

U.S. NUCLEAR REGULATORY COMMISSION

REGULATORY GUIDE 3.15, REVISION 2



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STANDARD FORMAT AND CONTENT OF LICENSE APPLICATIONS FOR RECEIPT AND STORAGE OF UNIRRADIATED POWER REACTOR FUEL AND ASSOCIATED RADIOACTIVE MATERIAL AT A NUCLEAR POWER PLANT

A. INTRODUCTION

Purpose

This regulatory guide (RG) describes the standard format and content that the U.S. Nuclear Regulatory Commission (NRC) staff considers acceptable for license applications to authorize the receipt, possession, and storage of unirradiated fuel assemblies and associated radioactive materials at a nuclear power plant.

Applicability

This RG applies to applications for the storage of unirradiated power reactor fuel and associated radioactive material. The application is the principal document in which an applicant provides the information and bases for the NRC staff to use in determining whether an unirradiated power reactor fuel storage facility meets the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 70, “Domestic Licensing of Special Nuclear Material” (Ref. 1). The application is most commonly filed in conjunction with an application filed under 10 CFR Part 50, “Domestic Licensing of Production and Utilization Facilities” (Ref. 2), as part of a combined license (COL) under 10 CFR Part 52, “Licenses, Certifications, and Approvals for Nuclear Power Plants” (Ref. 3), or, as a separate license application under 10 CFR Part 70.

Applicable Regulations

- 10 CFR Part 20, “Standards for Protection Against Radiation,” provides standards for protection against ionizing radiation resulting from activities conducted under licenses issued by the NRC (Ref. 4).
- 10 CFR Part 30, “Rules of General Applicability to Domestic Licensing of Byproduct Material,” governs domestic licensing of byproduct material (Ref. 5).

Written suggestions regarding this guide or development of new guides may be submitted through the NRC’s public Web site in the NRC Library at <https://nrcweb.nrc.gov/reading-rm/doc-collections/reg-guides/>, under Document Collections, in Regulatory Guides, at <https://nrcweb.nrc.gov/reading-rm/doc-collections/reg-guides/contactus.html>.

Electronic copies of this RG, previous versions of RGs, and other recently issued guides are also available through the NRC’s public Web site in the NRC Library at <https://nrcweb.nrc.gov/reading-rm/doc-collections/reg-guides/>, under Document Collections, in Regulatory Guides. This RG is also available through the NRC’s Agencywide Documents Access and Management System (ADAMS) at <http://www.nrc.gov/reading-rm/adams.html>, under ADAMS Accession Number (No.) ML20164A212. The regulatory analysis may be found in ADAMS under Accession No. ML14161A624. The associated draft guide DG-3036 may be found in ADAMS under Accession No. ML14161A621, and the staff responses to the public comments on DG-3036 may be found under ADAMS Accession No. ML20164A213.

- 10 CFR Part 37, “Physical Protection of Category 1 and Category 2 Quantities of Radioactive Material,” provides physical protection requirements for protection of an aggregated category 1 or category 2 quantity of radioactive material listed in Appendix A of this part (Ref. 6).
- 10 CFR Part 40, “Domestic Licensing of Source Material,” governs the issuance of licenses to receive title to, receive, possess, use, transfer, or deliver source and byproduct materials (Ref. 7).
- 10 CFR Part 50 provides for the licensing of nuclear production and utilization facilities.
- 10 CFR Part 52 provides for the issuance of early site permits, standard design certifications, and COLs, among other approvals, for nuclear power plants.
- 10 CFR Part 70 provides procedures and criteria for the issuance of licenses to receive title to, own, acquire, deliver, receive, possess, use, and transfer special nuclear material (SNM).
- 10 CFR Part 73, “Physical Protection of Plants and Materials” (Ref. 8), provides physical protection requirements for protection of special nuclear material at fixed sites and in transit and of plants in which special nuclear material is used.
- 10 CFR Part 74, “Material Control and Accounting of Special Nuclear Material” (Ref. 9), contains recordkeeping requirements for the receipt and storage of unirradiated reactor fuel.

Related Guidance

- NUREG-1520, “Standard Review Plan for Fuel Cycle Facilities License Applications” (Ref. 10), provides the expected format and content for a 10 CFR Part 70 license application.

Purpose of Regulatory Guides

The NRC issues RGs to describe to the public methods that the staff considers acceptable for use in implementing specific parts of the agency’s regulations, to explain techniques that the staff uses in evaluating specific problems or postulated events, and to provide guidance to applicants. Regulatory guides are not substitutes for regulations, and compliance with them is not required. Methods and solutions that differ from those set forth in RGs will be deemed acceptable if they provide a basis for the findings required for the issuance or continuance of a permit or license by the Commission.

Paperwork Reduction Act

This RG provides voluntary guidance for implementing the mandatory information collections in 10 CFR Parts 20, 30, 37, 40, 50, 52, 70, 73, and 74 that are subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et. seq.). These information collections were approved by the Office of Management and Budget (OMB), approval numbers 3150-0014, 3150-0017, 3150-0214, 3150-0020, 3150-0011, 3150-0151, 3150-0009, 3150-0002, and 3150-0123. Send comments regarding this information collection to the Information Services Branch (T6-A10M), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to Infocollects.Resource@nrc.gov, and to the OMB reviewer at: OMB Office of Information and Regulatory Affairs (3150-0014, 3150-0017, 3150-0214, 3150-0020, 3150-0011, 3150-0151, 3150-0009, 3150-0002, and 3150-0123), Attn: Desk Officer for the Nuclear Regulatory Commission, 725 17th Street, NW Washington, DC 20503; e-mail: oir_submission@omb.eop.gov.

Public Protection Notification

The NRC may not conduct or sponsor, and a person is not required to respond to, a collection of information unless the document requesting or requiring the collection displays a currently valid OMB control number.

B. DISCUSSION

Reason for Revision

This revision of the guide (Revision 2) updates references and reflects experience gained in licensing of the storage of unirradiated fuel and associated radioactive material at nuclear power reactor sites since issuance of the last revision of the guide in April 1983.

Background

Historically, receipt and storage of unirradiated fuel assemblies and associated radioactive material at nuclear power plants was licensed under 10 CFR Part 50 under 10 CFR Part 70. "Associated radioactive material" includes sealed neutron sources for reactor startup, sealed sources for reactor instrumentation, radiation monitoring equipment calibration sources, and fission detectors in amounts as necessary. For storage of unirradiated fuel and associated radioactive material at a reactor site, the fuel must be fully packaged in NRC-approved transportation packages such that potential accident conditions are no greater than those in the design bases for the containers during transportation. In addition, the storage must be in accordance with approved security plans for the plant.

The 10 CFR Part 50 licensing process is a two-step process that requires both a construction permit and an operating license. Under a Part 50 license, unirradiated fuel and associated radioactive material subject to 10 CFR Parts 30, 40, and 70 can be combined under the provisions of 10 CFR 50.52 "Combining licenses." During the latter portion of the construction phase, unirradiated fuel and associated radioactive material can be brought on site provided the applicant that will operate the plant holds 10 CFR Parts 30, 40, and 70 licenses. These licenses have historically been required as a condition of the construction permit if the applicant does not already have them.

In 1989, the NRC established an alternative licensing process with the promulgation of 10 CFR Part 52. This alternative process combines a construction permit and an operating license into a single combined license. The combined license typically requires the applicant to obtain 10 CFR Parts 30, 40, and 70 licenses if it does not already hold them prior to bringing unirradiated fuel and associated material on site.

In either case, the applicant needs to provide sufficient information to support compliance with the applicable portions of 10 CFR Parts 30, 40, and 70. A Part 50 or 52 application seeking a license that authorizes receipt, possession, and use of source, SNM, and byproduct material in connection with the operation of the reactor would seek authority for the following:

- to receive, possess, and use at any time SNM as reactor fuel;
- to receive, possess, and use at any time any byproduct material, source material, and SNM as sealed neutron sources for reactor startup, sealed sources for instrumentation, radiation monitoring equipment calibration sources, and fission detectors in amounts as required;
- to receive, possess, and use in the amounts as required any byproduct material, source material, or SNM without restriction to chemical or physical form, for a sample analysis or instrument and equipment calibration, or associated with radioactive apparatus or components; or
- to possess, but not separate, such byproduct material and SNM as produced by the operating facility.

Harmonization with International Standards

The International Atomic Energy Agency (IAEA) works with member states and other partners to promote the safe, secure, and peaceful use of nuclear technologies. The IAEA develops safety standards for protecting people and the environment from harmful effects of ionizing radiation. These standards provide a system of safety fundamentals, safety requirements, and safety guides reflecting an international consensus on what constitutes a high level of safety. This RG incorporates similar design and performance guidelines and is consistent with the safety principles provided in the following IAEA safety standard.

- IAEA Safety Standards Series NS-G-1.4, “Design of Fuel Handling and Storage Systems for Nuclear Power Plants,” issued 2003 (Ref. 11) provides detailed recommendations for the design of fuel handling and storage systems in nuclear power plants. It addresses all stages of fuel handling and storage including the safe receipt of fuel at the nuclear power plant and its storage and inspection of fuel before use.

C. STAFF REGULATORY GUIDANCE

This RG describes the standard format and content to meet the applicable regulations found in Section A of this guide. This format should ensure the completeness of an application, assist NRC staff in locating relevant information, and shorten the time needed to review the submittal. The information provided in the application should account for NRC regulations and guides, industry codes and standards, and developments in source material facilities that process significant quantities of uranium. The NRC may request additional information in support of an application if such information is necessary to provide reasonable assurance that the proposed facility will meet the regulations.

Conformance with the standard format is not required. Applications prepared in other formats will be deemed acceptable if they provide an adequate basis for the findings required to approve them. Nonetheless, the use of other formats may increase the time required to review the application because it may be more difficult for the staff to locate the required information to meet the applicable regulations.

The sections in the license application should address the following topics to demonstrate compliance with the applicable regulations.

GENERAL REQUIREMENTS

a. The Application

Applicants may submit their documents to the NRC by mail, hand delivery, or electronically, as specified in 10 CFR 70.5, “Communications.”

The NRC staff performs a preliminary acceptance review to determine whether the applicant provided sufficient information to conduct a detailed technical and regulatory review. If the application is acceptable, the NRC staff responds with an acceptance letter and initiates the detailed safety review. The NRC staff may request additional information if needed to complete the acceptance review.

b. Presentation of Information

The applicant should strive for a clear, concise presentation of the information in the license application. Each topic should include the analyses and supporting data with sufficient depth and documentation to permit the NRC to independently evaluate the information and verify the results. Each section should state the conclusions of the licensee’s analysis. The application should use tables, line drawings, and photographs wherever they contribute to clarity and brevity. The number of significant figures in numerical data should reflect the accuracy of the data. Descriptive and narrative passages should be brief and concise. For cases in which the application presents test results to support the conclusions, the applicant should describe the procedures, techniques, and equipment used to obtain the test data.

The application may incorporate by reference information contained in previous submittals, statements, or reports filed with the NRC under a license, provided such references are clear and specific. The reference should specify the document title, date, page, and paragraph number of the pertinent information.

c. Proprietary Information

Proprietary information should be submitted separately from the public version of the application. It should be accompanied by an affidavit containing the applicant's justifications for withholding the information from public disclosure, as specified in 10 CFR 2.390, "Public inspections, exemptions, requests for withholding." The NRC staff's review of the safety analysis should depend as much as possible on nonproprietary information.

d. Marking and Control of Sensitive Information

After the terrorist attacks on September 11, 2001, the NRC found it necessary to be more judicious in releasing sensitive information that could be useful to an adversary planning an attack. Guidance on the marking and control of sensitive information can be found in Regulatory Issue Summary (RIS) 2005-31, "Control of Security-Related Sensitive Unclassified Non-Safeguards Information Handled by Individuals, Firms, and Entities Subject to NRC Regulation of the Use of Source, Byproduct, and Special Nuclear Material " (Ref. 12).

Detailed information about the location of licensed material and the security measures used to protect the material could be useful to an adversary. Therefore, such information should be submitted separately from the public version of the application and marked as security-related information to be withheld under 10 CFR 2.390.

e. Style and Composition

Abbreviations should be consistent throughout the application and with generally accepted usage. Any abbreviations, symbols, or special terms not in general usage or unique to the plant should be defined when they first appear in the application and should be presented in an Abbreviations and Acronyms section, with symbols defined in an Explanation of Symbols section or a separate glossary.

References used should appear either as footnotes on the page where they are cited or at the end of each chapter.

f. Graphical Presentations

Graphical presentations, such as drawings, maps, diagrams, sketches, and tables may be used to improve the submittal. All such information should be legible, have defined symbols, and use appropriate scales. These graphical presentations should be located near the text where they are cited.

g. Physical Specifications

Paper size: The paper size for text pages should be $8\frac{1}{2} \times 11$ inches. Drawings and graphics may be on pages measuring larger than $8\frac{1}{2} \times 11$ inches if necessary. However, the finished copy when folded should not exceed $8\frac{1}{2} \times 11$ inches.

Page numbering: Pages should be numbered with the digits corresponding to the chapter followed by a hyphen and a sequential number (e.g., the third page of Chapter 4 should be numbered 4-3). Thus, the entire report should not be numbered sequentially.

Table of Contents: Each volume of the license application should include a table of contents and an index of key items.

h. Procedures for Updating or Revising Pages

For applicants making electronic submissions, a consolidated document is preferable to a submission of individually edited pages and will enable reviewers to have the latest information with minimal effort to print and replace pages. A comparison version of the edited pages should be submitted to assist the NRC staff in identifying the changes that were made.

For paper submissions, applicants should update data and text by replacing entire pages whenever a change is made to that page. Applicants should also highlight the updated or revised portion of each page using a change indicator consisting of a bold vertical line drawn in the margin opposite the binding margin.

All pages submitted to update, revise, or add pages to an application should show the date of the revision and the corresponding change or amendment number. The applicant should provide a transmittal letter that includes a guide page listing the pages to be inserted and removed. When applicable, supplemental pages may follow the revised page, with the pages still being numbered sequentially.

All statements on a revised page should be accurate as of the date of each submittal. Applicants should take special care to ensure that they revise the documents submitted as part of the application to reflect any changes to the design, contents, analysis, and tests reported in supplemental information (e.g., responses to NRC staff requests for information or responses to regulatory positions).

i. General Format

The license application should be written following the chapter/section titling and numbering as shown below.

1. GENERAL INFORMATION

This section of the application should include the (1) facility overview, (2) institutional information, and (3) site description. This section is needed to provide a general understanding of the purpose of the proposed facility and an overview of the authorized activities as listed below. The application should use the numbering and titles given in the sections below. This section is normally part of a 10 CFR Part 50 or 10 CFR Part 52 application.

1.1 Facility Overview

The facility overview should describe the site layout and include a process overview, site overview, and summary of the licensed material. The site layout should describe each major feature on the site and provide an overview of the interrelationships between the major features. The application should also include site drawings of building locations and major process components.

The facility overview should provide information regarding the reactor fuel and any other licensed material to be stored. The information should include:

- identification of the reactor, its geographic location, and the docket and construction permit numbers;
- a description of the fuel assemblies, including materials of construction; number of fuel rods; diameter of fuel pellets; cladding thickness and outside diameter; rod pitch; the number and location of instrument, water, or gas channels in the assemblies; and other appurtenances such as control rod guide tubes, spacer rods, and burnable poisons;
- a description of the maximum enrichment (pin values) of uranium; maximum quantities (kg) of U-235, U-233, plutonium, natural uranium, depleted uranium, and thorium per assembly; and the total weight of the assembly; and
- a description of the total number of fuel assemblies for which a license is requested and the total weight of U-235, U-233, plutonium, natural uranium, depleted uranium, and thorium contained therein.

The facility overview should provide information regarding the storage conditions. The information should include:

- scale drawings showing the areas where fuel assemblies will be stored and, if appropriate, inspected and channeled;
- a description of the storage environment;
- a description of the nature of the activities conducted in all adjacent areas and the potential effects of these activities on the safety of storage; and
- a description of the storage facility structures, components, equipment, and systems (e.g., racks, cranes, inspection stands) and the design criteria used to ensure structural integrity.

The process overview should provide a summary, nontechnical description for each activity in which the applicant proposes to acquire, deliver, receive, possess, transfer, or store unirradiated power reactor fuel and associated radioactive material. The overview also should briefly describe authorized activities. The information should include how packaging and shipping will be handled if any of the licensed material must be returned to the supplier.

The site overview should specify the proximity of the facility buildings to the site boundary and nearby populations and include drawings of the overall facility layout. This section should also describe the site's geographical characteristics, such as the relationship of facility structures with transportation rights of way and nearby population.

The descriptive summary of the licensed material should include the name, amount, and physical form of the licensed material.

The facility description in the license application should be consistent with the information presented in the other portions of the application.

1.2 Institutional Information

The institutional information should specify the corporate identity and ownership of the proposed facility. This section should include the identity and physical address of the applicant's facility

and corporate headquarters, corporate information sufficient to show the relationship of the applicant's organization to other corporate entities, and the existence and extent of foreign ownership or influence. It should also address the applicant's financial qualifications to pursue the activities for which the license is sought. The section should describe and demonstrate that the applicant has adequate financial resources to support the safe siting, construction, operation, maintenance, and eventual decommissioning of the proposed facility.

The application should clearly describe each proposed licensed activity in the form of requested authorized uses and the type of license the applicant is requesting. The application should list any specific exemptions and special authorizations and the regulatory requirements for which the applicant is seeking approval or exemption. This section should also specify the period of time for which the applicant is seeking approval and discuss the justification for this period.

1.3 Site Description

This section should include the location of the plant and a description of the geographic, demographic, meteorological, hydrologic, geologic, and seismologic characteristics of the site and the surrounding area. The application should summarize the more detailed site information located in related documents, such as the environmental report, emergency plan, and security plans.

- **Site Geography:** A description of the site's geography should include information on the State, county, municipality, topography, site boundary, and owner controlled-area boundary. The application should discuss the local terrain, including major nearby highways, nearby bodies of water, and any other significant geographical features within 1.6 kilometers (1 mile) of the site (e.g., ridges, valleys, and specific geologic structures).
- **Demographics:** Information on the demographics for the area surrounding the site should include the latest census results for areas of concern. This section should describe the distance and direction to the nearby population centers and nearby public facilities, such as schools, hospitals, and parks. The description should also address the distance and direction to nearby industrial areas or facilities that may present potential hazards (including other nearby nuclear facilities). The section should describe any nonlicensed land uses within the site boundary that may present potential hazards to licensed operations (e.g., residential, industrial, commercial, or agricultural).
- **Meteorology:** Information on the site's local meteorology should address the range of weather events possible for the site and the primary wind directions and average wind speeds. Information should include the annual amount and forms of precipitation, as well as the design-basis values of the maximum precipitation and any related structural loading. The description should summarize the analyzed events for severe types of weather (e.g., lightning, tornado, and hurricane), including the frequency and magnitude.
- **Hydrology:** A description of the site's hydrology should include the characteristics of the water table, nearby rivers, streams, and bodies of water, as appropriate. It should also address ground-water flow direction and velocity for the site, information on impacted aquifers, and analyzed flood events used for accident analysis.

- **Geology:** The description of the site’s geology should provide the characteristics of the soil types and bedrock and the design-basis earthquake magnitude and return periods. The application should include a map of the site, scaled to clearly define the boundary of the site and the distance from the significant facility features to the site boundary. The exclusion area should be clearly delineated if its boundaries are not the same as the boundaries of the plant site. The application should also provide a general location map encompassing at least an 80-kilometer (50-mile) radius as well as maps and site plots to present details near the plant and to establish orientation of the buildings, streams, ponds, and neighboring structures.

1.4 10 CFR Parts 30, 40, and 70 Materials and Use Clarification

An applicant seeking a license that would be incorporated into the COL to receive, possess, and use source material, SNM, and byproduct material in connection with the operation of a nuclear reactor should provide the following supplemental information to identify byproduct material, source material, and SNM; the chemical or physical forms; and the maximum amount at any one time of the requested materials licensed under 10 CFR Parts 30, 40, and 70. Such materials include sealed neutron sources for reactor startup, sealed sources for calibration of instruments and monitoring equipment, and fission detectors.

- **10 CFR Part 30 materials:** The applicant should provide the quantity of any sealed calibration and referenced sources of byproduct material with the atomic numbers 1 through 93.
- **10 CFR Part 40 materials:** The application should specify that no Part 40 specifically licensed material in the form of uranium hexafluoride is to be received, possessed, or used.
- **10 CFR Part 70 materials (nonfuel):** The application should describe the nonfuel SNM specifically required for use (e.g., local power range monitor assemblies and startup range nuclear monitor assemblies).

2. ORGANIZATION AND ADMINISTRATION

The application should provide the technical qualifications, including the training and experience requirements of key positions in the applicant’s organization. If this information is part of a 10 CFR Part 50 or Part 52 application, it may be referenced. For a Part 70 application, the NRC provides information on developing the “Organization and Administration” section of the application in Chapter 2 of NUREG-1520.

2.1 Management Structure

The applicant should identify and functionally describe the specific organizational groups that are responsible for managing the licensed activities. The application should provide a clear, unambiguous system for communications and control between management organizations. The application should clearly describe the roles and responsibilities of the different functions engaged in maintaining an organizational structure with appropriate administrative policies and procedures.

2.2 Health, Safety, and Environmental Organization

The application should define a health, safety, and environmental (HS&E) organization with authority over facility safety activities. The application should define the facility management hierarchy with clear authority provided to the HS&E organization to take appropriate safety actions, including shutting down operations. The application should address how facility management policies ensure the establishment and maintenance of design and operations. It should further provide clearly defined effective lines of communication and authority among the organizational units involved in the engineering, HS&E, and operations functions of the facility.

2.3 Qualifications of Key Individuals

The application should describe the education levels, the degrees attained, the fields in which the degrees were attained, training, and experience of key individuals. The descriptions should be provided for management positions commonly titled facility manager, operations manager, shift supervisor, and managers for various safety and environmental disciplines. Qualification criteria should be described generally in terms of academic credentials, formal continuing education, and work experience; for example, “Bachelor’s degree in nuclear engineering or related scientific or engineering field, with 5 years of experience managing operations involving radioactive materials.”

3. ACCIDENT ANALYSIS

The application should include an accident analysis for the facility. If this information is part of a 10 CFR Part 50 or Part 52 application, then it may be referenced. The accident analysis should identify and evaluate potential accidents that could affect the safety of licensed material.

4. RADIATION PROTECTION PROGRAM

The radiation protection program should address the occupational radiation protection measures in 10 CFR Parts 20 and 70. Specifically, licensees should develop, document, and implement a radiation protection program in accordance with 10 CFR 20.1101, “Radiation protection programs.” Additionally, 10 CFR 20.2102, “Records of radiation protection programs,” requires licensees to keep records of the radiation protection program, including a description of the program provisions, audits, and other aspects of program implementation.

The applicant should commit to establish, maintain, and implement a quality radiation protection program that addresses the areas listed below.

4.1 As Low as Reasonably Achievable

Applicants should describe the as low as reasonably achievable (ALARA) program pertaining to radiation workers and ALARA committee activities. The application should also state the committee’s membership, frequency of meetings, and scope. The procedures for performing the required audits and inspections of operations and for review of all new activities or changes in existing activities should also be described. RG 8.10, “Operating Philosophy for Maintaining Occupational Radiation Exposures as Low as Is Reasonably Achievable” (Ref. 13), may be useful in developing an ALARA program. A periodic report summarizing employee exposures and effluent release data should be made to senior management.

As part of the ALARA program, the licensee should investigate and address situations that significantly reduce the effectiveness of health and safety programs. For example, the licensee should analyze data from surveillance and monitoring programs for trends that may indicate an increasing trend in radiation exposures.

4.2 Organization and Personnel Qualifications

The application should describe the qualifications for the radiological protection personnel and identify their authority and responsibilities for implementing the radiation protection program functions. These individuals should have clearly defined position responsibilities within the radiation protection program and with other line managers. The application should also specify the level of education, experience, and training for key radiation protection staff.

4.3 Procedures

The applicant should commit to operate using written radiation protection procedures and radiation work permits. Procedures should address applicable radiation protection requirements found in 10 CFR Part 19, “Notices, Instructions and Reports to Workers: Inspection and Investigations” (Ref. 14), 10 CFR Part 20, and 10 CFR Part 70, and any other applicable regulations. The applicant should describe a process for procedure generation or modification, authorization, distribution, and training. In addition, the application should describe procedures for creating written radiation work permits for activities involving licensed material that are not covered by written radiation protection procedures.

4.4 Training

The application should demonstrate that there will be qualified workers trained in radiation protection procedures implement the radiation protection program and that the training program complies with 10 CFR Part 20. The training program should be provided to all personnel and visitors entering restricted areas that is commensurate with the health risk they may be exposed to. Alternatively, personnel and visitors may be escorted into restricted areas by those who have received the appropriate training. The workers should be trained on the health protection problems associated with exposure to radiation, precautions, and procedures to minimize exposure, and the purposes and functions of protective devices employed. The program should include regular refresher training.

4.5 Ventilation and Respiratory Protection Programs

The application should demonstrate that there will be adequate control of airborne concentrations of radioactive material using ventilation systems, containment systems, and respirators. The ventilation and containment systems should be appropriately sized and positioned to keep airborne concentration below levels specified in 10 CFR Part 20, Appendix B, “Annual Limits on Intake (ALIs) and Derived Air Concentrations (DACs) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sewerage.” The ventilation system should be maintained within design specifications through application of management measures, regular maintenance, and performance testing. The application should also describe the ventilation system’s operating criteria and performance testing. A survey and monitoring program should be in place to document radiation levels, concentrations of radioactive material, and occupational exposures at the facility.

The application should also describe the respiratory protection program needed to limit the inhalation of airborne radioactive materials and hazardous chemicals. The applicant should commit to maintain written procedures for fitting and training on the respiratory equipment. Appropriate procedures should be maintained for the respiratory program. RG 8.15, “Acceptable Programs for Respiratory Protection” (Ref. 15), should be used when evaluating programs for protection against airborne radioactive materials.

4.6 Radiation Surveys and Monitoring Programs

The application should describe the radiation surveys and monitoring programs to document the magnitude and extent of radiation levels, concentrations of radioactive materials, and occupational exposures to radiation by workers. The monitoring program should follow written procedures. The program should involve air sampling in areas of the facility identified as potential airborne radioactive areas. The application should address the routine radiation survey program and special surveys for planning and preparing maintenance operations to ensure that occupational exposures are ALARA. The application should also describe the personnel monitoring program for external radiation, including the types of personnel monitoring equipment that are used.

The application should identify the controlled areas established to prevent the spread of contamination. It should include commitments for appropriate step-off pads, change facilities, protective clothing facilities, and personnel monitoring instruments. It should also commit to maintain policies to ensure equipment and materials removed from restricted areas to unrestricted areas are not contaminated above the release levels presented in RG 8.24, “Health Physics Surveys during Enriched Uranium-235 Processing and Fuel Fabrication,” Appendix A, “Acceptable Surface Contamination Levels” (Ref. 16).

The application should describe the air sampling and analysis program used for monitoring the concentrations of radioactivity in working areas and detecting the presence of unsafe concentrations. The description should address the placement, monitoring, and maintenance of the air sampling equipment. It should address the action levels and actions to be taken if these levels are exceeded. The application should also describe conditions under which air sampling instruments (e.g., work-area samplers, continuous air monitors, and lapel air samplers) should be used.

The applicant should commit to maintain internal procedures on the use of protective clothing, surface contamination surveys, and allowable limits for fixed and removable contamination. The application should specify the cleanup action levels for clean (uncontrolled) areas, intermediate areas (e.g., change rooms), and controlled areas. A corrective action program should be in place for incidents that result in unplanned exposures.

The application should describe a bioassay program that detects and monitors any significant deposition of radioactive material in the body. The description should include the frequency of data collection and an evaluation of the urine bioassay sampling program (routine and special). RG 8.9, “Acceptable Concepts, Models, Equations, and Assumptions for a Bioassay Program” (Ref. 17), and RG 8.11, “Applications of Bioassay for Uranium” (Ref. 18), should be used as guidance on such topics as (1) the necessity for bioassay procedures, (2) the bioassay techniques to use and their frequency, (3) selecting participants, (4) actions to be taken based on bioassay results, (5) the particular results that should initiate such action, and (6) diagnostic evaluation.

4.7 Posting and Labeling

The application should describe the posting and labeling program used to comply with 10 CFR 20.1902, "Posting requirements," and 10 CFR 20.1904, "Labeling containers," respectively.

4.8 Control of Radiological Risk Resulting from Accidents

The applicant should ensure that (1) the emergency plan, if one is required, adequately addresses the response to a release of radioactive materials, or (2) the applicant gives a proper justification that precludes the development of an emergency plan.

4.9 Reports and Records

The application should describe the records that will be maintained and their required retention times, including those for audits, radiation survey results, corrective actions, radiation work permits, employee training, personnel exposure, and planned special exposures. The application should ensure safety-significant events are tracked in the correction action program and are reported to the NRC consistent with the reporting requirements. The applicant should ensure a program is established for shipping, receiving, and documenting transportation of radioactive materials.

4.10 Administrative Control Levels, Including Effluent Control

The application should describe action levels, alarm set points, frequency of measurements, and actions to be taken for the following radiation protection monitoring programs:

- occupational exposure (internal and external),
- airborne activity (area and stack or vent monitors),
- liquid activity (effluent monitors),
- surface contamination (work areas, release of equipment or packages), and
- personnel contamination (skin or internal contamination).

The application should also describe the sampling method, sampling frequency, analyses, lower limits of detection, instrumentation calibration and testing, method of reporting, and responsibility (by position) for all effluents at their point of discharge. The location of liquid effluent discharge points should be shown and labeled on appropriate site plans. The application should also describe the limits selected for a commitment of action and actions to be taken.

5. NUCLEAR CRITICALITY SAFETY

The application should include a description of the criticality safety program. If this information is part of a 10 CFR Part 50 or 10 CFR Part 52 application, then it may be referenced. The description should include the following information:

- The minimum qualifications for the key positions having nuclear criticality safety and fuel handling responsibilities.

- A description of the responsibilities for the key personnel responsible for nuclear criticality safety and fuel handling.
- If fuel elements will be stored in shipping containers, a description of the containers and the storage array, and the basis for nuclear criticality safety of the container storage array.
- If elements will not be stored in their shipping containers, a nuclear safety analysis of the alternative storage, including a description of the physical means for maintaining safe spacing of the elements (e.g., storage racks) and controls to be exercised over placing the elements in the storage location. In situations in which nuclear safety depends on proper spacing, the integrity of storage fixtures should be analyzed from the standpoint of possible failure due to such factors as loading, shock, fire, or corrosion. Provide drawings or sketches of racks and provide the spacing between elements and between elements and floors or walls.
- If nuclear criticality safety is based on other than the maximum enrichment of the fuel, the justification for the nominal enrichment used in the safety analysis.
- If nuclear criticality safety is based on the reactivity effects of neutron absorber materials in the racks, a description of the chemical and physical properties of the materials.
- Drawings or sketches showing the dimensions and locations of the neutron absorber materials.
- A description of quality assurance activities to ensure the continued presence and effectiveness of the neutron absorber materials.
- If nuclear safety is based on moderation control, a consideration of sources of water that go into dry storage (e.g., sprinkler systems) and the probability of flooding the storage area.
- A demonstration that fuel will be stored in such a manner that if the fuel were flooded and then drained, water could not be retained around or within an assembly; however, if water retention is possible, its results should be evaluated.
- An evaluation of the effects of low-density moderators (e.g., mist) or show that such densities are not credible.
- A description of the validation of the calculational method for nuclear criticality safety.
- If elements will be removed from storage (e.g., for inspection purposes), a detailed description of the activities to be performed and the controls to be exercised over removing and replacing the elements.
- The maximum number of fuel assemblies that will be out of approved shipping containers or approved storage racks at any one time; this number should be justified, preferably on the basis that it is less than the minimum number required to achieve criticality under optimum conditions of spacing, moderation, and reflection. As an alternative, provide an analysis of the safety of a large number of assemblies that includes the considerations in paragraphs 4 (alternate storage) and 9, 10, and 11 (moderation control) of this section.

- If an exemption from the requirements of 10 CFR 70.24 is not requested or has been disapproved, a description of the plans for compliance with the requirements of 10 CFR 70.24, including instrumentation, location of detectors, and emergency procedures and drills. However, applicants for a license for a nuclear power plant are exempt from the requirements of 10 CFR 70.24(b) in accordance with 10 CFR 70.24(c).

6. CHEMICAL SAFETY

Because a 10 CFR Part 50 or 10 CFR Part 52 application will address chemical safety, the application may refer to that part of the 10 CFR Part 50 or 10 CFR Part 52 application.

7. FIRE SAFETY

The application should describe appropriate equipment, facilities, and procedures for fire safety used to protect health and minimize danger to life and property. Implementation of the guidance below will ensure the regulatory requirements are met. If this information is part of a 10 CFR Part 50 or 10 CFR Part 52 application, then it may be referenced.

7.1 Fire Safety Management Measures

The applicant should commit to ensure that the safety controls are available and reliable, and that the facility maintains fire safety awareness among employees, controls transient ignition sources and combustibles, and maintains a readiness to extinguish the fire or limit its consequences. The application should provide for senior-level management oversight of the fire safety program with input from the facility safety committee or fire safety review committee.

The fire safety management measures described in the application should be consistent with National Fire Protection Association (NFPA) Standard 801, “Standard for Fire Protection for Facilities Handling Radioactive Materials” (Ref. 19), or NFPA Standard 805, “Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants” (Ref. 20). The application should discuss how the fire safety management measures address: (1) fire prevention, (2) inspection, testing, and maintenance of fire safety systems, (3) emergency response organization qualifications, drills, and training, and (4) pre-fire plans. Information on the fire safety management measures should contain sufficient detail to identify their relationship to and functions in, normal operations, anticipated (off-normal) events, and accident safety (mitigating features).

7.2 Fire Hazards Analysis

The application should describe the fire hazard analysis (FHA). The FHA is used to identify possible fire initiators and accident sequences leading to radiological consequences or toxic chemical consequences resulting from interaction with SNM.

The FHA should develop bounding, credible fire scenarios for each fire area containing significant fire loading and then assess the consequences of an unmitigated fire. The FHA should describe, by fire area, the fuel loading, fire scenarios, methods of consequence analysis, and potential consequences, as well as the controls. The FHA should also contain an inventory of safety controls that are susceptible to fire damage from credible fires within each fire area.

Elements of facility design, including building construction, fire area determination, electrical installation, life safety, ventilation, drainage, and lightning protection, may affect fire safety. The

application should document the fire safety considerations used in the general design of the facility.

In addition to standard industrial fire safety concerns, the application should also address nuclear safety, including water exclusion areas, environmental protection from large quantities of contaminated fire water, and physical security impacts on egress.

Many hazardous chemicals and processes used by fuel cycle facilities contribute to the fire hazards. For items that threaten licensed material, the application should identify the hazardous chemicals, processes, and design standards used to ensure fire safety.

7.3 Safety Controls and the Associated Management Measures

The application should describe fire-initiated release scenarios. Controls should be identified to mitigate or prevent the scenario, including whether they are safety controls or defense-in-depth measures. If the applicant takes a graded approach to safety, the NRC reviewer should establish that the classification of safety controls and grading are appropriate and sufficient to protect against fire-related risks.

7.4 Fire Protection and Emergency Response

The application should document the fire protection systems and fire emergency response organizations provided for licensed facilities. If needed, the facility should have an onsite fire emergency response team. If offsite fire departments are needed for facility fire safety, periodic training should be conducted. The applicant should have a memorandum of understanding with the fire departments to define the required protection.

7.5 Requirements for New Facilities or New Processes at Existing Facilities

The application should address the baseline design criteria as required under 10 CFR 70.64(a)(3) for new facilities or new processes at existing facilities. The application should describe how the applicant addressed 10 CFR 70.64(a)(3) in establishing the design principles, features, and control systems for the new licensed activities.

8. EMERGENCY MANAGEMENT

The application must demonstrate compliance with the requirements of 10 CFR 70.22(i). Specifically, the application should provide one of the following:

- An evaluation showing that the maximum dose to a member of the public offsite due to a release of radioactive materials would not exceed 1 rem effective dose equivalent or an intake of 2 milligrams of soluble uranium; or
- An emergency plan meeting the requirements of 10 CFR 70.22(i)(3). An existing emergency plan meeting the 10 CFR 70.22(i)(3) requirements may be incorporated by reference.

The NRC provides additional information on developing an emergency management plan in RG 1.101, "Emergency Planning and Preparedness for Nuclear Power Reactors" (Ref. 21), and RG 3.67, "Standard Format and Content for Emergency Plans for Fuel Cycle and Materials Facilities" (Ref. 22).

9. ENVIRONMENTAL PROTECTION PROGRAM

The application should include information demonstrating that the applicant's proposed environmental protection measures are adequate to protect the environment and public health and safety and to comply with the regulatory requirements in 10 CFR Part 20 and 10 CFR Part 70. If this information is part of a 10 CFR Part 50 or 10 CFR Part 52 application, then it may be referenced.

The environmental protection program should address the environmental protection measures, including the control and monitoring of gaseous and liquid effluents and the management of solid waste. The environmental program should also provide for the monitoring of the facility environment, including ambient air, surface water, ground water, soils, and vegetation that can be affected by facility effluents.

The application should describe an environmental protection program that is adequate to protect the environment and public health and safety. This information is separate from the requirements for an environmental report in accordance with 10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," Subpart A, "National Environmental Policy Act—Regulations Implementing Section 102(2)" (Ref. 23).

The environmental protection program differs from the environmental report in that the program (1) is part of the license application, (2) addresses the control and monitoring of effluents, and (3) should demonstrate compliance with 10 CFR 70.59, "Effluent monitoring reporting requirements." Information in the environmental safety program should be consistent with information in the environmental report.

The application's description of the environmental protection program should focus on that part of the plant used to control and assess the levels of radioactive and nonradioactive releases (gaseous, liquid, and solid) to the environment. The environmental program may rely heavily on the radiation protection program to maintain public doses ALARA in accordance with 10 CFR 20.1101. This includes the use of effluent controls (e.g., procedures, engineering controls, and process controls). The environmental protection program should also focus on the applicant's waste minimization practices to comply with 10 CFR 20.1406, "Minimization of contamination."

The application should describe the methods for demonstrating compliance with the U.S. Environmental Protection Agency's regulations at 40 CFR Part 190, "Environmental Radiation Protection Standards for Nuclear Power Operations" (Ref. 24) (see 10 CFR 20.1301(e)).

10. DECOMMISSIONING

The application should provide sufficient information to demonstrate the capability to decommission the facility safely and in accordance with 10 CFR 70.25, "Financial assurance and recordkeeping for decommissioning." The applicant should discuss its conceptual approach for meeting the decommissioning requirements in 10 CFR Part 20, Subpart E, "Radiological Criteria for License Termination." The applicant should discuss its plans for minimizing contamination. If this information is part of a 10 CFR Part 50 or 10 CFR Part 52 application, then it may be referenced.

If required, the decommissioning funding plan (DFP) should demonstrate that the applicant has considered decommissioning activities that may be needed in the future, performed a credible site-specific cost estimate for those activities, and presented the NRC with financial assurance to cover the cost of those activities in the future. Therefore, the DFP should contain the following:

- An overview of the proposed decommissioning activities,

- The methods used to determine the cost estimate, and
- The financial assurance mechanism.

This overview should contain sufficient detail to demonstrate that the decommissioning cost estimate is reasonably accurate.

The application should discuss plans for meeting the decommissioning recordkeeping requirements. Under the regulations, a licensee must keep records important for decommissioning. These should include records of spills or unusual occurrences involving the spread of contamination, as-built drawings and modifications to structures and equipment in restricted areas, a list of areas designated or formerly designated as restricted areas, and records of the financial assurance requirements.

11. MANAGEMENT MEASURES

Management measures are activities the licensee performs, generally on a continuing basis, to provide reasonable assurance that the safety programs will perform their intended function. Reasonable assurance is established by considering factors such as necessary maintenance, operating limits, common-cause failures, and the likelihood and consequences of failure or degradation of the safety controls and measures. As defined in 10 CFR 70.4, "Definitions," management measures include the following:

- **Configuration management**, which provides oversight and control of design information, safety information, and records of modifications (both temporary and permanent) that might affect the ability of items relied on for safety to perform their functions when needed.
- **Maintenance** of safety controls, which includes corrective maintenance, preventive maintenance, surveillance, monitoring, and functional testing.
- **Training and qualification programs**, which provide reasonable assurance that personnel who perform activities relied on for safety understand, recognize the importance of, and are qualified to perform these activities in a manner that adequately protects public health and safety and the environment.
- **Procedures**, which should be adequately prepared and used, and adequate management control of written procedures should be in place.
- **Audits and assessments**, which should be adequately planned and performed by appropriately trained personnel.
- **Incident investigations**, including appropriate corrective actions and lessons learned, which should be performed for abnormal events.
- **Records management**, which should be implemented for training, dosimetry, and effluents records, as well as records of classified information and records concerning facility safety controls and their failures.

12. MATERIAL CONTROL AND ACCOUNTING

The provisions of 10 CFR 70.22(b) require an application for an SNM license to include a full description of the applicant's program for material control and accounting (MC&A) of SNM under 10 CFR 74.31, "Nuclear material control and accounting for special nuclear material of low strategic significance," 10 CFR 74.41, "Nuclear material control and accounting for special nuclear material of moderate strategic significance," and 10 CFR 74.51 "Nuclear material control and accounting for strategic special nuclear material. The provisions of 10 CFR 70.32(c) require a license authorizing the use of SNM to include and be subject to a condition requiring the licensee to maintain and follow an SNM MC&A program, a measurement control program, and other material control procedures that include corresponding records management requirements.

10 CFR 70.22(b), 70.32(c), 74.31, 74.41, and 74.51 contain exceptions for nuclear reactors licensed under 10 CFR Part 50. Accordingly, the regulations applicable to the MC&A of SNM for nuclear reactors licensed under 10 CFR Part 50 are in 10 CFR Part 74, Subpart B, "General Reporting and Recordkeeping Requirements," and 10 CFR 74.11, "Reports of loss or theft or attempted theft or unauthorized production of special nuclear material," through 74.19, "Recordkeeping," except for 10 CFR 74.17, "Special nuclear material physical inventory summary report."

In contrast with 10 CFR Part 50 reactors, there are no exceptions for nuclear reactors licensed under 10 CFR Part 52 from the requirements of 10 CFR 70.22(b), 70.32(c), 74.31, 74.41, and 74.51; accordingly, 10 CFR Part 52 licensees must comply with these regulations. Pursuant to 10 CFR 72.7, 10 CFR Part 52 applicants may submit an exemption request from these regulations. The Commission may, upon request or upon its own initiative, grant such exemptions from the requirements of the regulations in this part 72 if it determines the request is authorized by law and will not endanger life or property or the common defense and security, and is otherwise in the public interest.

For MC&A of SNM, applicants should follow the guidance in the following NRC brochures:

- To address the reporting requirements contained in 10 CFR 74.15(a), use the guidance in NUREG/BR-0006, "Instructions for Completing Nuclear Material Transaction Reports (DOE/NRC Forms 741 and 740M)," dated May 4, 2018 (Ref. 26).
- To address receipts, transfers, and inventory adjustments of licensed source materials, use the guidance in the Nuclear Materials Management and Safeguards System Report D-24, "Personal Computer Data Input for Nuclear Regulatory Commission Licensees" dated August 1, 2016 (Ref. 27).
- To address the material status reports associated with the annual inventory of source material, use the guidance in NUREG/BR-0007, "Instructions for the Preparation and Distribution of Material Status Reports (DOE/NRC Forms 742 and 742C)," dated May 4, 2018 (Ref. 28). If this information is part of a 10 CFR Part 50 or 10 CFR Part 52 application, then it may be referenced.
- To address the MC&A reporting requirements of the Physical Inventory Summary reports (NRC Form 327), use the guidance in NUREG/BR-0096, "Instructions and Guidance for Completing Physical Inventory Summary Reports (NRC Form 327)," issued January 1992 (Ref. 29).

For MC&A SNM exemption requests under 10 CFR Part 50 and 52, the staff evaluates requests in accordance with 10 CFR 50.12, "Specific exemptions," and 10 CFR 52.7, "Specific exemptions," which conditionally incorporates the requirements of 10 CFR 50.12. Under these requirements the Commission may grant exemptions if (1) the exemption is authorized by law and will not present an undue risk to

public health and safety and is consistent with common defense and security, and (2) special circumstances are present as specified in 10 CFR 50.12(a)(2). The exemption criteria in 10 CFR 50.12 encompass the exemption criteria in 10 CFR 70.17(a) and 10 CFR 74.7, “Specific exemptions.” Therefore, by demonstrating that the exemption criteria in 10 CFR 50.12 are satisfied, these exemption requests also demonstrate that the exemption criteria in 10 CFR 52.7, 10 CFR 70.17(a), and 10 CFR 74.7 will be satisfied.

When the applicant has satisfied the exemption criteria in 10 CFR 50.12, the NRC staff would consider such exemption requests to also satisfy the exemption criteria in 10 CFR 52.7, 10 CFR 70.17(a) and 10 CFR 74.7.

12. PHYSICAL PROTECTION

The application should address the physical security requirements for the 10 CFR Part 70 license in accordance with 10 CFR 73.67, “Licensee fixed site and in-transit requirements for the physical protection of special nuclear material of moderate and low strategic significance.” For operating reactors, physical protection is required by a 10 CFR Part 50 license in accordance with 10 CFR 73.55, “Requirements for physical protection of licensed activities in nuclear power reactors against radiological sabotage.” 10 CFR 73.67(f) exempts Part 50 licensees from these requirements because the SNM would be protected in accordance with 10 CFR 73.55. The requirements of 10 CFR 73.67 would only apply to SNM in transit or SNM stored outside of a reactor’s protected area. For new reactors, physical protection will be part of a 10 CFR Part 50 or 10 CFR Part 52 application. The requirements in 10 CFR 73.67 would apply to SNM in transit, to fresh fuel stored on site prior to a Commission finding that the criteria in the reactor license are met, or SNM stored outside of a reactor’s protected area. The application should address the following aspects of physical protection:

- **Fixed site and in-transit general performance objectives:** The applicable physical protection requirements in 10 CFR 73.67(a) contain general performance objectives, including minimizing the possibilities for unauthorized removal of SNM; detection, assessment, response, and notification of appropriate responders; and recovery of SNM.
- **Fixed site general requirements:** The applicable requirements specified in 10 CFR 73.67(f) contain general requirements, including describing the area(s) where the material is to be stored and identifying temporary or permanent controlled access areas. A permanent controlled access area would have a barrier for access control during periods when it is not occupied. Granting unescorted access and access control using locks, badges, and monitoring are required where applicable. A security organization, procedures, and a security plan are also required.
- **In-transit general requirements:** The applicable requirements specified in 10 CFR 73.67(g) contain general requirements for in-transit protection of SNM. These include advance notification of shipments, receipt and inspection procedures, tracing, and communication.
- **Protection of safeguards information against unauthorized disclosure:** In addition to addressing the physical security requirements, the application should describe the measures that will be taken to provide for the protection of safeguards information against unauthorized disclosure. Safeguards information should be protected in accordance with 10 CFR 73.21, “Protection of Safeguards Information: Performance requirements,” 10 CFR 73.22, “Protection of Safeguards Information: Specific requirements,” and 10 CFR 73.23, “Protection of Safeguards Information—Modified Handling: Specific requirements.”

- **Physical security plan for the protection of SNM of moderate or low strategic significance:**
The application should follow the guidance on the content of a physical security plan in RG 5.59, “Standard Format and Content for a Licensee Physical Security Plan for the Protection of Special Nuclear Material of Moderate or Low Strategic Significance” (Ref. 30).

D. IMPLEMENTATION

The NRC staff may use this regulatory guide as a reference in its regulatory processes, such as licensing, inspection, or enforcement. However, the NRC staff does not intend to use the guidance in this regulatory guide to support NRC staff actions in a manner that would constitute backfitting as that term is defined in 10 CFR 50.109, “Backfitting,” and as described in NRC Management Directive 8.4, “Management of Backfitting, Forward Fitting, Issue Finality, and Information Requests” (Ref. 31), nor does the NRC staff intend to use the guidance to affect the issue finality of an approval under 10 CFR Part 52, “Licenses, Certifications, and Approvals for Nuclear Power Plants.” The staff also does not intend to use the guidance to support NRC staff actions in a manner that constitutes forward fitting as that term is defined and described in Management Directive 8.4. If a licensee believes that the NRC is using this regulatory guide in a manner inconsistent with the discussion in this Implementation section, then the licensee may file a backfitting or forward fitting appeal with the NRC in accordance with the process in Management Directive 8.4.

REFERENCES¹

1. *U.S. Code of Federal Regulations (CFR)*, “Domestic Licensing of Special Nuclear Material,” Part 70, Chapter 1, Title 10, “Energy.”
2. CFR, “Domestic Licensing of Production and Utilization Facilities,” Part 50, Chapter 1, Title 10, “Energy.”
3. CFR, “Licenses, Certifications, and Approvals for Nuclear Power Plants,” Part 52, Chapter 1, Title 10, “Energy.”
4. CFR, “Standards for Protections against Radiation,” Part 20, Chapter 1, Title 10, “Energy.”
5. CFR, “Rules of General Applicability to Domestic Licensing of Byproduct Material,” Part 30, Chapter 1, Title 10, “Energy.”
6. CFR, “Physical Protection of Category 1 and Category 2 Quantities of Radioactive Material,” Part 37, Chapter 1, Title 10, “Energy.”
7. CFR, “Domestic Licensing of Source Material,” Part 40, Chapter 1, Title 10, “Energy.”
8. CFR, “Physical Protection of Plants and Materials,” Part 73, Chapter 1, Title 10, “Energy.”
9. CFR, “Material Control and Accounting of Special Nuclear Material,” Part 74, Chapter 1, Title 10, “Energy.”
10. U.S. Nuclear Regulatory Commission (NRC), NUREG-1520, “Standard Review Plan for Fuel Cycle Facilities License Applications,” Washington, DC.
11. International Atomic Energy Agency Safety Standards Series S-G-1.4, “Design of Fuel Handling and Storage Systems for Nuclear Power Plants,” 2003.²
12. NRC, Regulatory Issue Summary (RIS) 2005-31, "Control of Security-Related Sensitive Unclassified Non-Safeguards Information Handled by Individuals Firms, and Entities Subject to NRC Regulation of the Use of Source, Byproduct, and Special Nuclear Material," Washington, DC, ADAMS Accession Number ML16196A237.
13. NRC, Regulatory Guide (RG) 8.10, “Operating Philosophy for Maintaining Occupational Radiation Exposures as Low as Is Reasonably Achievable,” Washington, DC.

1 Publicly available NRC published documents are available electronically through the NRC Library on the NRC’s public web site at <http://www.nrc.gov/reading-rm/doc-collections/> and through the NRC’s Agencywide Documents Access and Management System (ADAMS) at <http://www.nrc.gov/reading-rm/adams.html>. The documents can also be viewed online or printed for a fee in the NRC’s Public Document Room (PDR) at 11555 Rockville Pike, Rockville, MD. For problems with ADAMS, contact the PDR staff at (301) 415-4737 or (800) 397-4209; fax (301) 415-3548; or e-mail pdr.resource@nrc.gov.

2 Copies of International Atomic Energy Agency (IAEA) documents may be obtained through their web site: WWW.IAEA.Org/ or by writing the International Atomic Energy Agency, P.O. Box 100 Wagramer Strasse 5, A-1400 Vienna, Austria. Telephone (+431) 2600-0, Fax (+431) 2600-7, or e-mail at Official.Mail@IAEA.Org.

14. CFR, “Notices, Instructions and Reports to Workers: Inspection and Investigations,” Part 19, Chapter 1, Title 10, “Energy.”
15. NRC, RG 8.15, “Acceptable Programs for Respiratory Protection,” Washington, DC.
16. NRC, RG 8.24 “Health Physics Surveys During Enriched Uranium-235 Processing and Fuel Fabrication,” Washington, DC.
17. NRC, RG 8.9, “Acceptable Concepts, Models, Equations, and Assumptions for a Bioassay Program,” Washington, DC.
18. NRC, RG 8.11, “Applications of Bioassay for Uranium,” Washington, DC.
19. National Fire Protection Association (NFPA), Standard 801, “Standard for Fire Protection for Facilities Handling Radioactive Materials,” Quincy, MA.³
20. NFPA, Standard 805, “Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants,” Quincy, MA.
21. RG 1.101, “Emergency Planning and Preparedness for Nuclear Power Reactors,” Washington, DC.
22. NRC, RG 3.67, “Standard Format and Content for Emergency Plans for Fuel Cycle and Materials Facilities,” Washington, DC.
23. CFR, “Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions,” Part 51, Chapter 1, Title 10, “Energy.”
24. CFR, “Environmental Radiation Protection Standards for Nuclear Power Operations” Part 190, Chapter 1, Title 40, “Protection of Environment.”
25. NRC, NUREG-1757, “Consolidated Decommissioning Guidance,” Washington, DC.
26. NRC, NUREG/BR-0006, “Instructions for Completing Nuclear Material Transaction Reports (DOE/NRC Forms 741 and 740M),” Washington, DC, May 4, 2018.
27. Nuclear Materials Management and Safeguards System Report D-24, “Personal Computer Data Input for Nuclear Regulatory Commission Licensees,” Washington, DC, August 1, 2016.
28. NRC, NUREG/BR-0007, “Instructions for the Preparation and Distribution of Material Status Reports (DOE/NRC Forms 742 and 742C),” Washington, DC, May 4, 2018.
29. NRC, NUREG/BR-0096, “Instructions and Guidance for Completing Physical Inventory Summary Reports,” Washington, DC, January 1992.

3 The National Fire Protection Association (NFPA) makes important safety codes and standards available for free online and documents are available at <http://www.nfpa.org/codes-and-standards/document-information-pages>. They may also be purchased by calling NFPA Customer Sales 800.344.3555 or writing NFPA 1 Batterymarch Park, Quincy, MA 02169-7471.

30. NRC, RG 5.59, "Standard Format and Content for a Licensee Physical Security Plan for the Protection of Special Nuclear Material of Moderate or Low Strategic Significance," Washington, DC.
31. NRC Management Directive 8.4, "Management of Facility-Specific Backfitting and Information Collection," Washington, DC.