER NRC'S EXPORT LICENSING AUTHORITY

NOTE: Nuclear fuel elements are manufactured from source or special nuclear material. For oxide fuels, the most common type of fuel equipment for pressing pellets, sintering, grinding and grading will be present. Mixed oxide fuels are handled in glove boxes (or equivalent containment) until they are sealed in the cladding. In all cases, the fuel

is hermetically sealed inside a suitable cladding which is designed to be the primary envelope encasing the fuel so as to provide suitable performance and safety during reactor operation. Also, in all cases, precise control of processes, procedures and equipment to extremely high standards is necessary in order to ensure predictable and safe fuel performance.

(a) Items that are considered especially designed or prepared for the fabrication of fuel elements include equipment that:

(1) Normally comes in direct contact with, or directly processes or controls, the production flow of nuclear material;

(2) Seals the nuclear material within the cladding;

(3) Checks the integrity of the cladding or the seal;

(4) Checks the finished treatment of the sealed fuel; or

(5) Is used for assembling reactor fuel elements.

(b) This equipment or systems of equipment may include, for example:

(1) Fully automatic pellet inspection stations especially designed or prepared for checking final dimensions and surface defects of fuel pellets;

(2) Automatic welding machines especially designed or prepared for welding end caps onto the fuel pins (or rods);

(3) Automatic test and inspection stations especially designed or prepared for checking the integrity of completed fuel pins (or rods). This item typically includes equipment for:

(i) X-ray examination of pin (or rod) end cap welds;

(ii) Helium leak detection from pressurized pins (or rods); and

(iii) Gamma-ray scanning of the pins (or rods) to check for correct loading of the fuel pellets inside.

(4) Systems especially designed or prepared to manufacture nuclear fuel cladding.

(c) Any other components especially designed or prepared for use in a fuel element fabrication plant or in any of the components described in this appendix.

[79 FR 39299, July 10, 2014]

APPENDIX P TO PART 110—CATEGORY 1 AND 2 RADIOACTIVE MATERIAL

TABLE 1—IMPORT AND EXPORT THRESHOLD LIMITS

Radioactive material	Category 1		Category 2	
	Terabecquerels (TBq)	Curies (Ci) [1]	Terabecquerels (TBq)	Curies (Ci) [1]
Americium-241	60	1,600	0.6	16
Americium-241/Be	60	1,600	0.6	16
Californium-252	20	540	0.2	5.4
Curium-244	50	1,400	0.5	14
Cobalt-60	30	810	0.3	8.1
Cesium-137	100	2,700	1.0	27
Gadolinium-153	1,000	27,000	10.0	270
Iridium-192	80	2,200	0.8	22
Plutonium-238[2]	60	1,600	0.6	16
Plutonium-239/Be[2]	60	1,600	0.6	16
Promethium-147	40,000	1,100,000	400	11,000
Radium-226[a]	40	1,100	0.4	11
Selenium-75	200	5,400	2.0	54
Strontium-90 (Y–90)	1,000	27,000	10.0	270
Thulium-170	20,000	540,000	200	5,400
Ytterbium-169	300	8,100	3.0	81

[1] The values to be used to determine whether a license is required are given in TBq. Curie (Ci) values are provided for practical usefulness only and are rounded after conversion.

[2] The limits for Pu-238 and Pu-239/Be in this table apply for imports to the U.S. The limits for exports of Pu-238 and Pu-239/Be can be found in §110.21.

[a] Discrete sources of radium-226.

Calculation of Shipments Containing Multiple Sources or Radionuclides

The ''sum of fractions'' methodology for evaluating combinations of radionuclides being transported, is to be used when import or export shipments contain multiple sources or multiple radionuclides. The threshold limit values used in a sum of the fractions calculation must be the metric values (*i.e.*, TBq).

I. If multiple sources and/or multiple radionuclides are present in an import or export shipment, the sum of the fractions of the activity of each radionuclides must be determined to verify the shipment is less than the Category 1 or 2 limits of Table 1, as appropriate. If the calculated sum of the fractions ratio, using the following equation,

is greater than or equal to 1.0, then the import or export shipment exceeds the threshold limits of Table 1 and the applicable security provisions of this part apply.

II. Use the equation below to calculate the sum of the fractions ratio by inserting the actual activity of the applicable radionuclides or of the individual sources (of the same radionuclides) in the numerator of the equation and the corresponding threshold activity limit from the Table 1 in the denominator of the equation. Ensure the numerator and denominator values are in the same units and all calculations must be performed using the TBq (*i.e.*, metric) values of Table 1.

R_1 = activity for radionuclides or source number 1
R_2 = activity for radionuclides or source number 2
R_N = activity for radionuclides or source number n
AR_1 = activity limit for radionuclides or source number 1
AR_2 = activity limit for radionuclides or source number 2
AR_N = activity limit for radionuclides or source number n

$$\frac{R_1}{AR_1} + \frac{R_2}{AR_2} + \cdots + \frac{R_n}{AR_n} \geq 1.0$$

[70 FR 37993, July 1, 2005, as amended at 71 FR 20339, Apr. 20, 2006; 82 FR 52826, Nov. 15, 2017; 86 FR 67843, Nov. 30, 2021]

PART 140—FINANCIAL PROTECTION REQUIREMENTS AND INDEMNITY AGREEMENTS

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