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## 1.0 INTRODUCTION AND GENERAL DESCRIPTION OF PLANT

This chapter of the U.S. Nuclear Regulatory Commission's (NRC's) safety evaluation report (SER) provides the NRC staff overview of the North Anna 3 Combined License (COL) application (COLA), the COL applicants design, site plan, material licenses, application submittal information, financial qualifications and the staff review principals and regulations. This chapter of the SER is organized as follows:

- Section 1.1 provides an overview of the North Anna 3 COLA.
- Section 1.2 provides the regulatory basis for the COL licensing process.
- Section 1.3 provides an overview of the principal review matters in the COLA and where the staff's reviews of the ten parts of the COLA are documented.
- Section 1.4 documents the staff's review of Chapter 1 of the Final Safety Analysis Report (FSAR).
- Section 1.5 documents the staff's review of other regulatory considerations for Chapter 1.

### 1.1 Summary of Application

By letter dated November 26, 2007 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML073320913), Dominion Virginia Power (Dominion) submitted its application to the NRC for a COL to construct and operate a General Electric-Hitachi Economic Simplified Boiling-Water Reactor (ESBWR) at North Anna Power Station site (North Anna site) pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 52, "Licenses, Certification, and Approvals for Nuclear Power Plants," and the associated material licenses under 10 CFR Part 30, "Rules of General Applicability to Domestic Licensing of Byproduct Material," 10 CFR Part 40, "Domestic Licensing of Source Material," and 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material."

The ESBWR nuclear reactor design is a 4,500-megawatt thermal reactor that uses natural circulation for normal operations and has passive safety features. This reactor will be identified as North Anna 3 and will be located on Dominion's existing North Anna site in Louisa County, Virginia, approximately 40 miles north northwest of Richmond, Virginia. There are two existing nuclear reactors in operation at the North Anna site, as well as an Independent Spent Fuel Storage Installation (ISFSI). North Anna 3 will be located adjacent to and generally west of the existing units on the North Anna site.

As indicated in the applicant's November 26, 2007 submittal, the application incorporated by reference Revision 4 of the ESBWR Design Control Document (DCD) and Revision 9 of the North Anna 3 Early Site Permit (ESP) for the North Anna 3 site. The NRC issued the North Anna ESP (ESP-003) on November 27, 2007 based on Revision 9 of the ESP application (ADAMS Accession No. ML073180421).

By letter dated June 28, 2010, Dominion revised its application to incorporate by reference the Mitsubishi Heavy Industries', Ltd. United States – Advanced Pressurized Water Reactor

(US-APWR) technology to construct and operate at the North Anna 3 site. By letter dated April 25, 2013, Dominion notified the staff that it planned to revert back to ESBWR reactor technology for its North Anna 3 COLA. Dominion then submitted a revised application that incorporated by reference the ESBWR DCD, Revision 9 by letter dated December 18, 2013.

By letter dated June 24, 2014, Dominion submitted a revised application that incorporated by reference the ESBWR DCD, Revision 10. In a letter dated January 23, 2015, Dominion followed the design center approach and reviewed the recent Detroit Edison Company Fermi 3 COLA updates (ADAMS Accession Nos. ML14295A354 and ML14308A337) that reflected the changes to the Fermi 3 COLA incorporating by reference the codified version of the ESBWR design certification rule (DCR) which is contained in 10 CFR Part 52, Appendix E, "Design Certification Rule for the U.S. Economic Simplified Boiling Water Reactor." The ESBWR DCR was published on October 15, 2014 (79 FR 61944) and is effective as of November 14, 2014. The ESBWR DCR references Revision 10 of the ESBWR DCD.

In developing the Final Safety Evaluation Report (FSER) for North Anna 3, the staff reviewed the ESBWR DCD, Revision 10 and the North Anna ESP to ensure that the combination of the information in the DCD and the information in the COLA represents the complete scope of information relating to a particular review topic.

There is a North Anna 3 FSER chapter that was issued without a corresponding ESBWR DCD chapter. Specifically, North Anna 3 FSER Chapter 20, "Requirements Resulting from Fukushima Near-Term Task Force Recommendations," does not have a corresponding ESBWR DCD Chapter 20. The FSER Chapter 20 describes the staff's evaluation and findings for the requirements resulting from the Fukushima Near-Term Task Force recommendations that are applicable to the North Anna 3 COL. The applicable recommendations address the following four topics:

- A re-evaluation of the seismic hazard (related to Recommendation 2.1).
- Mitigation strategies for beyond-design-basis external events (related to Recommendation 4.2).
- Spent fuel pool instrumentation (related to Recommendation 7.1).
- Emergency preparedness (EP) staffing and communications (related to Recommendation 9.3).

For more information on the staff's review of the above four topics, please refer to Chapter 20 of this SER.

The North Anna 3 COLA is organized as follows:

- **Part 1 General and Administrative Information**

Part 1 provides an introduction to the application and includes certain corporate information regarding Dominion pursuant to 10 CFR 50.33(a)–(d).

- **Part 2 Final Safety Analysis Report**

Part 2 contains information pursuant to the requirements of 10 CFR 52.79 “Contents of applications; technical information in final safety analysis report,” and, in general, adheres to the content and format guidance in Regulatory Guide (RG) 1.206, “Combined License Applications for Nuclear Power Plants (LWR Edition).”

- **Part 3 Environmental Report**

Part 3 contains environmental-related information pursuant to the requirements of 10 CFR 52.80, “Contents of applications; additional technical information,” and 10 CFR 51.50(c).

- **Part 4 Technical Specifications and Bases**

Part 4 addresses how the ESBWR generic technical specifications (TS) and bases of the design are incorporated by reference into the North Anna 3 plant-specific TS and bases.

- **Part 5 Emergency Plan**

Part 5 contains the North Anna 3 Emergency Plan with supporting information such as evacuation time estimates for the North Anna 3 plume exposure pathway and applicable offsite state and local emergency plans.

- **Part 6 [Not Used - reserved for Limited Work Authorization/site redress information]**

- **Part 7 Departures Report**

Part 7 contains information from the applicant regarding departures, exemptions, and variances from the ESBWR DCD and the North Anna ESP accordingly. The departures, exemptions, and variances are all evaluated by the staff within their respective SER sections. However, the applicant has included one exemption request from 10 CFR 70.22(c); 70.32(c); 74.31, “Nuclear material control and accounting for special nuclear material of low strategic significance”; 74.41, “Nuclear material control and accounting for special nuclear material of moderate strategic significance”; and 74.51, “Nuclear material control and accounting for strategic special nuclear material.” The staff evaluated this exemption request in Section 1.5.5 of this SER chapter.

- **Part 8 Safeguards and Security Plans**

Part 8 was submitted concurrent with the application to the NRC as separate licensing correspondence in order to fulfill the requirements of 10 CFR 52.79(a)(35) and 10 CFR 52.79(a)(36). Part 8 contains the North Anna 3 Security Plan and Safeguards Information (SGI) that is withheld from public disclosure pursuant to 10 CFR 73.21, “Protection of Safeguards Information: Performance Requirements.” The information in Part 8 consists of the Physical Security Plan, the Training and Qualification Plan, the Safeguards Contingency Plan, the Cyber Security Plan, the Mitigative Strategies Description and Plans, and the Special Nuclear Material Physical Protection Program. Portions of Part 8 contain Security-Related information and are withheld from public

disclosure pursuant to 10 CFR 2.390, "Public inspections, exemptions, requests for withholding."

- **Part 9 [Not used – Reserved for Withheld Information]**
- **Part 10 ITAAC**

Part 10 contains the applicant's Tier 1 information incorporated by reference from the ESBWR DCD. This part also contains the North Anna 3 Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC). The entire set of North Anna 3 COL ITAAC are addressed in four parts: (1) Design Certification (DC), (2) Emergency Planning, (3) Physical Security, and (4) Site-Specific. In addition, Part 10 includes a list of proposed license conditions from the applicant.

## **1.2 Regulatory Basis**

### **1.2.1 Applicable Regulations**

10 CFR Part 52, Subpart C, "Combined Licenses," establishes the requirements and procedures applicable to the Commission-issued COL for nuclear power facilities. The following requirements are of particular significance:

- 10 CFR 52.79, identifies the technical information required in the FSAR.
- 10 CFR 52.79(d) provides additional requirements for a COL referencing a standard certified design.
- 10 CFR 52.80, provides additional technical information outside of the FSAR (ITAAC and the environmental report).
- 10 CFR 52.81, "Standards for review of applications," provides standards for reviewing the application.
- 10 CFR 52.83, "Finality of referenced NRC approvals; partial initial decision on site suitability," provides for the finality of the referenced NRC approvals (e.g., standard DC approvals).
- 10 CFR 52.85, "Administrative review of applications; hearings," provides requirements for administrative reviews and hearing.
- 10 CFR 52.87, "Referral to the Advisory Committee on Reactor Safeguards (ACRS)," provides for referral to the ACRS.

The staff reviewed this application according to the following requirements:

- 10 CFR Part 20, "Standards for Protection Against Radiation"
- 10 CFR Part 30
- 10 CFR Part 40

- 10 CFR Part 50, “Domestic Licensing of Production and Utilization Facilities”
- 10 CFR Part 51, “Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions”
- 10 CFR Part 52
- 10 CFR Part 54, “Requirements for Renewal of Operating Licenses for Nuclear Power Plants”
- 10 CFR Part 55, “Operators’ Licenses”
- 10 CFR Part 70
- 10 CFR Part 73, “Physical Protection of Plants and Materials”
- 10 CFR Part 74, “Material Control and Accounting of Special Nuclear Material”
- 10 CFR Part 100, “Reactor Site Criteria”
- 10 CFR Part 140, “Financial Protection Requirements and Indemnity Agreements”

The staff evaluated the application against the guidance and acceptance criteria in the following:

- NUREG–0800, “Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants (LWR Edition)”
- NUREG–1520, “Standard Review Plan for Fuel Cycle Facilities License Applications”
- NUREG–1555, Revision 1: “Standard Review Plans for Environmental Reviews for Nuclear Power Plants: Environmental Standard Review Plan (with Supplement 1 for Operating Reactor License Renewal)”
- NUREG–1556, “Consolidated Guidance About Materials Licenses”
- NUREG–1577, “Standard Review Plan on Power Reactor Licensee Financial Qualifications and Decommissioning Funding Assurance”

In addition, the staff considered the format and content guidance in RG 1.206, “Combined License Applications for Nuclear Power Plants (LWR Edition),” for the COLA.

### **1.2.2 Finality of Referenced NRC Approvals**

The North Anna 3 COL references the codified version of the ESBWR DCD (ESBWR DCD, Revision 10). The regulatory basis of the information incorporated by reference is addressed in NUREG–1966, the FSER related to the certified ESBWR DCD (ADAMS Accession No. ML103470210) and NUREG–1966, Supplement 1 (ADAMS Accession No. ML14265A084). In addition, the North Anna 3 COLA references the North Anna ESP Site Safety Analysis Report (SSAR), Revision 9. The ESP was issued by the NRC on November 27, 2007. The staff documented its review of the North Anna 3 ESP SSAR in NUREG–1835 (ADAMS Accession

No. ML052710305), the staff FSER for the North Anna 3 ESP and NUREG–1835, Supplement 1 (ADAMS Accession No. ML063170371). In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for the North Anna 3 COLA and the associated acceptance criteria, are given in NUREG–0800, “Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants (LWR Edition),” (SRP) (54 FR 31268).

Based on the finality afforded to referenced certified designs and ESPs, the scope of this COLA review, as it relates to the referenced certified design and ESP, is limited to items that fall outside the scope of the certified design (e.g., COL information items, design information replacing conceptual design information (CDI), and programmatic elements that are the responsibility of the COL) or the ESP. During its evaluation of the COLA, the staff confirmed that the complete set of information required to be addressed in the COLA was addressed in the DC or referenced ESP, the DC or ESP as supplemented by the COLA, or completely in the COLA. Following this confirmation, the staff’s review of the COLA is limited to the COL-specific review items.

In accordance with 10 CFR 52.83, if the application for a COL references a DCD or ESP, the scope and nature of matters resolved for the application and any COL issued are governed by the applicable relevant provisions. For the ESBWR DCD, finality is specifically addressed in 10 CFR 52.63, “Finality of standard design certifications.” In addition, if the application for a COL references an ESP, the scope and nature of matters resolved in the ESP for the application and any COL issued are governed by 10 CFR 52.39, “Finality of early site permit determinations.”

The contents of the FSAR are specified in 10 CFR 52.79(a), which requires the information submitted in the FSAR to describe the facility; identify the design bases and the limits on its operation; and present a safety analysis of the structures, systems, and components (SSCs) of the facility as a whole. For a COLA that references a DC, Section 52.79(d) requires the DCD to be included in or incorporated by reference into the FSAR. Additionally, a COLA that references a DC must also contain the information and analysis required to be submitted within the scope of the COLA but is outside the scope of the DCD. This combined information addresses plant- and site-specific information and includes all COL action or information items; design information that replaces CDI; and programmatic information that was not reviewed and approved in connection with the DC rulemaking.

For a COLA that references an ESP, Section 52.79(b) requires; that the ESP SSAR to be included in or incorporated by reference into the FSAR, that information and analyses that demonstrate that the design of the facility fall within the North Anna site and design characteristics specified in the ESP, and that application must include any updates or changes related to any previously approved emergency plans.

The initial step in the staff’s evaluation of the COLA is to confirm that the complete set of information required to be addressed in the COLA is also in the DC or ESP as supplemented by the COLA or completely included in the COLA. Following this confirmation, the staff’s review of the COLA is limited to the COL review items. This FSER is based on the applicant’s Revision 8 of the North Anna 3 FSAR, which incorporates by reference ESBWR DCD, Revision 10. In addition the changes to the North Anna 3 site-specific seismic hazard evaluation were confirmed by the staff in the North Anna 3 FSAR Revision 9, submitted in June 2016, which considered the latest seismic hazards information as described in this SER for North Anna 3,

Chapter 3, Section 3.7, Section 3.8 and Chapter 2, Section 2.5.2. The results of the staff's technical evaluation of the ESBWR DCD application are in NUREG-1966, "Final Safety Evaluation Report Related to the Certification of the Economic Simplified Boiling-Water Reactor Standard Design" (ADAMS Accession No. ML14100A304), and its Supplement 1 (ADAMS Accession No. ML14265A084).

The outcome of the ESBWR DC rulemaking was previously tracked as Open Item 1-1. This rulemaking has been completed and the application and the staff's safety evaluations have been updated accordingly. This Open Item is now considered closed.

### **1.2.3 Overview of the Design-Centered Review Approach**

The design-centered review approach (DCRA) is described in Regulatory Issue Summary 2006-06, "New Reactor Standardization Needed to Support the Design-Centered Licensing Review Approach." The DCRA is endorsed by the Commission's Staff Requirements Memorandum SECY-06-0187, "Semiannual Update of the Status of New Reactor Licensing Activities and Future Planning for New Reactors," dated November 16, 2006. The DCRA is the Commission's policy intended to promote a standardization of COLAs; it is beyond the scope of information included in the DC. This policy directs the staff to perform one technical review for each standard issue outside the scope of the DC and to use this decision to support decisions on multiple COLAs. In this context, "standard" refers to essentially identical information and may include information provided by the applicant(s) to resolve plant-specific issues. The first COLA submitted for the staff to review is designated in a design center as the referenced COL (R-COL) application, and the subsequent applications in the design center are designated as subsequent COL (S-COL) applications. The North Anna 3 COLA was originally designated as the R-COLA for the ESBWR design center, and the staff issued an SER with open items that documented a review of both standard and site-specific information. In a letter dated May 18, 2010, Dominion Energy, Inc. informed the NRC that it had changed reactor technology and had selected the US-APWR for its North Anna 3 COLA. As a result of Dominion's decision, for the Fermi 3 COLA, Detroit Edison responded to all of the open items in the staff's North Anna 3 SER that related to standard content on behalf of the ESBWR design center and consistent with its new position as the R-COL for the ESBWR design center.<sup>1</sup> Thus, the Final SER for the Fermi 3 COL documents the staff's review of both standard and site-specific information and is the first complete SER for a COLA in the ESBWR design center.

In a letter dated January 23, 2015, Dominion followed the design center approach and reviewed the recent Detroit Edison Company Fermi 3 COLA Revision 8 updates (ADAMS Accession Nos. ML14295A354 and ML14308A337) that reflected the changes to the Fermi 3 COLA incorporating by reference the codified version of the ESBWR DCD.

To ensure that the staff's findings on standard content that were documented in the Final SER for the Fermi 3 COLA are equally applicable to the North Anna 3 COLA, the staff undertook the following reviews:

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<sup>1</sup> By letter dated April 25, 2013 (ADAMS Accession No. ML13120A016), the applicant for the North Anna 3 COL application informed the NRC that it had revised its technology selection and selected the General Electric (GEH) ESBWR nuclear technology for the North Anna 3 project. The applicant submitted a revised North Anna 3 COL application to the NRC on July 31, 2013 (ADAMS Accession No. ML13221A504). However, the Fermi COL application remains as the ESBWR design center R-COL.

- The staff compared the North Anna 3 COL FSAR, Revision 8, to the Fermi 3 COL FSAR Revision 8. In performing this comparison, the staff considered changes to the Fermi 3 COL FSAR (and other parts of the COLA, as applicable) resulting from requests for additional information (RAIs) and open and confirmatory items identified in the Fermi 3 SER with open items.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation (the Fermi 3 FSER) were endorsed.
- The staff verified that the site-specific differences are not relevant.

Where there were differences between the information provided by the Fermi 3 applicant and that provided by the North Anna 3 applicant regarding details in the application for the standard content material, the staff evaluated the differences and determined whether the standard content material of the Fermi 3 FSER was still applicable to the North Anna 3 application. These evaluations are in the SERs that reference the standard content. In various portions of this SER, the technical review of the related standard content material is identified by using italicized, double-indented formatting.

### **1.3 Principal Review Matters**

The staff's evaluations related to the COLA review are addressed as follows:

- **Part 1           General and Administrative Information**

The staff's evaluation of the corporate information regarding Dominion that is pursuant to 10 CFR 50.33, "Contents of applications; general information," is in Section 1.5.1 of this SER.

- **Part 2           Final Safety Analysis Report**

The staff's evaluation of information in the North Anna 3 FSAR is in the corresponding sections of this SER.

- **Part 3           Environmental Report**

The staff's evaluation of environmental information pursuant to the requirements of 10 CFR 51.50(c) addressed in the environmental report is in the staff's Supplemental Environmental Impact Statement in NUREG-1917, "Supplemental Environmental Impact Statement for Combined License (COL) for North Anna Power Station Unit 3."

- **Part 4           Technical Specifications**

Chapter 16 of this SER contains the staff's evaluation of the North Anna 3 plant-specific TS (PTS), and the associated PTS bases.

- **Part 5           Emergency Plan**

Chapter 13 of this SER includes the staff's evaluation of the North Anna 3 Emergency Plan, including related ITAAC, and the Federal Emergency Management Agency's review of State and local emergency plans.

- **Part 6**            **[Not Used - reserved for Limited Work Authorization/site redress information]**
- **Part 7**            **Departures Report**

The staff's evaluation of departures and exemptions is provided in the applicable chapters of this SER (i.e., Chapters 1 through 19). In addition, the staff's review of one requested exemption is included in Section 1.5.4 of this SER. Any associated exemptions are granted separately from this SER.

- **Part 8**            **Safeguards and Security Plans**

The information in Part 8 consists of the Physical Security Plan, the Training and Qualification Plan, the Safeguards Contingency Plan, the Cyber Security Plan, the Mitigative Strategies Description and Plans, and the Special Nuclear Material Physical Protection Program. Portions of Part 8 contain Security-Related information and are withheld from public disclosure pursuant to 10 CFR 2.390. The staff's evaluation of the sensitive information, withheld information in Part 8 occurs in the context of the specific subject being reviewed and is documented by the staff accordingly throughout the staff's SER.

The staff's evaluation of the North Anna 3 Security Plan and SGI is documented separately from this SER and is withheld from the public in accordance with 10 CFR 73.21. A non-sensitive summary of the staff's evaluation is in Section 13.6 of this SER.

The applicant has included withheld portions of the applicant's Cyber Security Plan as required by 10 CFR 73.54, "Protection of digital computer and communication systems and networks." The staff's evaluation of the cyber security-related plans is included in SER Section 13.8.

The applicant has provided withheld portions of the Mitigative Strategies Description and Plans for the loss of large areas of the plant due to explosions or fire, as required by 10 CFR 52.80(d). A summary of the staff's evaluation of this information is in Appendix 19A of this SER. The staff's complete evaluation is documented separately from this SER and is withheld from the public in accordance with 10 CFR 2.390. The applicant has provided withheld portions of the Special Nuclear Material Physical Protection Program as required by 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." A summary of the staff's evaluation of this information is in SER Section 1.6.

- **Part 9**            **[Not used – Reserved for Withheld Information]**
- **Part 10**          **ITAAC and Proposed License Conditions**

Chapter 14 of this SER contains the staff's evaluation of the ITAAC, except for the Physical Security ITAAC in SER Section 13.6. In addition, Part 10 of the application includes a list of proposed license conditions that are evaluated by the staff throughout this SER. At the completion of the staff's North Anna 3 COLA review, the staff will identify all proposed license conditions and ITAAC for recommendation that the Commission should impose if a COL is issued to the applicant.

## Organization of SER

The staff's SER is structured as follows:

- The SER adheres to the “finality” afforded to COLAs that incorporate by reference a standard certified design or ESP. As such, rather than repeat any technical evaluation of material incorporated by reference, this SER points to the corresponding review findings of NUREG–1966, NUREG–1811, “Final Environmental Impact Statement for an Early Site Permit (ESP) at the North Anna ESP Site,” and NUREG–1917 “Supplemental Environmental Impact Statement for the Combined License (COL) for North Anna Power Station Unit 3). However, the referenced ESBWR DCD, ESP and the North Anna 3 COL FSAR are considered in the staff's safety evaluation—to the extent necessary—to ensure that the expected scope of information to be included in a COLA is adequately addressed in the DCD, ESP and/or in the COL FSAR.
- For sections that were completely incorporated by reference without any supplements or departures, the SER simply points to the ESBWR DCD and the related NUREG–1966 to confirm that all relevant review items are addressed in the ESBWR DCD and the staff's evaluation is documented in NUREG–1966.
- Staff made its safety determinations on specific COLA items based on the applicants FSAR revision and the DCD revision in which final staff conclusions were made. For example the staff SER with Open Items was based on FSAR Revision 2 and DCD Revision 5. Open items were closed and information confirmed based on FSAR Revision 8 and DCD Revision 10. The final FSAR Revision 9, submitted in June, 2016 included all changes based on staff review of final confirmatory items principally from the seismic re-evaluations changes and confirmed by the staff as discussed in the staff FSER for North Anna 3.
- For subject matter within the scope of the COLA that supplements or departs from the DCD, this SER generally follows a six-section organization as follows:
  - “Introduction,” which provides a brief overview of the specific subject matter.
  - “Summary of Application,” which identifies whether portions of the review have received finality and clearly identify the scope of the COL review.
  - “Regulatory Basis,” which identifies the regulatory criteria for the information addressed by the COLA.
  - “Technical Evaluation,” which focuses on the information addressed by the COLA.
  - “Post Combined License Activities,” which identifies the proposed license conditions, the ITAAC, or the FSAR information commitments that are post COL activities.
  - “Conclusion,” which summarizes how the technical evaluation resulted in a reasonable assurance determination by the staff on the basis that the relevant acceptance criteria have been met.

## **1.4 Staff Review of North Anna 3 COL FSAR Chapter 1:**

### **1.4.1 Introduction**

There are two types of information in Chapter 1 of the North Anna 3 COL FSAR:

- General information that enables the reviewer or reader to obtain a basic understanding of the overall facility without having to refer to the subsequent chapters. A review of the remainder of the application can then be completed with a better perspective and recognition of the relative safety significance of each individual item in the overall plant description.
- Specific information relating to qualifications of the applicant, construction impacts, and regulatory considerations that applies throughout the balance of the application (e.g., conformance with the acceptance criteria in the SRP).

This section of the Chapter 1 SER (1) identifies the information in Chapter 1 incorporated by reference, (2) summarizes all of the new information, and (3) documents the staff's evaluation of the sections addressing regulatory considerations.

### **1.4.2 Summary of Application**

The information related to COL and supplemental (SUP) items included in Chapter 1 of the North Anna 3 COL FSAR includes either statements of fact or information recommended in RG 1.206. No staff technical evaluation was necessary where the statements were strictly background information. However, where technical evaluation of these COL/SUPs was necessary, the evaluation is not in this SER section, but in subsequent sections as referenced below.

#### Section 1.1 – Introduction

Section 1.1 of the North Anna 3 FSAR, Revision 8, incorporates by reference Section 1.1 of the ESBWR DCD, Revision 10.

In addition, in COL FSAR Section 1.1, the applicant provides the following:

#### COL Item:

- NAPS COL 1.1-1-A

The applicant provides information regarding the site-specific values for the North Anna 3 power output.

#### Supplemental Information:

- NAPS SUP 1.1-1 and NAPS SUP 1.1-2

The applicant provides supplemental information that includes general information regarding format and content of the application. The applicant provides a description of incorporating by reference the North Anna ESPA (Early Site Permit Application) SSAR. The applicant also

identifies systems and structures outside the scope of the ESBWR standard plant that are discussed in the applicable chapter (i.e., Chapters 2 through 20) of this SER.

- NAPS SUP 1.1-3

The applicant indicates that the Virginia Electric and Power Company was submitting the application to the NRC under Section 103 of the Atomic Energy Act of 1954, as amended, (the Act) to construct and operate a nuclear plant to be located on the existing North Anna site in Louisa County, Virginia.

- NAPS SUP 1.1-4

The applicant incorporates by reference the North Anna ESPA SSAR Section 2.1.1.1 to provide a description of the plant location.

- NAPS SUP 1.1-5

The applicant provides the anticipated schedule for the construction and operation of the North Anna 3 plant.

Conceptual Design Information:

- NAPS CDI

The applicant indicates that FSAR Figure 2.1-201 provides the orientation of the principal North Anna 3 plant structures.

Section 1.2 – General Plant Description

Section 1.2 of the North Anna 3 FSAR, Revision 8, incorporates by reference Section 1.2 of the ESBWR DCD, Revision 10.

In addition, in COL FSAR Section 1.2, the applicant provides the following:

Departure Not Requiring NRC Approval:

- NAPS DEP 11.4-1

The applicant states that the radwaste building is configured to accommodate at least 10 years of packaged Class B and Class C waste and approximately 3 months of packaged Class A waste based on routine operations and anticipated operational occurrences. The applicant also provides the revised radwaste building elevation plans in Figures 1.2-21R to 1.2-25R, which contain security-related information and are therefore withheld under 10 CFR 2.390. This departure is discussed and reviewed in Chapter 11 of this SER.

Supplemental Information:

- STD SUP 1.2-1

The applicant provides a general statement regarding modular construction techniques to be used during ESBWR construction.

Conceptual Design Information:

- STD and NAPS CDI

The applicant provides CDI regarding the general plant descriptions of the main turbine, main condenser, plant service water system, hydrogen water chemistry system, zinc injection system, and freeze protection as well as other building structures. This information is discussed in the applicable chapter (i.e., Chapters 2 through 20) of this SER.

Section 1.3 – Comparison Tables

Section 1.3 of the North Anna 3 COL FSAR, Revision 8, incorporates by reference Section 1.3, “Comparison Tables”, of the ESBWR DCD, Revision 10. In addition, in COL FSAR Section 1.3 the applicant provides the following:

Departure Requiring NRC Approval:

- NAPS DEP 3.7-1

The applicant has provided information for a departure regarding ground response spectra for seismic structural loads and floor response spectra in Table 1.3-4R “Comparison of Structural Design Characteristics.” This departure is discussed and reviewed in Chapter 3 and Section 3.7 of this SER.

COL Item:

- NAPS COL 1.3-1-A

The applicant states that there are no updates to DCD Tier 2, Table 1.3-1 based on unit-specific information.

Section 1.4 – Identification of Agents and Contractors

Section 1.4 of the North Anna 3 COL FSAR, Revision 8, incorporates by reference Section 1.4, “Identification of Agents and Contractors”, of the ESBWR DCD, Revision 10.

In addition, in COL FSAR Section 1.4, the applicant provides the following:

Supplemental Information:

- NAPS SUP 1.4-1

The applicant provides additional information to identify Dominion (the applicant) as the licensee and operator of North Anna 3. Dominion also identifies GE-Hitachi Nuclear Energy Americas,

LLC (GEH) as the primary contractor for the design of the unit, preparation of the COLA, and will support deployment of the ESBWR design on the North Anna 3 site. Dominion has identified Fluor Corporation (Flour) as the primary contractor for site engineering, along with construction of the turbine island and the nuclear island. Other contractors are listed for the environmental, geotechnical, and seismic hazard analysis support.

#### Section 1.5 Requirements for Further Technical Information

Section 1.5 of the North Anna 3 COL FSAR, Revision 8, incorporates by reference Section 1.5 of the ESBWR DCD, Revision 10.

#### Supplemental Information:

- CWR SUP 1.5-1

The applicant provides information regarding Post-Fukushima Near-Term Task Force Recommendations.

#### Section 1.6 – Material Incorporated by Reference

Section 1.6 of the North Anna 3 COL FSAR, Revision 8, incorporates by reference Section 1.6, “Material Incorporated By Reference,” of the ESBWR DCD, Revision 10.

In addition, in COL FSAR Section 1.6, the applicant provides the following:

#### Supplemental Information:

- NAPS SUP 1.6-1

Table 1.6-201 lists technical reports (TRs) not included in DCD Section 1.6 that are incorporated by reference in whole or in part into the North Anna 3 FSAR.

#### Section 1.7 – Drawings and Other Detailed Information

Section 1.7 of the North Anna 3 COL FSAR, Revision 8, incorporates by reference Section 1.7 of the ESBWR DCD, Revision 10.

In addition, in COL FSAR Section 1.7, the applicant provides the following:

#### Departures Requiring NRC Approval:

- NAPS DEP 8.1-1

The applicant has provided information for a departure regarding the electrical power distribution system in FSAR Table 1.7-201. This departure is discussed and reviewed in Chapter 8 of this SER.

- NAPS DEP 12.3-1

The applicant has provided information for a departure regarding the liquid radwaste effluent discharge piping flow path in FSAR Table 1.7-202. This departure is discussed and reviewed in Chapters 11 and 12 of this SER.

Departure Not Requiring NRC Approval:

- NAPS DEP 11.4-1

The applicant has provided information for a departure regarding the long-term, temporary storage of Class B and C low-level radioactive waste in FSAR Table 1.7-202. This departure is discussed and reviewed in Chapter 11 of this SER.

Supplemental Information:

- NAPS SUP 1.7-1

FSAR Table 1.7-201 supplements DCD Table 1.7-2 for those portions of the electrical system configuration drawings outside the scope of the DCD. FSAR Table 1.7-202 supplements DCD Table 1.7-3 for those portions of the mechanical system configuration drawings outside the scope of the DCD. In addition, COL Item 1.7-1-H was deleted from the referenced DCD.

Section 1.8 – Interfaces with Standard Design and Early Site Permits

Section 1.8 of the North Anna 3 COL FSAR, Revision 8, incorporates by reference Section 1.8, “Interfaces with Standard Design,” of the ESBWR DCD, Revision 10.

In addition, in COL FSAR Section 1.8, the applicant provides the following:

Supplemental Information:

- NAPS SUP 1.8-1

The applicant states that information in FSAR Chapter 2 demonstrates that the site characteristics fall within the ESBWR site parameters specified in the referenced certified design. The applicant also states that FSAR Chapter 2 provides information that the facility falls within the North Anna site characteristics and bounding design parameters for the referenced ESP.

- NAPS SUP 1.8-2

The applicant states that Section 1.10 identifies specific FSAR sections that address the COL information items from the referenced certified design, and the COL action items and Permit Conditions from the ESP.

- NAPS SUP 1.8-3

The applicant has provided FSAR Table 1.8-201 that identifies the site-specific departures taken from the referenced certified design. These departures are fully described in Part 7 of the COLA and listed in FSAR Table 1.8-201. These departures are evaluated in the respective Chapters of this SER.

- NAPS SUP 1.8-4

The applicant has provided FSAR Table 1.8-202 which identifies the requested variances from the referenced ESP. These variances are fully described in Part 7 of the COLA and evaluated in the respective Chapters of this SER.

- NAPS SUP 1.8-5

The applicant includes FSAR Table 1.8-203, which identifies systems that either adopt the CDI in the DCD as the actual system design information or replace the CDI in the DCD with site-specific design information. Information adopted from the DCD is evaluated by the NRC in NUREG-1966. Information replaced by site-specific design information is evaluated in the applicable chapters of this SER (i.e., Chapters 2 through 20).

- NAPS SUP 1.8-6

The FSAR states that the applicant reviewed site- and plant-specific information that included North Anna site meteorological data, site-specific population distribution, and plant-specific design information that replaced CDI described in the DCD with respect to the DC probabilistic risk assessment (PRA). FSAR Section 19.5 documents the conclusion that there is no significant change from the certified design PRA. The staff's evaluation is in Section 19.5 of this SER.

- NAPS SUP 1.8-7

The applicant states that there are no current plans for an independent North Anna 3 spent ISFSI.

Conceptual Design Information:

- STD CDI

The applicant states that DCD Tier 1 identifies significant interface requirements for those systems that are beyond the scope of the DCD.

Section 1.9 – Conformance with Standard Review Plan and Applicability of Codes and Standards

Section 1.9 of the North Anna 3 COL FSAR, Revision 8, incorporates by reference Section 1.9, “Conformance with Standard Review Plan and Applicability of Codes and Standards,” of the ESBWR DCD, Revision 10.

In addition, in COL FSAR Section 1.9, the applicant provides the following:

COL Item:

- NAPS COL 1.9-3-A

The applicant adds three FSAR tables. Table 1.9-201 evaluates conformance with the SRP sections and the Branch Technical Positions that were in effect 6 months before submitting the COLA. Table 1.9-202 evaluates conformance with Division 1, 4, 5, and 8 RGs in effect 6 months before submittal of the COLA. Table 1.9-203 evaluates conformance with FSAR content information and format guidance in RG 1.206.

Supplemental Information:

- NAPS SUP 1.9-1

The applicant provides FSAR Table 1.9-204, which identifies the industrial codes and standards applicable to those portions of the North Anna 3 design that are beyond the scope of the DCD and to the operational aspects of the facility.

- NAPS SUP 1.9-2

The applicant provides FSAR Table 1.9-205, which addresses operational experience information as described in the applicable NUREG and NUREG/CR reports, for those portions of the North Anna 3 design and operation that are beyond the scope of the ESBWR DCD. The comment column of Table 1.9-205 includes a reference to the applicable FSAR section that provides further discussion of the operational experience.

Departure Not Requiring NRC Approval:

- NAPS DEP 8.1-2

The applicant has provided information for a departure regarding their switchyard and lightning protection system as it relates to RG 1.204, "Guidelines for Lightning Protection of Nuclear Power Plants." This departure is discussed in Chapter 8 of this SER.

- NAPS DEP 11.4-1

The applicant has provided information for a departure regarding the long-term, temporary storage of Class B and C low-level radioactive waste in FSAR Table 1.9-11R. This departure is discussed in Chapter 11 of this SER.

Section 1.10 – Summary of COL Items

Section 1.10 of the North Anna 3 COL FSAR, Revision 8, incorporates by reference Section 1.10, "Summary of COL Items," of the ESBWR DCD, Revision 10.

In addition, in COL FSAR Section 1.10, the applicant provides the following:

Supplemental Information:

- NAPS SUP 1.10-1

The applicant includes FSAR Table 1.10-201, which lists the FSAR locations that address the individual COL items from the DCD and FSAR Table 1.10-202 which lists the FSAR locations that address the individual COL items and permit conditions from the ESP.

Section 1.11 – Technical Resolutions of Task Action Plan Items, New Generic Issues, New Generic Safety Issues, and Chernobyl Issues

Section 1.11 of the North Anna 3 COL FSAR, Revision 8, incorporates by reference Section 1.11, “Technical Resolutions of Task Action Plan Items, New Generic Issues, New Generic Safety Issues and Chernobyl Issues,” of the ESBWR DCD, Revision 10.

In addition, in COL FSAR Section 1.11, the applicant provides the following:

COL Items:

- NAPS COL 1.11-1-A

The applicant provides FSAR Table 1.11-201, which supplements DCD Table 1.11-1 to address the site-specific aspects of activities required by the action plan that the COL applicant must complete (i.e., Note 2) and environmental issues that are outside the scope of the DCD (i.e., Note 7). The staff’s technical evaluations of these topics are addressed in the environmental report in the staff’s Supplemental Environmental Impact Statement in NUREG–1917 and the relevant sections of this SER.

Supplemental Information:

- NAPS SUP 1.11-1 and NAPS SUP 1.11-2

The applicant adds FSAR Table 1.11-202, which supplements DCD Table 1.11-1 with references to FSAR locations that provide additional information on specific issues. In addition, the applicant adds references to new generic issues from NUREG–0933, “A Prioritization of Generic Safety Issues,” through Supplement 34.

Section 1.12 – Impact of Construction Activities on Units 1 and 2

The applicant includes a supplemental information section not provided in the referenced DCD, which addresses an evaluation of the impacts from North Anna 3 construction activities on North Anna 1 and 2.

In addition, in COL FSAR Section 1.12, the applicant provides the following:

COL Item:

- NAPS ESP COL 2.4-1

The applicant has provided information to address ESP COL Item 2.4-1. This item requires the COL applicant to provide for NRC review the layout of intake and discharge tunnels and the construction techniques to be used before construction activities begin. The staff reviewed this information in Chapter 2 of this SER.

Supplemental Information:

- NAPS SUP 1.12-1

The applicant provides FSAR Section 1.12, which summarizes the applicant's evaluation of the potential impact from the construction of North Anna 3 on North Anna 1 and 2 SSCs important to safety. Section 1.12 also describes the managerial and administrative controls used to provide assurance that North Anna 1 and 2 limiting conditions for operation (LCOs) will not be exceeded as a result of North Anna 3 construction activities. This evaluation involved the following sequential steps:

- Identification of potential construction activity hazards
- Identification of SSCs important to safety
- Identification of LCOs
- Identification of impacted SSCs and LCOs
- Identification of applicable managerial and administrative controls

Appendices 1A – 1D

The applicant has provided four appendices which contain information that the staff has identified and evaluated in Section 1.4.4 below.

### **1.4.3 Regulatory Basis**

The regulatory basis of the information incorporated by reference is in NUREG–1966, NUREG-1811, and NUREG–1917. In addition, the relevant requirements of the Commission regulations for the information in FSAR Chapter 1, and the associated acceptance criteria, are in SRP Section 1.0.

The applicable regulatory requirements are as follows:

- 10 CFR 50.43(e), as it relates to requirements for approving applications for a DC, COL, manufacturing license, or operating license that proposes nuclear reactor designs that differ significantly from light-water reactor designs licensed before 1997 or that use simplified, inherent, passive, or other innovative means to accomplish their safety functions.
- 10 CFR 52.77 and 10 CFR 52.79, as they relate to general introductory matters.

- 10 CFR 52.79(a)(17), as it relates to compliance with technically relevant positions of the Three Mile Island (TMI) requirements.
- 10 CFR 52.79(a)(20), as it relates to proposed technical resolutions of those unresolved safety issues and medium- and high-priority generic safety issues that are identified in the current version of NUREG–0933 on the date up to 6 months before the docket date of the application and that are technically relevant to the design.
- 10 CFR 52.79(a)(31), as it relates to nuclear power plants that will be operated on multiunit sites and to an evaluation of potential hazards to the SSCs important to safety of operating units resulting from construction activities; in addition to providing a description of the managerial and administrative controls to be used to provide assurance that the LCO will not be exceeded as a result of construction activities at the multiunit sites.
- 10 CFR 52.79(a)(37), as it relates to the information necessary to demonstrate how operating experience insights are incorporated into the plant design.
- 10 CFR 52.79(a)(41), as it relates to an evaluation of the application against the applicable NRC review guidance in effect 6 months before the docket date of the application.
- 10 CFR 52.79(d)(2), which requires that for a COL referencing a standard DC, the FSAR must demonstrate that the interface requirements established for the design under 10 CFR 52.47, “Contents of applications; technical information,” have been met.
- 10 CFR 52.97(a)(1)(iv), which states that an applicant is technically and financially qualified to engage in the activities authorized.

The related acceptance criteria are as follows:

- There are no specific SRP acceptance criteria associated with the general requirements.
- For regulatory considerations, acceptance is based on addressing the regulatory requirements discussed in FSAR Chapter 1 or in the FSAR section referenced in Chapter 1. The SRP acceptance criteria associated with the referenced section will be reviewed within the context of that review.
- For the performance of new safety features, the FSAR information should be sufficient to provide reasonable assurance that (1) the new safety features will perform as predicted in the applicant's FSAR; (2) the effects of system interactions are acceptable; and (3) the applicant's data are sufficient to validate analytical codes. The design qualification testing requirements may be met with either separate effects or integral system tests; prototype tests; or a combination of tests, analyses, and operating experience.
- For conformance with regulatory criteria, RG 1.206 states that an applicant should perform an evaluation for conformance with the RGs that were in effect 6 months before the submittal of the COLA.

#### 1.4.4 Technical Evaluation

As documented in NUREG–1966, the staff reviewed and approved Chapter 1 of the certified ESBWR DCD. The staff also reviewed Chapter 1 of the North Anna 3 COL FSAR, Revision 8, and checked the referenced ESBWR DCD to ensure that the combination of the information in the COL FSAR and the information in the ESBWR DCD represents the complete scope of information relating to this review topic<sup>2</sup>. The staff's review confirms that information in the application and information incorporated by reference address the required information related to this chapter.

The staff notes that the information in the following sections of North Anna 3 FSAR Chapter 1 is for general informational purposes, and no specific technical or regulatory findings are made within the review scope of SER Chapter 1. The applicant's information in these sections are used as reference material to support the staff's technical reviews in Chapters 2 through 20 of this SER.

The staff reviewed the information in the North Anna 3 COL FSAR as follows:

##### Section 1.1 – Introduction

In this section, the applicant briefly discusses the principal aspects of the overall application. There are no specific SRP acceptance criteria related to the general information in Section 1.1 and no specific regulatory findings. The applicant's information gives the reader a basic overview of the nuclear power plant and the construct of the North Anna 3 FSAR itself. The applicant also identifies systems and structures outside the scope of the ESBWR standard plant that are discussed in the applicable chapter (i.e., Chapters 2 through 20) of this SER. The staff finds that the applicant's information provided in FSAR Section 1.1 is acceptable within the review scope of Chapter 1 and satisfies RG 1.206, Regulatory Position C.I.1.1.

##### Section 1.2 – General Plant Description

In this section, the applicant summarizes the principal characteristics of the site and describes the facility. There are no specific SRP acceptance criteria related to the general information in FSAR Section 1.2 and no specific regulatory findings. The applicant's information gives the reader a general plant description. The staff finds that the applicant's information provided in FSAR Section 1.2 is acceptable within the review scope of Chapter 1 and satisfies RG 1.206, Regulatory Position C.I.1.2.

##### Departure Not Requiring NRC Approval:

- NAPS DEP 11.4-1

The staff notes the following for Departure NAPS DEP 11.4-1 identified in this section:

The applicant states that the radwaste building is configured to accommodate at least 10 years of packaged Class B and Class C waste and approximately 3 months of packaged Class A

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<sup>2</sup> See "Finality of Referenced NRC Approvals" in this SER Section 1.2.2 for a discussion on the staff's review related to verification of the scope of information to be included in a COL application that references a design certification.

waste based on routine operations and anticipated operational occurrences. The applicant also provides the revised radwaste building elevation plans in Figures 1.2-21R to 1.2-25R. This departure is discussed in Chapter 11 of this SER.

Conceptual Design Information:

- STD and NAPS CDI

The applicant provides CDI regarding the general plant descriptions of the main turbine, main condenser, plant service water system, hydrogen water chemistry system, zinc injection system, and freeze protection as well as other building structures. The CDI information presented in this section is discussed in the applicable chapter (i.e., Chapters 2 through 20) of this SER.

Section 1.3 – Comparison Table

In this section, the applicant provides information regarding a comparison with other facilities of a similar design and comparable power level. There are no specific SRP acceptance criteria related to the general information in Section 1.3 and no specific regulatory findings. The staff finds that the applicant's information provided in FSAR Section 1.3 is acceptable within the review scope of Chapter 1 and satisfies RG 1.206, Regulatory Position C.I.1.3.

Departure Requiring NRC Approval:

- NAPS DEP 3.7-1

The applicant has provided information for a departure regarding ground response spectra for seismic structural loads and floor response spectra in Table 1.3-4R "Comparison of Structural Design Characteristics." This departure is discussed and reviewed in Section 3.7 of this SER.

COL Item:

- NAPS COL 1.3-1-A

The applicant provided North Anna 3 COL 1.3-1-A, which states that there are no updates to DCD Table 1.3-1 based on unit-specific information. The staff finds that the applicant's information satisfies COL Item 1.3-1-A, and the information in FSAR Section 1.3 is acceptable within the review scope of Chapter 1 and satisfies RG 1.206, Regulatory Position C.I.1.3.

Section 1.4 – Identification of Agents and Contractors

This section identifies primary agents or contractors for the design, construction, and operation of the nuclear power plant. SRP Section 1.4 does not identify specific acceptance criteria related to the general information in Section 1.4 or specific regulatory findings. The quality assurance measure applied to these agents or contractors are specified in Chapter 17 of the FSAR. The staff finds that the applicant's information provided in FSAR Section 1.4 is acceptable within the review scope of Chapter 1 and satisfies RG 1.206, Regulatory Position C.I.1.4.

Supplemental Information:

- NAPS SUP 1.4-1

The staff notes the following for NAPS SUP 1.4-1 identified in this section:

In accordance with RG 1.206, Regulatory Position C.I.1.4, “Identification of Agents and Contractors,” the applicant’s supplemental information identifies the primary agents for the design, construction, and operation of the proposed facility with the exception of contractors for the site engineering and for the construction of the Turbine Island and nuclear island. In addition, the applicant delineates the division of responsibility among the contractors cited in the FSAR.

North Anna 3 FSAR Chapter 17, “Quality Assurance [QA],” and the North Anna 3 Quality Assurance Program Description (QAPD) describe the Dominion QA Program and QA controls for contractors performing safety-related work activities associated with the North Anna 3 COLA. The staff’s evaluation of Chapter 17 of the North Anna 3 FSAR is in Chapter 17 of this SER.

Section 1.5 – Requirements for Further Technical Information

In this section, an applicant who does not reference a certified design should provide information to demonstrate the performance of new safety features. The North Anna 3 application references the ESBWR DCD application. There are no specific SRP acceptance criteria related to the general information in Section 1.5 and no specific regulatory findings. The applicant incorporates by reference Section 1.5 of the ESBWR DCD. Per RG 1.206, Regulatory Position C.I.1.5, only an applicant who does not reference a certified design would need to provide additional information for this section. The staff finds that the applicant’s information provided in FSAR Section 1.5 is acceptable within the review scope of Chapter 1 and satisfies RG 1.206, Regulatory Position C.I.1.5.

Supplemental Information:

- CWR SUP 1.5-1

The applicant provides summary information regarding Post-Fukushima Near-Term Task Force Recommendations with respect to the ESBWR design and North Anna 3. The staff’s evaluation of Fukushima Recommendations 2.1, 4.2, 7.1, and 9.3 for the North Anna 3 COLA are provided in Chapter 20 of the SER as stated in Section 1.1, Summary of Application, above.

Section 1.6 – Material Incorporated by Reference

In this section, an applicant provides a tabulation of all TRs that are incorporated by reference as part of the application. There are no specific SRP acceptance criteria related to the general information in Section 1.6 and no specific regulatory findings. The staff finds that the applicant’s information provided in FSAR Section 1.6 is acceptable within the review scope of Chapter 1 and satisfies RG 1.206, Regulatory Position C.I.1.6.

COL Item:

- NAPS SUP 1.6-1

In site-specific COL Item NAPS SUP 1.6-1, the applicant includes FSAR Table 1.6-201 which lists the TRs that are incorporated by reference in whole or in part into the FSAR that were not included in ESBWR DCD, Section 1.6. The incorporation of these TRs are discussed accordingly within the relevant Sections of this SER.

Section 1.7 – Drawings and Other Detailed Information

In this section, the applicant provides a tabulation of all instrument and control functional diagrams cross-referenced to the related application sections. There are no specific SRP acceptance criteria related to the general information in Section 1.7 and no specific regulatory findings. The staff finds that the applicant's information provided in FSAR Section 1.7 is acceptable within the review scope of Chapter 1 and satisfies RG 1.206, Regulatory Position C.I.1.7.

Departures Requiring NRC Approval:

- NAPS DEP 8.1-1

The applicant has provided information for a departure regarding the electrical power distribution system in FSAR Table 1.7-201. This departure is discussed and reviewed in Chapter 8 of this SER.

- NAPS DEP 12.3-1

The applicant has provided information for a departure regarding the liquid radwaste effluent discharge piping flow path in FSAR Table 1.7-202. This departure is discussed and reviewed in Chapters 11 and 12 of this SER.

Departure Not Requiring NRC Approval:

- NAPS DEP 11.4-1

The applicant has provided information for a departure regarding the long-term, temporary storage of Class B and C low-level radioactive waste in FSAR Table 1.7-202. This departure is discussed in Chapter 11 of this SER.

Supplemental Information:

- NAPS SUP 1.7-1

NAPS SUP 1.7-1, includes FSAR Tables 1.7-201 and 1.7-202, which list the supplemental drawings of electrical system and mechanical system configurations, in addition to the information in ESBWR DCD, Tables 1.7-2 and 1.7-3.

## Section 1.8 – Interfaces with Standard Design and Early Site Permits

In this section, an applicant who references a certified design has to satisfy interface requirements established for the certified design. There are no specific SRP acceptance criteria related to the general information in Section 1.8 and no specific regulatory findings. The staff finds that the applicant's information provided presented in FSAR Section 1.8 is acceptable within the review scope of Chapter 1 and satisfies RG 1.206, Regulatory Position C.I.1.8.

The applicant provides the following supplemental information and CDI:

### Supplemental Information:

- NAPS SUP 1.8-1

The applicant states that FSAR Chapter 2 provides information demonstrating that site characteristics fall within the ESBWR site parameters specified in the referenced certified design. The review of the site characteristics is in Chapter 2 of this SER.

- NAPS SUP 1.8-2

The applicant states that FSAR Section 1.10 identifies specific sections that address the COL information items from the referenced certified design and the COL action items. The review of the COL items listed in Table 1.10-201 is in the applicable chapter (i.e., Chapters 1 through 19) of this SER.

- NAPS SUP 1.8-3

The applicant identifies site-specific departures from the referenced certified design, which are fully described in Part 7 of the COLA. The applicant provides Table 1.8-201 to identify FSAR sections affected by the requested departures listed in Part 7 of the COLA. These departures are evaluated in their respective Chapters throughout this SER.

- NAPS SUP 1.8-4

The applicant has provided FSAR Table 1.8-202 which identifies the requested variances from the referenced ESP. These variances are fully described in Part 7 of the COLA and evaluated in their respective Chapters throughout this SER.

- NAPS SUP 1.8-5

The applicant provides FSAR Table 1.8-203, which identifies systems that either adopt the CDI in the DCD as the actual system design information or replace the CDI in the DCD with site-specific design information. The table also includes cross references to FSAR sections that address the CDI. The DCD CDI that the applicant replaced with site-specific design information is reviewed in the applicable chapters of this SER (i.e., Chapters 1 through 19).

- NAPS SUP 1.8-6

As stated above, the applicant's review of site- and plant-specific information is in FSAR Section 19.5. The staff's review of the applicant's PRA conclusion is evaluated in Section 19.5 of this SER.

- NAPS SUP 1.8-7

As stated above, the applicant does not provide information pertaining to the ISFSI because no North Anna 3 ISFSI is currently planned. Therefore, the staff is not reviewing information associated with this supplemental information item.

Conceptual Design Information:

- STD CDI

The applicant states that DCD Tier 1 identifies significant interface requirements for those systems that are beyond the scope of the DCD. As indicated above in the evaluation of Supplemental Information NAPS SUP 1.8-5, the system design information is in FSAR Table 1.8-203 and evaluated in the applicable chapters of this SER.

Section 1.9 – Conformance with Standard Review Plan and Applicability of Codes and Standards

This FSAR section provides the information required by 10 CFR 52.47(a)(9) showing conformance with the SRP and applicable codes and standards. The section summarizes deviations from each SRP section and regulatory criteria (i.e., Division 1, 4, 5, and 8 RGs; RG 1.206; and industrial codes and standards). In addition, this section provides information on the applicability of operational experience. The staff finds that the applicant's information provided in FSAR Section 1.9 is acceptable within the review scope of Chapter 1 and satisfies RG 1.206, Regulatory Position C.I.1.9.

COL Item:

- NAPS COL 1.9-3-A

The applicant provides additional information in FSAR Tables 1.9-201 through 1.9-203 that evaluate the conformance of technical information in the North Anna 3 FSAR with the SRP and applicable regulatory criteria. The staff evaluated the information in Section 1.9 as part of the technical evaluations in Chapters 2 through 20 of this SER, as needed.

Supplemental Information:

- NAPS SUP 1.9-1

As stated earlier, the applicant provides additional information in FSAR Table 1.9-204 that lists the industrial codes and standards applicable to those portions of the North Anna 3 design that are beyond the scope of the ESBWR DCD and are applicable to the operational aspects of the facility. This table also identifies additional codes and standards referenced in various chapters

of the COLA. The staff's technical evaluations of the additional industrial codes and standards are in the relevant chapters of this SER.

- NAPS SUP 1.9-2

In FSAR Table 1.9-205, the applicant provides additional information on the operational experience applicable to North Anna 3. The staff finds that the applicant has provided sufficient information to address conformance with the operational experience information, as described in applicable NUREG reports, for those portions of the North Anna 3 design and operation that are beyond the scope of the ESBWR DCD. The staff's technical evaluations of the applicable operational experience are in the relevant chapters of this SER.

Departures Not Requiring NRC Approval:

- NAPS DEP 8.1-2

The applicant has provided information for a departure regarding their switchyard and lightning protection system as it relates to RG 1.204. This departure is discussed in Chapter 8 of this SER.

- NAPS DEP 11.4-1

The applicant has provided information for a departure regarding the long-term, temporary storage of Class B and C low-level radioactive waste in FSAR Table 1.9-11R. This departure is discussed in Chapter 11 of this SER.

Section 1.10 – Summary of COL Items

The applicant's supplemental information in this section specifies NAPS SUP 1.10-1 which provides FSAR Table 1.10-201 and Table 1.10-202. These tables list the COL items from both the DCD and ESP along with the permit conditions from the ESP. The ESBWR DCD and the North Anna ESP describe the information for each COL item that the COL applicant needs to provide in the application that include site-specific information; information related to operational program descriptions; and other required information to support the construction and operation of an ESBWR standard design at the North Anna 3 site. FSAR Table 1.10-201 lists the COL items and the proper references to the FSAR sections that describe each item. The applicant's supplemental information also includes FSAR Table 1.10-202 which identifies where the COL items and permit conditions identified in the ESP are addressed in the FSAR. The COL items and permit conditions listed in both of these tables are reviewed in the applicable chapter (i.e., Chapter 2 through Chapter 19) of this SER. There are no specific SRP acceptance criteria related to the general information in Section 1.10 and no specific regulatory findings. The staff finds that the applicant's information provided in FSAR Section 1.10 is acceptable within the review scope of Chapter 1.

Section 1.11 – Technical Resolutions of Task Action Plan Items, New Generic Issues, New Generic Safety Issues, and Chernobyl Issues

In accordance with 10 CFR 52.79(a)(20), this FSAR section provides technical resolutions of unresolved safety issues (USIs); new generic issues (GI); medium- and high-priority generic

safety issues (GSIs); human factor issues (HFIs); and Chernobyl issues identified in NUREG–0933 and its supplements.

COL Item:

- NAPS COL 1.11-1-A

In FSAR Section 1.11.1, the applicant provides Table 1.11-201 to supplement DCD Table 1.11-1 (Notes 2 and 7) and to address the site-specific aspects of activities required by the action plan that the COL applicant must complete (i.e., Note 2) and environmental issues that are outside the scope of the DCD (i.e., Note 7).

ESBWR DCD, Table 1.11-1 identifies Task Action Items (i.e., GI and USI) A-33, B-1, B-28, B-37 through B-43, and C-16 and the two new GIs: 184 requiring site-specific information and 199 which the applicant has included information in FSAR Section 3.7.1. These issues are mainly associated with the site-specific environmental concerns addressed in the site environmental report. The applicant provides the required information in Table 1.11-201 with appropriate references to various sections in Parts 2, 3, and 4 of the COLA. The staff's technical evaluations of these topics are addressed in the environmental reports of NUREG–1811 and NUREG–1917.

Supplemental Information:

- NAPS SUP 1.11-1 and NAPS SUP 1.11-2

In Table 1.11-202, the applicant provides supplemental information to DCD Table 1-11 on the issues in the TMI Action Plan that relate to staffing, qualifications, quality assurance, post-accident sampling, in-plant radiation monitoring, and shift staff HFI. The table identifies the FSAR sections where each issue is discussed. The staff's evaluations of these issues are in Chapters 12, 13, and 17 of this SER. In addition, the applicant provided references to new GIs 201, 202, and 203 to Table 1.11-201 as identified in NUREG–0933 through Supplement 24, December 2011.

The staff finds that the applicant's COL Item NAPS COL 1.11-1-A, and supplemental information NAPS SUP 1.11-1 and NAPS SUP 1.11-2 in FSAR Section 1.11 are acceptable and consistent with the guidance in the SRP and NUREG–0933 and the requirements of 10 CFR 52.79(a)(20). The staff finds that the applicant's information provided in FSAR Section 1.11 is acceptable within the review scope of Chapter 1 and satisfies RG 1.206, Regulatory Position C.1.1.9.3.

Section 1.12 – Impact of Construction Activities on Units 1 and 2

In this section of the SER, the applicant evaluates the potential hazards to the SSCs important to safety of the operating North Anna 1 and 2 that would result from future construction activities of North Anna 3. The applicant also describes the managerial and administrative controls to be used to provide assurance that the LCO will not be exceeded as a result of construction activities, in accordance with 10 CFR 52.79(a)(31). This section was pending the staff's review and previously identified as Open Item 1-2. The review has been completed and is presented below. This Open item is now considered closed.

COL Item:

- NAPS ESP COL 2.4-1

The applicant has provided information to address ESP COL Item 2.4-1. This item requires the COL applicant to provide for NRC review the layout of intake and discharge tunnels and the construction techniques to be used before construction activities begin. The applicant has provided a statement that they will provide this information for NRC review at least 60 days before the commencement of construction. The staff reviewed this information in Chapter 2, Section 2.4 of this SER and found that since the ESBWR is based on a passive-cooling design, that neither Lake Anna nor the piping to and from Lake Anna provide safety functions and, therefore, ESP COL Action Item 2.4-1 is no longer required. With respect to North Anna 3 construction activities affecting Units 1 and 2, the staff notes below that other mechanisms will be used by the licensee of the operating Units 1 and 2 to address these considerations and to ensure that potential impacts from the construction of a new North Anna 3 are precluded and/or mitigated.

Supplemental Information:

- NAPS SUP 1.12-1

The applicant provides FSAR Section 1.12 as supplemental information. Based on the Interim Staff Guidance (ISG) COL ISG-022, "Interim Staff Guidance on Impact of Construction (under a Combined License) of New Nuclear Power Plants Units on Operating Units at Multi-Unit Sites," the applicant should address the requirements of 10 CFR 52.79(a)(31) with respect to ISG-022.

The requirements in 10 CFR 52.79(a)(31) can be viewed as having two subparts:

1. The COL applicant must evaluate the potential hazards from constructing new plants on SSCs important to safety for existing operating plants located at the North Anna site (i.e., North Anna 1 and 2).
2. The COL applicant must evaluate the potential hazards from constructing new plants on SSCs important to safety for newly constructed plants that begin operation at the North Anna site. This subpart will not be applicable to North Anna 3.

The applicant has provided a construction impact evaluation plan that contains the following six elements discussed in the ISG:

- A discussion of the construction activity identification process and the impact evaluation criteria used to evaluate the construction activities that may pose potential hazards to the SSCs important to safety for operating unit(s).
- A table of those construction activities and the potential hazards that are identified using that construction impact evaluation plan, the SSCs important to safety for the operating unit potentially impacted by the construction activity, and proposed mitigation methods.
- Identification of the managerial and administrative controls, such as proposed license conditions that may involve construction schedule constraints or other restrictions on construction activities, that are credited to manage the safety/security interface and to

preclude and/or mitigate the impacts of potential construction hazards to the SSCs important to safety for the operating unit(s).

- A discussion of the process for communications and interactions planned and credited between the construction organization and the operations organization to ensure appropriate coordination and authorization of construction activities and implementation of the prevention or mitigation activities as necessary.
- A memorandum of understanding or agreement (MOU or MOA) between the COL applicant and the operating unit(s) licensee as a mechanism for communications, interactions, and coordination to manage the impact of the construction activities.
- An implementation schedule corresponding to construction tasks or milestones to ensure the plan is reviewed on a recurring basis and maintained current as construction progresses.

In NAPS SUP 1.12-1, the applicant has provided the following FSAR information with respect to each of the above six elements:

- A discussion of the construction activity identification process and the impact evaluation criteria used to evaluate the construction activities that may pose potential hazards to the SSCs important to safety for operating unit(s).

The process and criteria used to evaluate potential North Anna 3 construction hazards associated with North Anna 1 and 2 SSCs important to safety are discussed in FSAR Section 1.12. Section 1.12.1 specifically outlines a series of sequential steps that are discussed in further detail in FSAR Sections 1.12.2 through 1.12.6. These steps include the identification of potential construction activity hazards, SSCs important to safety, LCOs, impacted SSCs and LCOs, and applicable managerial and administrative controls.

- A table of those construction activities and the potential hazards that are identified using that construction impact evaluation plan, the SSCs important to safety for the operating unit potentially impacted by the construction activity, and proposed mitigation methods.

Using the identification and evaluation process described above, the applicant developed FSAR Table 1.12-201, "Potential Hazards to Units 1 and 2 from Unit 3 Construction Activities," which delineates the North Anna 3 construction activities; identifies the potential hazards using this evaluation; and describes the potentially impacted Unit 1 and 2. The applicant also developed FSAR Table 1.12-202, "Potential Consequences to Units 1 and 2 Due to Potential Hazards Resulting from Unit 3 Construction Activities," which describes the potential hazards and consequences specifically related to Units 1 and 2 SSCs. In addition, the applicant developed FSAR Table 1.12-203, "Managerial and Administrative Controls for Unit 3 Construction Activity Hazards," which delineates the proposed mitigation methods.

- Identification of the managerial and administrative controls such as the proposed license conditions that may involve construction schedule constraints or other restrictions on construction activities that are credited to manage the safety/security interface and to preclude and/or mitigate the impacts of potential construction hazards to the SSCs important to safety for the operating unit(s).

The managerial and administrative controls to manage the safety/security interface and to mitigate the impacts of potential North Anna 3 construction hazards to the Units 1 and 2 SSCs important to safety and security are discussed in Section 1.12.6, "Managerial and Administrative Controls," and in FSAR Table 1.12-203, "Managerial and Administrative Controls for North Anna 3 Construction Activity Hazards." FSAR Section 1.12.6 also states that there are additional controls established during construction as described and addressed in FSAR Section 13AA.1.9, "Management and Review of Construction Activities."

- A discussion of the process for communications and interactions planned and credited between the construction organization and the operations organization to ensure appropriate coordination and authorization of construction activities and implementation of the prevention or mitigation activities as necessary.

FSAR Table 1.12-203 provides the managerial and administrative controls for preventative and mitigation activities that outline the planned interactions between Units 1 and 2 and North Anna 3. In addition, FSAR Subsection 13.AA.1.9 includes a description of the process for Units 1 and 2 and North Anna 3 communications and interactions to ensure organizational coordination and authorization requirements for construction activities with potential Units 1 and 2 impacts, as well as implementation plans for the mitigation controls identified.

- A memorandum of understanding or agreement (MOU or MOA) between the COL applicant and the operating unit(s) licensee as a mechanism for communications, interactions, and coordination to manage the impact of the construction activities.

The North Anna 3 COL applicant and the Units 1 and 2 operating licensee are the same entity. Therefore, an MOU or MOA is not considered necessary.

- An implementation schedule corresponding to construction tasks or milestones to ensure the plan is reviewed on a recurring basis and maintained current as construction progresses.

FSAR Section 1.12.6 describes the identification of specific hazards, impacted SSCs, and managerial and administrative controls including safety/security interfaces to be developed and implemented as work progresses on the site. FSAR Table 1.12-201 describes the work progression via identification of construction activities. FSAR Subsection 13.AA.1.9 states that assessments will be performed to facilitate an implementation schedule for the administrative and managerial controls that correspond with the scheduled construction activities. The applicant also describes periodic assessments involving both Units 1 and 2 and North Anna 3 organizations to identify Units 1 and 2 SSCs that could be reasonably expected to be impacted by scheduled construction activities.

In conclusion, based on a review of the information discussed above, the staff finds that the applicant's Supplemental Information NAPS SUP 1.12-1 in FSAR Section 1.12 is acceptable and consistent with the six program elements of 10 CFR 52.79(a)(31) as expressed in COL ISG-022.

In addition, the staff notes that other mechanisms will be used by the licensee of the operating Units 1 and 2 to address these considerations and to ensure that potential impacts from the construction of a new North Anna 3 are precluded and/or mitigated. Examples include the 10 CFR 50.59 change process, the 10 CFR 50.65 risk assessment process, the 10 CFR 73.58

safety/security interface process, the technical specification change process, the EP change process, and the FSAR update process.

#### Appendix 1A – Response to TMI Matters

This FSAR Appendix supplements ESBWR DCD, Table 1A-1 with STD SUP 1A.1-1, which provides assessments of the TMI Action Plan items listed in 10 CFR 50.34(f). There are no specific SRP acceptance criteria related to the general information in FSAR Appendix 1A. The applicant provides supplemental information to DCD Table 1A-1 that addresses site-specific items related to construction, operations, and quality assurance. The detailed technical evaluations of these items are in Chapters 13 and 17 of this SER. The staff finds that the applicant's supplemental information provided in FSAR Appendix 1A is acceptable within the review scope of Chapter 1.

#### Appendix 1B – Plant Shielding To Provide Access to Areas and To Protect Safety Equipment for Post-Accident Operation [II.B.2]

The applicant has incorporated by reference this section of the DCD with no departures or supplements.

#### Appendix 1C – Industry Operating Experience

This FSAR Appendix supplements ESBWR Tables 1C-1 and 1C-2 with FSAR Tables 1C-201 and 1C-202. The DCD tables review industry operating experience issued in the Generic Letters (GL) and Bulletins (BL) that are potentially applicable to the ESBWR design or operation. These tables address GLs and BLs that were in effect/issued up to 6 months before a COLA submittal, and after the SRP revisions that are applicable to the FSAR. They also address GL 82-39 and Industry Experience (IE) BL 2005-02, which were identified in the DCD as the responsibility of the COL applicant. There are no specific SRP acceptance criteria related to the general information in Appendix 1C and no specific regulatory findings; however, the applicant provides its evaluation results in Table 1C-201. The applicant states that GL 82-39 is not applicable and is an administrative communication. The site has an approved procedure for handling SGI including how to mail such information to authorized recipients. IE Bulletin 2005-02 is discussed in the North Anna 3 COLA Part 5, Emergency Plan. The staff's evaluation of the Emergency Plan is in Section 13.3 of this SER.

#### Departure Not Requiring NRC Approval:

- NAPS DEP 11.4-1

In FSAR Table 1C-201, the applicant states under GL 81-38 that the radwaste building includes space for processing and storing low-level radioactive wastes. The radwaste building provides storage space for at least 10 years of packaged Class B and Class C wastes and approximately 3 months of packaged Class A waste. FSAR Section 11.4 provides additional information regarding the onsite storage of low-level radioactive wastes. This departure is discussed in Chapter 11 of this SER.

COL Items:

- STD COL 1C.1-1-A

In FSAR Table 1C-201, the applicant states that the site has an administrative procedure for handling SGI that meets the requirements of 10 CFR 73.21. This procedure also includes how to mail SGI to authorized recipients.

The staff finds that this response adequately addresses COL Item STD COL 1.C.1-1A, because the North Anna site has a procedure for handling SGI. However, the staff's review noted that ESBWR DCD Table 1C-1 conforms to the applicable GLs up to June 2006. The staff's review of the GLs in effect 6 months before the submittal date of the North Anna 3 COLA identified GL 2007-01, "Inaccessible or Underground Power Cable Failures that Disable Accident Mitigation Systems or Cause Plant Transients," as not listed in FSAR Table 1C-201. The staff's review finds that SER Section 8.2 evaluates the applicability of this GL to North Anna 3. According to SER Section 8.2, the applicant revised FSAR Section 17.6.4 to include the underground cable monitoring program regardless of the voltage. This FSAR section states that the condition monitoring underground or inaccessible cables is in the Maintenance Rule (MR) Program. The cable condition monitoring program incorporates lessons learned from industry operating experience (e.g., GL 2007-01); addresses regulatory guidance; and utilizes information from detailed design and procurement documents to determine the appropriate inspections, tests, and monitoring criteria for underground and inaccessible cables within the scope of the MR (10 CFR 50.65).

- STD COL 1C.1-2-A

In FSAR Table 1C-202, the applicant states that COLA Part 5 provides the North Anna 3 Emergency Plan. The staff finds that this response adequately addresses COL Item STD COL 1C.1-2-A. The staff's evaluation of the North Anna 3 Emergency Plan is in Section 13.3 of this SER.

STD SUP 1C-1 and NAPS SUP 1C-2, address GL 2007-01 and the staff has reviewed this information as discussed above.

In conclusion, the staff finds that the applicant's COL and supplemental information in FSAR Appendix 1.C is acceptable within the review scope of Chapter 1 and satisfies RG 1.206, Regulatory Position C.I.1.9.4.

Appendix 1D – Summary of Tier 2\* Information

This FSAR Appendix supplements ESBWR DCD Table 1D-1 with NAPS SUP 1AA.1-1, which provides the incorporation of the North Anna ESP SSAR Chapter 1 for historical purposes. There are no specific SRP acceptance criteria related to the general information in FSAR Appendix 1D. The staff finds that the supplemental information submitted by the applicant is acceptable with the review scope of Chapter 1.

**1.4.5 Post Combined License Activities**

There are no post COL activities applicable to this Section.

## **1.4.6 Conclusion**

The staff's finding related to information incorporated by reference is in NUREG-1966. The staff reviewed the application and checked the referenced DCD. The staff's review confirms that the applicant has addressed the required information; and no outstanding information is expected to be addressed in the COL FSAR related to these sections. Pursuant to 10 CFR 52.63(a)(5), all nuclear safety issues relating to these sections that were incorporated by reference have been resolved.

## **1.5 Additional Regulatory Requirements**

### **1.5.1 Financial Qualifications**

#### **1.5.1.1 Introduction**

By letter dated November 27, 2007, as supplemented on December 12, 2008, Virginia Electric and Power Company, doing business as Dominion, and Old Dominion Electric Cooperative (ODEC), submitted a COL application (Revision 1) for a proposed reactor at the North Anna site pursuant to 10 CFR Part 52, Subpart C, "Combined Licenses." In their submittal, Dominion and ODEC requested that the NRC issue a COL under Section 103 of the Act, for construction and operation of North Anna 3, which will be located in Louisa County, Virginia, approximately 40 miles north, northwest of Richmond.

Dominion and ODEC currently own NAPS, which includes the two existing nuclear units (Units 1 and 2) and an ISFSI at that site, as tenants in common, with respective undivided ownership interests of 88.4 and 11.6 percent. Dominion is the licensed operator of the existing facilities, with control of the North Anna site and authority to act as ODEC's agent. According to Revision 4 of the COLA, Dominion (hereafter, the applicant) has acquired sole title to the portion of the North Anna site on which North Anna 3 will be located, will own North Anna 3, and will construct and operate the proposed reactor.

The COLA incorporates by reference the GE-Hitachi Nuclear Energy Americas' ESBWR DCD, Revision 10. The codified version of the ESBWR DCR is contained in 10 CFR Part 52, Appendix E. The ESBWR DCR was published on October 15, 2014 (79 FR 61944) and is effective as of November 14, 2014. The ESBWR DCR references Revision 10 of the ESBWR DCD.

#### **1.5.1.2 Regulatory Evaluation**

The applicant's request for the NRC to issue a COL under Section 103 of the Act, as amended, for construction and operation of North Anna 3 is subject to, among other things, the requirements of the Act, as amended; Subpart C to 10 CFR Part 52; 10 CFR Part 50; and 10 CFR Part 140.

In its review, the staff used guidance in NUREG-1577, Revision 1, issued February 1999, to evaluate the financial qualifications of the applicant to construct, operate, and decommission the proposed facility.

In addressing foreign ownership, control, or domination (FOCD), the staff used guidance in the SRP, "Foreign Ownership, Control, or Domination of Applicants for Reactor Licenses," dated

June 1999 (SRP on FOCD), to determine whether the applicant is owned, controlled, or dominated by an alien, a foreign corporation, or a foreign government. The NRC published the SRP on FOCD in the *Federal Register* on September 28, 1999 (64 FR 52357–52359).

The staff also used guidance in NUREG–1307, Revision 15, “Report on Waste Burial Charges: Changes in Decommissioning Waste Disposal Costs at Low-Level Waste Burial Facilities,” to independently validate the licensee’s calculation of the minimum funding needed for decommissioning.

This safety evaluation documents the staff’s review and analysis of financial qualifications, decommissioning funding assurance, FOCD, and nuclear insurance and indemnity. In addition, this safety evaluation contains proprietary information that is withheld from public disclosure per 10 CFR 2.390 as commercially sensitive. Therefore, there will be both public and non-public versions of this safety evaluation with proprietary information marked with doubled brackets [[ ]].

### **1.5.1.3 Financial Qualifications**

Pursuant to 10 CFR 52.77, “Contents of applications; technical information,” the application must contain all of the information required in 10 CFR 50.33, “Contents of applications; general information.”

#### **Construction Costs**

Pursuant to 10 CFR 50.33(f)(1):

[T]he applicant shall submit information that demonstrates that the applicant possesses or has reasonable assurance of obtaining the funds necessary to cover estimated construction costs and related fuel cycle costs. The applicant shall submit estimates of the total construction costs of the facility and related fuel cycle costs, and shall indicate the source(s) of funds to cover these costs.

Under 10 CFR Part 50, Appendix C, “A Guide for the Financial Data and Related Information Required to Establish Financial Qualifications for Construction Permits and Combined Licenses,” Section I.A.1:

[E]ach applicant's estimate of the total cost of the proposed facility should be broken down as follows and be accompanied by a statement describing the bases from which the estimate is derived:

- (a) Total nuclear production plant costs; [and]
- (b) Transmission, distribution, and general plant costs; [and]
- (c) Nuclear fuel inventory cost for first core

If the fuel is to be acquired by lease or other arrangement than purchase, the application should so state. The items to be included in these categories should be the same as those defined in the applicable electric plant and nuclear fuel inventory accounts prescribed by the Federal

Energy Regulatory Commission [FERC] or an explanation given as to any departure therefrom.

In Part 1 of the COLA (Revision 4), the applicant provided projected overnight costs for the construction of one ESBWR nuclear unit at the North Anna site. Under 10 CFR 2.390, this information was withheld as information that is commercially confidential.

**PROJECTED PROJECT COST**  
**NORTH ANNA POWER STATION UNIT 3**  
**DOMINION VIRGINIA POWER**  
(In millions of 2013 \$)<sup>3</sup>

	<b><u>TOTAL</u></b>
Total Nuclear Production Plant Costs	[[ ]]
Transmission, Distribution & General Plant Costs	[[ ]]
Nuclear Fuel Inventory & Cost for First Core	[[ ]]
<b>TOTAL (OVERNIGHT COST)</b>	<b>[[ ]]</b>
Interest & Escalation	[[ ]]
Total w/ Interest & Escalation	<b>[[ ]]</b>

According to the applicants, North Anna 3 is expected to operate at an estimated gross electrical power output of approximately 1,594 MWe installed (as shown in DCD Section 10.1). Therefore, the total overnight cost of [[ ]] million is equivalent to [[ ]]/kWe installed. The applicants describe, in part, the foregoing cost estimate to be based on assumptions set forth in the application and attributable to the GE Hitachi ESBWR design.

The staff finds the applicant’s ESBWR overnight construction cost estimate to be a reasonable projection based on a number of studies<sup>4</sup> that have been conducted by governmental agencies, universities and other entities. In particular, the U.S. Energy Information Administration’s (EIA) June 2012 report, “Annual Energy Outlook (AEO) 2012 with Projections to 2035,” (DOE/EIA-0383(2012)), states that “...the overnight capital costs associated with building a nuclear power plant planned in 2012 are assumed to be \$5,335 per kilowatt of capacity...” The staff applied an annual adjustment factor ranging from 3% to 10% to the EIA overnight capital cost estimate to account for inflation beyond 2012, and determined that the EIA projected 2015 overnight cost would range from \$5,830 to \$7,101/kWe installed. The construction cost estimate is expressed in terms of “overnight cost,” which is a term commonly used in describing the cost of large capital projects<sup>5</sup>. As stated in the application, this overnight cost includes the engineering,

<sup>3</sup> Commercially sensitive data. The data in brackets is exempt from public disclosure under 10 CFR 2.390(a)(4).

<sup>4</sup> See, e.g., the 2003 the Massachusetts Institute of Technology (MIT) interdisciplinary study entitled The Future of Nuclear Power; the U.S. Department of Energy’s (EIA 2012 AEO; the Nuclear Energy Agency (NEA) of the Organization for Economic Cooperation and Development 2005 update on Projected Costs of Generating Electricity; and the Keystone Center 2007 report entitled Nuclear Power Joint Fact-Finding.

<sup>5</sup> overnight cost is the cost of a construction project if no interest was incurred during construction, as if the project was completed "overnight." An alternate definition is: the present value cost that would have to be paid as a lump sum up front to completely pay for a construction project. The overnight cost is frequently used when describing power plants.

procurement, and construction costs for the ESBWR plant, owner's costs, and contingencies, but excludes interest and escalation during the construction period. Owner's costs include site work and preparation, cooling water intake structures and cooling towers, import duties on components, insurance, spare parts, transmission interconnection, development costs, project management costs, owner's engineering, state and local permitting, legal fees, and staffing-related training. The applicant's overnight cost estimate of [[ ]]/kWe installed exceeds the most recent EIA 2012 range of overnight costs as adjusted for inflation. Accordingly, the staff finds Dominion's overnight cost estimate to be reasonable as presented in its COLA.

### **Sources of Construction Funds**

Pursuant to 10 CFR Part 50, Appendix C, I.A.2:

The application should include a brief statement of the applicant's general financial plan for financing the cost of the facility, identifying the source or sources upon which the applicant relies for the necessary construction funds, e.g., internal sources such as undistributed earnings and depreciation accruals, or external sources such as borrowings.

### **Dominion's Source of Construction Funds**

According to the application, Dominion plans to finance the cost to construct North Anna 3 through a combination of debt and equity. The relative amount of debt and equity may depend on the availability of Federal loan guarantees under the provisions of the Energy Policy Act of 2005 (EPAAct). If Federal loan guarantees are available on satisfactory terms, Dominion may be able to issue Federally guaranteed debt for a greater portion of the total financing need. If Federal loan guarantees are not available on satisfactory terms, Dominion may issue debt for a lesser portion of the total financing need. In either case, Dominion has sufficient capacity from a combination of internal and external funds for the equity and debt financing of the project through various means such as rate regulation under Virginia Code § 56-585.1.A.6, as described below, and also internal cash flows. The traditional capital markets will serve as the sources for the financing of North Anna 3.

Under Virginia Code § 56-585.1.A.6, a utility that constructs a nuclear generation facility has the right to recover the costs of the facility through a rate adjustment clause. This rate recovery includes projected construction work in progress (CWIP), and associated allowance for funds used during construction (AFUDC). Allowable costs include planning, development and construction costs, life-cycle costs, and costs of infrastructure associated therewith. Projected CWIP and AFUDC can be recovered prior to the date the facility begins commercial operation. As an incentive to undertake a nuclear generation facility, the statute allows an enhanced rate of return on common equity of 100 basis points above the utility's general rate of return on common equity.

This enhanced rate of return on common equity is applied to CWIP and the calculation of AFUDC during the facility construction phase. It is also applied to the nuclear facility from the date of the commencement of commercial operation and continuing for a period of 12 to 25 years, as the Virginia State Corporation Commission (VSCC) shall determine. After this period, the general rate of return is applied to the facility for the remainder of its service life.

In consideration of the foregoing, the staff finds that Dominion has demonstrated it possesses or has reasonable assurance of obtaining the funds necessary to cover estimated construction costs and related fuel cycle costs.

### **Financial Statements**

Pursuant to 10 CFR Part 50, Appendix C, I.A.3:

The application should also include the applicant's latest published annual financial report, together with any current interim financial statements that are pertinent. If an annual financial report is not published, the balance sheet and operating statement covering the latest complete accounting year together with all pertinent notes thereto and certification by a public accountant should be furnished.

### **Dominion's Financial Statements**

Dominion files its financial statements with the Securities and Exchange Commission (SEC).

Dominion submitted, pursuant to Appendix C.I.A.3 to 10 CFR Part 50, annual financial statements. The staff did not identify anything in Dominion's financial statements that warranted further inquiry.

#### **1.5.1.4 Operating License**

Pursuant to 10 CFR 50.33(f)(3),

If the application is for a combined license under subpart C of part 52 of this chapter, the applicant shall submit the information described in paragraphs (f)(1) and (f)(2) of this section.

Section 50.33(f) of 10 CFR provides that each application shall state:

[e]xcept for an electric utility applicant for a license to operate a utilization facility of the type described in [10 CFR] § 50.21(b) or § 50.22, information sufficient to demonstrate to the Commission the financial qualification[s] of the applicant to carry out, in accordance with the regulations in this chapter, the activities for which the permit or license is sought.

Section 50.2, "Definitions," of 10 CFR states, in part, that an electric utility is:

any entity that generates or distributes electricity and which recovers the cost of this electricity, either directly or indirectly, through rates established by the entity itself or by a separate regulatory authority.

According to the application, Dominion is an electric utility as defined in 10 CFR 50.2. Dominion generates and distributes electricity and recovers the cost of this electricity through cost-of-service based rates established by the VSCC, the North Carolina Utilities Commission (NCUC), and FERC.

Based on the foregoing, the staff finds that Dominion is not subject to a financial qualifications review pursuant to 10 CFR 50.33(f)(2).

#### **1.5.1.5 Decommissioning Funding Assurance**

Pursuant to the requirements of 10 CFR 50.33(k)(1), an applicant for a COL for a production or utilization facility will state information in the form of a report, as described in 10 CFR 50.75, "Reporting and recordkeeping for decommissioning planning," indicating how reasonable assurance will be provided that sufficient funds will be available to decommission the facility.

Under 10 CFR 50.75, the report must contain a certification that the applicant will provide financial assurance for decommissioning no later than 30 days after the Commission publishes notice in the *Federal Register* under 10 CFR 52.103(a), using one or more of the methods allowed under the regulation at 10 CFR 50.75(e). In addition, the amount of the financial assurance may be more, but not less, than the amount stated in the table in 10 CFR 50.75(c)(1), as adjusted under § 50.75(c)(2). Under 10 CFR 50.75(b)(4), a COL applicant need not obtain a financial instrument appropriate to the method to be used or submit a copy of the instrument to the Commission. (Once the COL is granted, the holder of a COL must submit an instrument as provided in § 50.75(e)(3)).

#### **Decommissioning Funding Estimate**

According to the COLA, Dominion certified that it will provide decommissioning funding assurance in the amount of \$672,826,269 (2012 dollars). This value was derived using the methodology delineated in 10 CFR 50.75(b) and (c), and guidance in NUREG-1307, Revision 15. The staff independently calculated the minimum funding needed for North Anna 3 using the regulations and guidance described above, and obtained results similar to Dominion's. Accordingly, the staff finds that the amount provided by Dominion is acceptable.

#### **Decommissioning Funding Mechanism**

Pursuant to 10 CFR 50.75(b), a reactor licensee is required to provide decommissioning funding assurance by one or more of the methods described in 10 CFR 50.75(e), as determined to be acceptable to the NRC. According to the COLA, Dominion has chosen to provide decommissioning funding assurance for North Anna 3 using an external sinking fund. Dominion's external sinking fund will be in the form of a trust; will be established in writing and maintained at all times in the United States with an entity that is an appropriate State or Federal government agency, or an entity whose operations are regulated and examined by a State or Federal agency; and will include the provisions required by 10 CFR 50.75(h)(2). The staff finds that Dominion's use of an external sinking fund is acceptable since it will recover, either directly or indirectly, the estimated total cost of decommissioning through rates established by "cost of service" or similar ratemaking regulation. Therefore, the staff finds this method to be acceptable since it meets the requirements in 10 CFR 50.75(e)(1)(ii).

#### **Certification Updates, Financial Instruments, and Annual Adjustment**

According to the application, 2 years and 1 year before the scheduled date for initial loading of fuel, Dominion will submit a report updating this certification in accordance with 10 CFR 50.75(e)(3) and providing copies of the financial instruments to be used. In addition, no later than 30 days after the NRC publishes the notice in the *Federal Register* under 10 CFR

52.103(a), Dominion will submit a report containing a certification that the financial assurance for decommissioning is being provided in an amount specified in the most recent updated certification and will include a copy of the executed financial agreements obtained to satisfy the requirements of 10 CFR 50.75(e). Thereafter, the decommissioning funding amount will be adjusted annually using a rate at least equal to that stated in 10 CFR 50.75(c)(2). The staff finds Dominion's proposed plan as described above and in the application to be reasonable.

#### **1.5.1.6 Antitrust**

The EAct removed the antitrust review authority contained in Section 105.c of the Act, regarding license applications for production or utilization facilities submitted under Sections 103 or 104b. of the Act after the date of enactment of the EAct. Accordingly, the NRC is not authorized to conduct an antitrust review in connection with this COLA.

#### **1.5.1.7 Foreign Ownership, Control, or Domination**

Section 103 of the Act prohibits the Commission from issuing a license for a nuclear power plant to:

an alien or any corporation or other entity if the Commission knows or has reason to believe it is owned, controlled, or dominated by an alien, a foreign corporation or a foreign government.

10 CFR 50.38, "Ineligibility of certain applicants," is the regulatory provision that implements this statutory prohibition.

The staff reviewed the application pursuant to the guidance provided in the SRP on FOCD to determine whether the applicant is owned, controlled, or dominated by an alien, a foreign corporation, or a foreign government.

#### **Dominion Foreign Ownership, Control, or Domination**

According to the application, Dominion is not owned, controlled, or dominated by an alien, a foreign corporation, or a foreign government. Dominion was incorporated in 1909 as a Virginia public service corporation, with its principal business location in Richmond, Virginia. Dominion is a wholly owned subsidiary of Dominion Resources, Inc. (DRI), an investor-owned electric utility. The shares of common stock of DRI are publicly traded and widely held. The application also contained the names and addresses of the Dominion directors and principal officers, and stated that all are United States citizens.

The staff performed an independent analysis of the information provided in the application for Dominion and DRI, including open-source research, and found no evidence of FOCD. Based on this review, the staff does not know or have reason to believe that Dominion is owned, controlled, or dominated by a foreign interest. Therefore, Dominion conforms to the guidance provided in the SRP for FOCD and meets the requirements of 10 CFR 50.38.

#### **1.5.1.8 Nuclear Insurance & Indemnity**

This section of the SER addresses the applicant's offsite and onsite insurance requirements found in 10 CFR Part 140 and 10 CFR 50.54(w), respectively.

The provisions of the Price-Anderson Act (Section 170 of the Act) and the Commission's regulations in 10 CFR Part 140, require, in part, that each holder of a license issued pursuant to 10 CFR Part 52 have and maintain financial protection. Further, 10 CFR 50.54(w) establishes requirements for each power reactor licensee to obtain insurance or provide an equivalent amount of protection for the onsite costs of an accident. Under these regulations, Dominion is required to provide satisfactory documentation that it has obtained the amount of financial protection required by (1) 10 CFR 140.13, "Amount of financial protection required of certain holders of construction permits and combined licenses under 10 CFR part 52," (2) 10 CFR 140.11(a)(4), and (3) 10 CFR 50.54(w). In addition, each licensee required to have and maintain financial protection under 10 CFR 140.11(a)(4) shall provide evidence that it maintains a guarantee of payment of deferred premiums pursuant to 10 CFR 140.21, "Licensee guarantees of payment of deferred premiums." Finally, as required by 10 CFR 140.20, "Indemnity agreements and liens," the staff will amend Dominion's current indemnity agreement for existing NAPS 1 and 2 to include the addition of North Anna 3.

The regulation in 10 CFR 140.13 provides the amount of financial protection required by a 10 CFR Part 52 license holder who also holds a license under 10 CFR Part 70 during the period before the Commission makes the finding under 10 CFR 52.103(g) (i.e., a finding that the acceptance criteria in the license are met, which allows the licensee to initially load fuel and operate). Because the 10 CFR Part 70 license will be issued with the COL, Dominion must have and maintain \$1,000,000 in financial protection from issuance of the COL until the 10 CFR 52.103(g) finding is made. In addition, as required by 10 CFR 140.11(a)(4), after the 10 CFR 52.103(g) finding is made, each licensee must have and maintain financial protection in an amount equal to the sum of primary financial protection (\$375,000,000) and the amount available as secondary financial protection. Since the existing reactors (Units 1 and 2) at the North Anna site already have primary financial protection in the amount of \$375,000,000, the current policy covering the North Anna site will be amended to include North Anna 3.

Because Dominion did not address the above requirements in its initial COLA submittal and supplements thereafter, the staff issued RAI 01-6 on May 18, 2016 to determine how Dominion will comply with these regulations (ADAMS Accession No. ML16139A590). By letter dated June 9, 2016, Dominion responded to the RAI (ADAMS Accession No. ML16168A027). The RAI response included a letter of intent from American Nuclear Insurers (ANI) that documents its commitment to amend the nuclear liability insurance policy for North Anna 1 and 2 to include the primary financial protection coverage of \$375,000,000 for North Anna 3. This coverage will be effective concurrent with the NRC's issuance of a COL to Dominion. Therefore, the staff concludes that the \$375,000,000 coverage satisfies the \$1,000,000 requirement of 10 CFR 140.13, and the primary financial protection requirement in 10 CFR 140.11(a)(4).

The staff notes that although licensees of large operating reactors under Parts 50 and 52 must have and maintain protection under 10 CFR 140.11(a)(4) upon NRC action authorizing operation, the timing provisions for reporting under 10 CFR 140.21 do not explicitly address the Part 52 process. Under the requirements in 10 CFR 140.11(a)(4) and 10 CFR 140.21, the coverage for secondary financial protection and the guarantee of payment of deferred premiums are only required for reactors authorized to load fuel and operate. Under the 10 CFR Part 52 COL process, the license authorizes operation only upon a Commission finding pursuant to 10 CFR 52.103(g). Therefore, these requirements apply as of the date the Commission makes such a finding. As such, Dominion's RAI response also included proposed license conditions to meet the requirements in 10 CFR 140.11(a)(4) and 10 CFR 140.21. While 10 CFR 50.54(w) by

its terms applies upon a Commission finding under 10 CFR 52.103(g), Dominion also included a reporting requirement for 10 CFR 50.54(w) in its proposed condition.

Dominion proposed the following license condition to address the reporting of 10 CFR 140.11(a)(4) requirements for secondary financial protection, and the reporting of 50.54(w) requirements for onsite financial protection. The staff agreed with the proposed license condition but made some modifications. The staff's recommended license condition is stated below:

Before the scheduled date for initial fuel load, and within ninety (90) days after the NRC publishes the notice of intended operation in the Federal Register, Dominion Virginia Power shall provide satisfactory documentary evidence to the Director of the Office of Nuclear Reactor Regulation, or designee, that it has obtained the appropriate amount of secondary financial protection pursuant to 10 CFR Part 140.11(a)(4) and the appropriate amount of financial protection pursuant to 10 CFR 50.54(w).

With the license condition as described above, the staff concludes that Dominion will satisfy the requirements of 10 CFR 140.11(a)(4) with respect to obtaining an appropriate amount of secondary financial protection and 10 CFR 50.54(w) with respect to obtaining the appropriate amount of financial protection. The staff notes that it will conform any license condition to the correct format if the Commission determines to issue the license. For example, the staff may change "the Director of the Office of Nuclear Reactor Regulation" to "the Director of the Office of New Reactors" and the like.

Dominion also proposed the following license condition to address the reporting of 10 CFR 140.21 for guarantee of payment of deferred premiums. The staff agreed with the proposed license condition but made some modifications. The staff's recommended license condition is stated below:

Before the scheduled date of initial fuel load, and within ninety (90) days after the NRC publishes the notice of intended operation in the Federal Register, Dominion Virginia Power shall provide evidence to the NRC that it would have the ability to pay into the nuclear industry retrospective rating plan in the event of a nuclear incident and in the amount specified in 10 CFR Part 140.11(a)(4) for one calendar year using one of the following methods:

- (a) Surety bond,
- (b) Letter of credit,
- (c) Revolving credit/term loan arrangement,
- (d) Maintenance of escrow deposits of government securities, or
- (e) Annual certified financial statement showing either that a cash flow (i.e., cash available to a company after all operating expenses, taxes, interest charges, and dividends have been paid) can be generated and would be available for payment of retrospective premiums within three (3) months after submission of the statement, or a cash reserve or a combination of cash flow and cash reserve.

Thereafter, Dominion Virginia Power shall provide evidence of the guarantees of payment of deferred premiums in accordance with the provisions specified in 10 CFR 140.21.

With the license condition as described above, the staff concludes that Dominion will satisfy the requirement in 10 CFR 140.21.

In consideration of the staff's evaluation and license conditions as described above, the staff concludes that Dominion will satisfy the provisions of the Price-Anderson Act (Section 170 of the Act) and the Commission's applicable regulations in 10 CFR Part 140, 10 CFR Part 52, and 10 CFR Part 50 for insurance and indemnity.

#### **1.5.1.9 Conclusion**

Based on the evaluation above, in consideration of the proposed license conditions, the staff finds reasonable assurance that Dominion is financially qualified to engage in the proposed activities regarding North Anna 3, and that Dominion satisfies the NRC requirements relating to financial qualification, decommissioning funding assurance, FOCD, and nuclear insurance and indemnity. The staff finds this acceptable since it conforms to the guidance in NUREG-1577, the SRP on FOCD, NUREG-1307, and meets the applicable regulations in 10 CFR Part 52, 10 CFR Part 50, and 10 CFR Part 140 as described above.

#### **1.5.2 Nuclear Waste Policy Act**

Section 302(b) of the Nuclear Waste Policy Act of 1982, as amended, states:

The Commission, as it deems necessary or appropriate, may require as a precondition to the issuance or renewal of a license under Section 103 or 104 of the Atomic Energy Act of 1954 [42 U.S.C. 2133, 2134] that the applicant for such license shall have entered into an agreement with the Secretary for the disposal of high-level radioactive waste and spent nuclear fuel that may result from the use of such license.

In a letter dated March 26, 2009 (ADAMS Accession No. ML090840271) the staff issued RAI 01-3 requesting the applicant to identify the Department of Energy (DOE) contract number applicable to North Anna 3 for disposal of high-level radioactive waste and spent nuclear fuel. In a letter dated June 17, 2009 (ADAMS Accession No. ML091700117), the applicant stated that:

The DOE contract number applicable to North Anna 3 for disposal of high-level radioactive waste and spent nuclear fuel is Contract No. DE-CR01-09RW09011.

Because Dominion has entered into a contract with the DOE for the disposal of high-level radioactive waste and spent nuclear fuel for North Anna 3, the staff accepts that Dominion has met the applicable requirements of Section 302(b) of the Nuclear Waste Policy Act of 1982. This RAI was previously tracked as an Open Item and is now closed.

#### **1.5.3 Consultation with Department of Homeland Security and Notifications**

In accordance with Section 657 of the EPA Act, the NRC consulted with the Department of Homeland Security.

In April 2008, the NRC published notices of the application in the local newspapers: *The Richmond Times-Dispatch*, *The Daily Progress*, *The Free-Lance Star*, and *The Central Virginian*. As required by Section 182c. of the Act and 10 CFR 50.43(a), the NRC took the following actions. On April 20, 2016, the NRC notified the VSCC (ADAMS Accession No. ML16064A508), the NCUC (ADAMS Accession No. ML16064A507) and the Federal Energy Regulatory Commission (FERC) (ADAMS Accession No. ML16064A506) regarding the North Anna 3 COL application.

In addition, the staff also published a notice of the application in the *Federal Register* (FR) on April 27, May 4, May 11, and May 18, 2016 (81 FR 24900, 81 FR 26837, 81 FR 29308, and FR 31263).

Based on the staff's completion of notifications to regulatory agencies and the public notices described above, the staff concludes that, for the purposes of issuing a COL for North Anna 3, all required notifications to other agencies or bodies have been duly carried out.

#### **1.5.4 Evaluation of Exemptions Associated with the Special Nuclear Material (SNM) Material Control and Accounting (MC&A) Program**

In Revision 6 of their application, the applicant updated Part 7 to include exemption requests from 10 CFR 70.22(b), 70.32(c), 74.31, 74.41, and 74.51. The provisions of 10 CFR 70.22(b) require an application for a SNM license to include a full description of the applicant's program for MC&A of SNM under 10 CFR 74.31, 10 CFR 74.33, "Nuclear material control and accounting for uranium enrichment facilities authorized to produce special nuclear material of low strategic significance," 10 CFR 74.41; and 10 CFR 74.51.<sup>6</sup> 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 record management requirements. However, 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. 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 and 74.11 through 74.19, except for 74.17. The applicant states that the purpose of this exemption request is to seek similar exceptions for this COL under 10 CFR Part 52, so that the same regulations applicable to nuclear reactors licensed under 10 CFR Part 50 will apply to the SNM MC&A Program.

The applicant also states that there is no technical or regulatory reason to treat nuclear reactors licensed under 10 CFR Part 52 differently from reactors licensed under 10 CFR Part 50, with respect to MC&A for SNM provisions in 10 CFR Part 74. The staff finds the applicant's justifications in Part 7 of the application acceptable in that nuclear reactors licensed under 10 CFR Part 52 should be treated the same as reactors licensed under 10 CFR Part 50 regarding MC&A for SNM.

For 10 CFR Part 52, an exemption request is evaluated under 10 CFR 52.7, "Specific exemptions," which incorporates the requirements of 10 CFR 50.12, "Specific exemptions," and states that the Commission may grant exemptions from the requirements of the regulations in 10 CFR 50.12 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

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<sup>6</sup> Although it does not include an explicit exception for 10 CFR Part 50 reactors, 10 CFR 74.33 applies only to uranium enrichment facilities and thus is not directly impacted by this exemption request.

circumstances are present as specified in 10 CFR 50.12(a)(2). According to 10 CFR 50.12(a)(2)(ii), special circumstances are present whenever the application of the regulation in particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule. In addition, the criteria in 10 CFR 50.12 encompass the criteria for an exemption in 10 CFR 70.17(a) and 10 CFR 74.7, the specific exemption requirements for 10 CFR Part 70 and 10 CFR Part 74, respectively. 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.

The staff reviewed the subject exemption requests that will allow the applicant to have similar exceptions for the COL under 10 CFR Part 52. The same regulations applied to nuclear reactors licensed under 10 CFR Part 50 (i.e., the regulations under Part 74 Subpart B) will apply to the SNM MC&A Program. The staff determined that (1) these requested exemptions are consistent with the Act and are authorized by law; (2) the exemptions will not present an undue risk to public health and safety; (3) these exemptions are consistent with common defense and security; and (4) special circumstances may exist so that the application of the regulations is not necessary to achieve the underlying purpose of the rule.

Because the staff finds that the applicant has satisfied the exemption criteria in 10 CFR 50.12, the staff considers these exemption requests to also satisfy the exemption criteria in 10 CFR 52.7, 70.17(a) and 74.7. Therefore, the staff finds that the exemptions from 10 CFR 70.22(b), 70.32(c), 74.31, 74.41 and 74.51 are justified.

## **1.5.5 Receipt, Possession, and Use of Source, Byproduct, and SNM Authorized by 10 CFR Part 52, Subpart C**

### **1.5.5.1 Introduction**

The reviews conducted for compliance with the requirements of 10 CFR Part 52 to support the issuance of the COLs encompass those requirements necessary to support granting 10 CFR Parts 30, 40, and 70 licenses. As a result, the 10 CFR Part 52 COL for North Anna 3 will be consistent with the licensing requirements in 10 CFR Parts 30, 40, and 70 for nuclear power plant licenses in accordance with 10 CFR Part 50.

In SECY-00-0092, "Combined License Review Process," dated April 20, 2000, the Commission approved generic license conditions for 10 CFR Parts 30, 40, and 70. In addition, per the memorandum dated December 9, 2008, from the Director of the Division of New Reactor Licensing in the Office of New Reactors (ADAMS Accession No. ML083030065); holders of a COL under 10 CFR Part 52 will also be authorized to receive, possess, and use source, byproduct, and SNM in accordance with Commission regulations in 10 CFR Parts 30, 40, and 70 including 10 CFR Sections 30.33, "General requirements for issuance of specific licenses;" 40.32, "General requirements for issuance of specific licenses;" 70.23, "Requirements for the approval of applications;" and 70.31, "Issuance of licenses," under their 10 CFR Part 52 COL. Licensees will be required to comply with all applicable regulations in 10 CFR Parts 30, 40, and 70, as well as the regulations in 10 CFR Parts 20, 50, and 52.

In order to meet these requirements, the applicant needed to supplement the COLA with a request to receive, possess, and use source, byproduct, and SNM accordingly and provide sufficient information to support compliance with the applicable portions of 10 CFR Parts 30, 40,

and 70. In RAI 01-4 (ADAMS Accession No. ML091550016), the staff requested for Dominion to address these items and on September 25, 2009 (ADAMS Accession No. ML092730455) the applicant responded. The staff reviewed this information and detailed the privileges to be granted under 10 CFR Parts 30, 40 and 70 licenses in the proposed "License Conditions" section specified below. This RAI was previously tracked as an Open Item and is now closed.

#### **1.5.5.2 Parts 30, 40, and 70 License Requests**

Pursuant to 10 CFR 52.8, "Combining licenses; elimination of repetition," Part 1, "General and Administrative Information"; Section 2 (e), "Information Required by 10 CFR 50.33," of the North Anna 3 application, Dominion requested additional Parts 30, 40 and 70 licenses to be incorporated into the COL to receive, possess and use source, SNM, and byproduct material in connection with the operation of North Anna 3.

Pursuant to 10 CFR 52.8, this application also seeks licenses that would be incorporated into the COL to receive, possess, and use source, SNM, and byproduct material in connection with the operation of North Anna 3. Specifically, as the proposed operator of North Anna 3, Dominion seeks 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, source, and SNM, as sealed neutron sources for reactor startup, sealed sources for instrumentation, and radiation monitoring equipment calibration, and as fission detectors in amounts as required.
- To receive, possess, and use in the amounts as required any byproduct, source, 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.
- To possess, but not separate, such by-product and SNM as may be produced by the operation facility.

#### **1.5.5.3 Parts 30, 40, 70 License Request Clarifications**

In Part 10, Revision 7, the applicant has updated these proposed license requests. The staff notes that the initial license requests and conditions, stated above, have evolved based on the staff's review of information in the application. The full set of applicable license conditions for Parts 30, 40, and 70 to be proposed by the staff for North Anna 3 are listed below in Subsection 1.5.5.6, Parts 30, 40, and 70 License Conditions. In addition, the program elements to be in place to allow for receipt of byproduct and special materials before the 10 CFR 52.103(g) finding are discussed more specifically in the staff's review below and are also provided in the applicant's FSAR Table 13.4-201 "Operational Programs Required by NRC Regulations."

#### **1.5.5.4 Exemptions from Part 70 License Request**

In Part 7, Revision 6, of the application, the applicant has requested exemptions from 10 CFR 70.22(b), 70.32(c), 74.31, 74.41, and 74.51 as they relate the SNM Accountability. The staff's review for the SNM MC&A is provided below and discusses these exemptions. In addition, the evaluation of these exemption requests are summarized in SER Section 1.5.4.

#### **1.5.5.5 Parts 30, 40, and 70 Materials and Use Clarifications**

In order to clarify the specific types of byproducts, sources, and SNMs; the chemical or physical forms; and the maximum amount at any one time of the requested material licenses under 10 CFR Parts 30, 40, and 70, the applicant has provided supplemental information in FSAR Section 12.2 to identify additional byproduct, source, and SNM materials beyond what has been described in the ESBWR DCD. The information in the section has been reviewed by the staff below, and was found to be acceptable.

##### **10 CFR Part 30 Materials**

With respect to the amount of 10 CFR Part 30 materials specified by the applicant between the issuance of the COL and before the 10 CFR 52.103(g) finding, the applicant has provided FSAR Table 12.2-206 which indicates that the quantity of any sealed calibration and referenced sources of byproduct material with the atomic numbers 1 through 93 would not exceed 100 millicuries for a single source and 5 curies total. In addition, the maximum for americium-241 would not exceed 300 millicuries for a single source and a total of 500 millicuries. The applicant has also provided STD SUP 12.2-1 in Subsection 12.2.1.1.2 to state that the Californium-252 (Cf) Cf-252 reactor startup source is a sealed source and each source capsule contains 0.5 to 0.822 mg of Cf-252. Six sources are required, resulting in a total of 3 to 5 mg Cf-252.

The applicant stated that this information remains in effect between the issuance of the COL and the 10 CFR 52.103(g) finding. The applicant included this information as Table 12.2-206 in FSAR Chapter 12. Further clarifications of the licensing for the receipt, possession, and use of 10 CFR Part 30 materials are outlined below in Subsection 1.5.5.6, Parts 30, 40, and 70 License Conditions.

##### **10 CFR Part 40 Materials**

In FSAR Section 12.2, the applicant states that no 10 CFR Part 40 specifically licensed material, including natural uranium, depleted uranium, and uranium hexafluoride will be received, possessed, or used during the period prior to implementation of the Emergency Plan (in preparation for initial fuel load following the 52.103(g) finding.) Accordingly, the license conditions described below only grant licenses for Parts 30 and 70 materials between the issuance of the COL and the 10 CFR 52.103(g) finding. Further clarifications of the licensing for the receipt, possession, and use of 10 CFR Part 40 materials after a 10 CFR 52.103(g) finding are outlined below in Subsection 1.5.5.6, Parts 30, 40, and 70 License Conditions.

##### **10 CFR Part 70 Materials (non-fuel)**

In FSAR Section 12.2, the applicant states that the radioactive materials identified in the table below represent nominal values of known non-fuel SNM specifically required for use at North Anna 3. Table 1-1 includes the following data from Table 12.2-207 of the North Anna 3 COL FSAR:

Table 1-1 Non-Fuel Special Nuclear Material for Use

(a) Element and Mass Number	(b) Chemical or Physical Form	(c) Maximum Amount
U-234 (approx. 78%) U-235 (approx. 22%)	Local Power Range Monitor Assemblies – Each assembly includes four fission chambers (64 assemblies and 4 spares)	0.0104 grams of uranium per assembly. Total of approx. 0.71 grams.
U-234 (approx. 78%) U-235 (approx. 22%)	Startup Range Nuclear Monitor Assemblies – Fission chambers (12 installed assemblies and 1 spare)	0.0129 grams of uranium per assembly. Total approx. 0.17 grams.

Further clarifications of the licensing for the receipt, possession, and use of 10 CFR Part 70 materials as a non-fuel are outlined below in Subsection 1.5.5.6, Parts 30, 40, and 70 License Conditions.

**10 CFR Part 70 Materials (fuel)**

The receipt, possession, and use of 10 CFR Part 70 SNMs as fuel are fully described in accordance with the limitations for storage and in the amounts necessary for reactor operation in the applicant’s FSAR, as supplemented and amended. Further clarifications of the licensing for the receipt, possession, and use of 10 CFR Part 70 materials as fuel are outlined below in the license conditions.

**1.5.5.6 Parts 30, 40, and 70 License Conditions**

Based on the discussions above and the reviews outlined below, the staff proposes to include the following license conditions for the North Anna 3 COL as they relate to authorization pursuant to the regulations in 10 CFR Parts 30, 40, and 70:

- License Condition (1-1) – Subject to the conditions and requirements incorporated herein, the Commission hereby licenses Dominion:
  - (a) (i) Pursuant to the Act and 10 CFR Part 70, to receive and possess at any time SNM as reactor fuel in accordance with the limitations for storage and in the amounts necessary for reactor operation, as described in the FSAR as supplemented and amended;
  - (ii) Pursuant to the Act and 10 CFR Part 70, to use SNM as reactor fuel, after a Commission finding under 10 CFR 52.103(g) has been made, in accordance with the limitations for storage and in amounts necessary for reactor operation, described in the FSAR, as supplemented and amended;

- (b) (i) Pursuant to the Act and 10 CFR Parts 30 and 70, to receive, possess, and use, at any time before a Commission finding under 10 CFR 52.103(g), such byproduct and SNM as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts, as necessary;
  - (ii) Pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use, after a Commission finding under 10 CFR 52.103(g) any byproduct, source, and SNM as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as necessary;
  - (c) (i) Pursuant to the Act and 10 CFR Parts 30 and 70, to receive, possess, and use, before Commission finding under 10 CFR 52.103(g), in amounts not exceeding those specified in 10 CFR 30.35(d) and 10 CFR 70.25(d) required for establishing decommissioning financial assurance, any byproduct or SNM that is (1) in unsealed form; (2) on foils or plated surfaces, or (3) sealed in glass, for sample analysis or instrument calibration or other activity associated with radioactive apparatus or components;
  - (ii) Pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use, after a Commission finding under 10 CFR 52.103(g), in amounts as necessary, any byproduct, source, or SNM without restriction as to chemical or physical form, for sample analysis or instrument calibration or other activity associated with radioactive apparatus or components but not uranium hexafluoride; and
  - (d) Pursuant to the Act and 10 CFR Parts 30 and 70, to possess, but not separate, such byproduct and SNMs as may be produced by the operation of the facility.
- License Condition (1-2) – Prior to initial receipt of SNM onsite, the licensee shall implement the SNM Material Control and Accounting Program. No later than 12 months after issuance of the COL, the licensee shall submit to the Director of Office of New Reactors (NRO) a schedule that supports planning for and conduct of NRC inspections of the SNM MC&A Program. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until the SNM MC&A Program has been fully implemented.
  - License Condition (1-3) – The fire protection measures in accordance with RG 1.189, “Fire Protection for Nuclear Power Plants,” for designated storage building areas (including adjacent fire areas that could affect the storage area) shall be implemented before initial receipt of byproduct or SNMs that are not fuel (excluding exempt quantities as described in 10 CFR 30.18, “Exempt quantities”).
  - License Condition (1-4) – The fire protection measures in accordance with RG 1.189 for areas associated with new fuel (including all fuel handling, fuel storage, and adjacent fire areas that could affect the new fuel) shall be implemented before receipt of fuel onsite.

- License Condition (1-5) – Prior to the receipt of fuel onsite, a formal letter of agreement shall be in place with the local fire department specifying the nature of arrangements in support of the Fire Protection Program (FPP).
- License Condition (1-6) – All FPP features shall be implemented before initial fuel load.

#### **1.5.5.7 Operational Programs to Support 10 CFR Parts 30, 40, and 70**

The staff notes that North Anna 3 COL FSAR Table 13.4-201, “Operational Programs Required by NRC Regulations,” provides milestones and commitments for the implementation of various operational programs. Important milestones for the portions of operational programs applicable to radioactive materials that support the issuance of licenses and requirements relative to 10 CFR Parts 30, 40, and 70 are included in the following programs:

- Item 8: Fire Protection Program
- Item 10: Radiation Protection (RP) Program
- Item 11: Non-Licensed Plant Staff Training Program
- Item 15: Security Program
- Item 23: SNM Control and Accounting Program

#### **1.5.5.8 Part 70 License Staff Review**

The applicant’s compliance with several applicable 10 CFR Part 70 requirements regarding RP, nuclear criticality safety (NCS), and environmental protection are already encompassed by the design information incorporated by reference from the ESBWR DCD. In addition, the staff evaluated the applicant’s compliance with these requirements as part of the DC review. Other applicable 10 CFR Part 70 requirements to be addressed by the COL applicant are outlined below. In order to satisfy NRC regulations and requirements for licensing under 10 CFR Part 70 so as to receive, possess, and use SNM as fuel and non-fuel, the applicant addressed the following areas for review per the guidance in NUREG–1520 and the SRP:

- General Information – Applicant identifications, location, licenses sought, financial qualifications, exemption requests, site layout, population, geography, nearby facilities, meteorology, hydrology, geology, and seismicity
- Organization and Administration – Structure, management, functions, qualifications, experience, communications, and turnover of the construction to operation
- Radiation Protection
- Criticality Safety
- Fire Safety
- EP
- Effluent Controls and Monitoring Programs
- SNM MC&A–Exemptions, MC&A, and Fixed Site Security Review

- Physical Security

### **General Information**

The legal identities of the applicant and the site location are described by the applicant in Part 1, Sections 1, 2(a-d), and Part 2, Subsection 1.1.2.2. The license action types requested by the applicant are described in Part 1, Section 2(e). However, the staff has further clarified the 10 CFR Parts 30, 40, and 70 licenses to be granted in the license conditions listed above in Section 1.5.5.6. Financial qualifications are in Part 1, Section 2(f), which the staff reviewed in SER Section 1.5.1. The exemption requests for 10 CFR Part 70 licensing are in Part 7 of the application, which the staff reviewed in Section 1.5.4. The facility layout, property boundaries, geography, and population are described in FSAR Section 2.1. Locations of nearby facilities are described in FSAR Section 2.2. Meteorology is described in FSAR Section 2.3, and site hydrology is described in FSAR Section 2.4. Site geology and seismicity are described in FSAR Section 2.5. These sections also incorporate information from the North Anna ESP Standard SSAR. Based on the above information, the staff finds that the applicant has satisfactorily addressed general information.

### **Organization Information**

The applicant's organizational structure and charts are in FSAR Section 13.1 and Appendix 17AA. This information includes functional descriptions of the organizational groups—including those responsible for managing the design, construction, operations, and modifications of the facility; in addition to responsibilities, reporting hierarchy, and communications. FSAR Subsection 13.1.1.4 discusses the education and experience qualifications for managers, supervisors, and technicians. FSAR Appendix 13AA describes the activities required to transition the unit from the construction phase to the operation phase. Based on the above information, the staff finds that the applicant has satisfactorily addressed organizational information.

### **Radiation Protection**

The staff's safety review under 10 CFR Part 52 for RP programs and systems for the construction and operation of North Anna 3 is in SER Chapter 12. The staff finds the applicant's RP programs and systems acceptable for construction and operation.

In FSAR Table 13.4-201, the applicant states that the following four commitments will be implemented for the RP Program at North Anna 3:

- Prior to initial receipt of byproduct, source, or SNMs (excluding Exempt Quantities as described in 10 CFR 30.18) for those elements of the RP Program necessary to support such receipt.
- Prior to fuel receipt for those elements of the RP Program necessary to support receipt and storage of fuel onsite.
- Prior to fuel load for those elements of the RP Program that are necessary to support fuel load and plant operation.

- Prior to first shipment of radioactive waste for those elements of the RP Program that are necessary to support shipment of radioactive waste.

The above commitments correspond to the four milestones for the RP Program that is specified in Nuclear Energy Institute (NEI) Template 07-03A, "Generic FSAR Template Guidance for Radiation Protection Program Description." NEI 07-03A is incorporated by reference by the applicant in Chapter 12, Appendix 12BB, of the North Anna 3 FSAR. By letter dated March 18, 2009 (ADAMS Accession No. ML090510379), the staff determined that NEI 07-03A provides an acceptable template for assuring that the RP program meets applicable NRC regulations and guidance. Therefore, the staff finds these commitments acceptable. With respect to the RP review of 10 CFR Part 70 licenses, the staff performed the following review:

The regulatory basis for this review of the North Anna 3 RP Program applicable to the fresh fuel assemblies for the first reactor core prior to commencement of operation is contained in 10 CFR Parts 19, "Notices, Instructions, and Reports to Workers: Inspections and Investigations," 20, and 70. The purpose of this review is to determine whether Dominion's proposed RP program is adequate to protect the radiological health and safety of workers, the public, and the environment during fresh fuel handling and storage operations under 10 CFR Part 70. This review is necessary in anticipation of the operation of the North Anna 3 ESBWR.

The applicable acceptance criteria for the NRC's 10 CFR Part 70 review of the North Anna 3 RP Program are outlined in Section 4.4 of NUREG-1520, Revision 1, *Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility* (SRP). While some portions of the acceptance criteria in NUREG-1520, Section 4.4 are relevant to this incremental review, other portions are not. For example, certain RGs and other documents referenced in NUREG-1520, Section 4.4 are specific to fuel cycle facilities and are not applicable to reactor reviews. Also, reactors are not one of the engagements for which an Integrated Safety Analysis is required as per 10 CFR 70.60, "Applicability."

Operations pertaining to 10 CFR Part 70 include uncrating, handling, and inspection of fuel assemblies and storing them in the new fuel and spent fuel storage pool prior to loading into the reactor. As the fuel assemblies are effectively contained/sealed material with little associated external radiation, the radiological risks associated with this operation are considered minimal. Other forms (not fuel) of SNM on site include small amounts in fission chambers used for monitoring and wire sources used for startup operations. Similarly, because that is also contained/sealed material, the radiological risks associated with the materials are considered minimal.

The review documented here is not applicable in determining the acceptability of the described program with respect to operations under 10 CFR Part 52. The radiation protection methods and estimated occupational radiation exposures to operation and construction personnel during normal and anticipated operational occurrences will be reviewed with respect to issuance of the combined construction permit and operating license (COL) in Chapter 12 of the Advanced SER for the North Anna 3 COL Application. The staff will have to verify the resolution of all relevant issues when the North Anna 3 final SER is available in order to complete its 10 CFR Part 70 review.

In general, the NUREG-1520 acceptance criteria require descriptions to ensure the following topics will be adequately addressed at the facility: RP program implementation; radiation exposures as low as reasonably achievable (ALARA); RP organization and qualifications;

written procedures; training; ventilation and respiratory protection programs; radiation survey and monitoring programs; radiological risk associated with accidents; and additional programs normally impacting the RP function. The applicant's FSAR Section 12.5 provides a description of the operational RP program. The program incorporates by reference NEI Template 07-03A, Revision 0 (NEI, 2009a), with site-specific supplements or substitutions included elsewhere in the FSAR or ESBWR DCD (GE-Hitachi, 2014), as the operational RP Program description. NEI 07-03A is the final accepted version of the NRC reviewed NEI-07-03, Revision 7. The staff completed the review and safety evaluation of NEI 07-03, Revision 7, as documented in "Safety Evaluation Regarding the Nuclear Energy Institute Technical Report 07-03 "Generic FSAR Template Guidance for Radiation Protection Program Description, Revision 7". Table 13.4-201 (item 10) in the applicant's FSAR indicates that all necessary aspects of its RP program will be implemented prior to its receipt of any by-product, source, SNM (except as described in 10 CFR 30.18), or fuel.

The generic RP program template commits an applicant to NRC regulatory requirements and guidance and to acceptance criteria listed in RG 1.206 and SRP Section 12.5. While the SRP is not as prescriptive regarding the required information for a radiological protection program as NUREG-1520, the staff believes that a program established to address 10 CFR Part 52 operations would adequately address 10 CFR Part 70 operations as well. The staff reviewed NEI 07-03A, as well as the modifications and supplements to that information described in the FSAR and found that it adequately addressed the topics of evaluation in Section 4 of the NUREG-1520 (Radiation Protection) with the exceptions of ALARA, ventilation, and radiological risk associated with accidents.

With respect to ALARA, the applicant states in Appendix 12AA and Appendix 12BB of its FSAR that it incorporates NEI 07-08A (NEI, 2009b), "Generic FSAR Template Guidance for Ensuring That Occupational Radiation Exposures are As Low As Is Reasonably Achievable (ALARA), Revision 0," with modifications or supplements as noted in the section. Similar to NEI 07-03A, the staff previously reviewed NEI 07-08, Revision 3, and found it acceptable as documented via letter. The template, in conjunction with template NEI 07-03A, generally describes operational policies, regulatory compliance, and operational considerations applicable to the ALARA program. Compliance with the template, when considering the minimal risks associated with storage and handling fresh fuel under 10 CFR Part 70, is adequate to assure operations will be ALARA. The applicant's RP program to achieve occupational doses ALARA also addresses regulatory requirements for RP found in 10 CFR Part 20.

Regarding ventilation, the materials of interest for this license are expected to be contained and pose little airborne potential or risk of internal exposure. For this reason, staff found it unnecessary to evaluate the facility's ventilation systems.

The Integrated Safety Analysis requirements for control of radiological risk discussed in Section 4.4.8 of NUREG-1520 are not applicable to North Anna 3 because the operations proposed are excluded from the list of engagements in 10 CFR 70.60 for which 10 CFR Part 70, Subpart H, applies. The applicant did submit an emergency plan that addresses response to accident situations involving potential radiological exposures. As stated previously, it is expected that the unirradiated uranium contained in the fuel poses little radiological risk for the operations pertaining to 10 CFR Part 70.

The staff finds that Dominion will establish and maintain an acceptable RP program for North Anna 3 that addresses operations under 10 CFR Part 70, which includes:

- An effective documented program to ensure that occupational radiological exposures are ALARA;
- An organization with adequate qualification requirements for RP personnel;
- Approved, written RP procedures and RWPs for RP activities;
- RP training for all personnel who have access to radiologically restricted areas;
- A program to control airborne concentrations of radioactive material with engineering controls and respiratory protection.
- A radiation survey and monitoring program that includes requirements for controlling radiological contamination within the facility and monitoring of external and internal radiation exposures; and,
- Other programs to correct upsets at the facility, maintain records, and generate reports in accordance with 10 CFR Parts 20 and 70.

The staff concludes that the applicant's RP program for North Anna 3, with respect to the initial fresh fuel elements for the first reactor core and other forms of SNM as described in its COL application, complies with regulatory requirements in 10 CFR Parts 19, 20, and 70, adequately addresses the applicable acceptance criteria in Section 4.4 of NUREG-1520, Revision 1, and is, therefore, acceptable to the staff.

### **Criticality Safety**

The assessment of criticality safety of fresh and spent fuel storage and handling is based, in part, on the information in the ESBWR DCD. The applicant has incorporated by reference Sections 9.1.1 and 9.1.2 of the ESBWR DCD. The ESBWR DCD, Tier 2, Subsection 9.1.1.7, "Safety Evaluation," for criticality control designates DCD COL Item 9.1-4-A for the applicant to describe the programs that address criticality safety of fuel handling operations. The staff's safety review of fuel handling is in SER Section 9.1.4. The staff has found that the applicant has satisfactorily addressed fuel handling operations, including criticality safety.

In addition, in SER Section 1.5.5.9 below, the staff finds that the applicant's request for a 10 CFR Part 70 SNM license did not involve an authorization to possess enriched uranium or plutonium for uranium hexafluoride in excess of 50 kilograms in a single container or 1,000 kilograms total; or in excess of 2 curies of plutonium in an unsealed form or on foils or plated sources. Therefore, a criticality alarm system is not required and implementation of the emergency plan before receipt of the SNM is also not required.

With respect to additional review of 10 CFR Part 70 licenses, the staff performed the following review. The regulatory basis for the review of North Anna 3 NCS is contained in 10 CFR 70.22, "Contents of applications;" 10 CFR 70.23; and 10 CFR 70.52, "Reports of accidental criticality." The purpose of this review is to determine whether the Dominion's North Anna 3 proposed NCS program is adequate to protect the radiological health and safety of workers, the public, and the environment during fresh fuel handling and storage operations under 10 CFR Part 70. This review is necessary in anticipation of the operation of the North Anna 3 ESBWR.

The acceptance criteria for NRC's 10 CFR Part 70 review of North Anna 3's NCS program are outlined in Section 5.4 of NUREG-1520. However, staff determined that few of the acceptance criteria in NUREG-1520 were applicable to the 10 CFR Part 70 operations proposed at North Anna 3 and, therefore, limited the review to that necessary to assure compliance with the applicable 10 CFR Part 70 requirements noted previously.

Dominion has submitted a COLA for an ESBWR design to be designated North Anna 3. This review is to focus on criticality safety for the receipt, possession, inspection, and storage of SNM in the form of fresh fuel assemblies as applicable under 10 CFR Part 70. Other forms of SNM are specified in Table 12.2-207 of the COLA (primarily fission chambers) and constitute less than 1 gram total of SNM which was considered negligible relative to NCS concerns. The operations relevant to the 10 CFR Part 70 portion of the license include the uncrating and inspection of the fuel assemblies and storing them in the new fuel racks and spent fuel storage pool prior to loading into the reactor. The applicant has prepared the FSAR to be consistent with guidance in the SRP. Consistent with the format of that guidance, Section 9.1 of the FSAR discusses criticality safety of fresh and spent fuel storage and handling, including movement of light and heavy loads (fuel assemblies).

Acceptance criteria for a 10 CFR Part 70 review are in Section 5.4 of NUREG-1520. However, the staff determined that few of those acceptance criteria are applicable to the proposed reactor operations. The staff therefore limited the review to what was necessary to assure compliance with the applicable 10 CFR Part 70 requirements noted previously.

The staff evaluation of criticality concerns relating to fresh and spent fuel storage for the standard ESBWR design is set forth in ESBWR FSER Sections 9.1.1, and 9.1.2.

Finally, staff determined that reporting compliant with 10 CFR 70.52 would be self-evident and no elaboration in the application should be required to assure compliance with those regulations. The information submitted by the applicant and reviewed by the staff assures the applicant's equipment, facilities and procedures will be adequate to assure subcriticality of the fresh fuel consistent with 10 CFR 70.23(a)(3) and (4), thus adequately protecting health and minimizing danger to life or property.

### **Fire Safety**

The staff's safety review under 10 CFR Part 52 for the FPPs) and systems for the licensing and operation of North Anna 3 was completed and is contained in Chapter 9 SER, Subsection 9.5.1. In FSAR Table 13.4-201 the applicant has made three commitments to adhere to the FPP: 1) prior to initial receipt of byproduct, source, or SNM (excluding exempt quantities as described in 10 CFR 30.18) for portions of the FPP applicable to radioactive material; 2) prior to fuel receipt for the elements of the FPP necessary to support receipt and storage of fuel onsite, and; 3) prior to fuel load for the elements of the FPP necessary to support fuel load and plant operation. The staff found these commitments contribute to the reasonable assurance that adequate fire protection will be provided and maintained to meet the criteria of 10 CFR 70.23.

With respect to the fire safety review of 10 CFR Part 70 licenses, the staff performed the following review:

The purpose of this review is to determine, with reasonable assurance, that North Anna 3 has (1) designed a facility that provides adequate protection against fires and explosions that could affect the safety of licensed materials and thus present an increased radiological risk; (2) considered the radiological consequences of fires; and (3) instituted suitable safety controls to protect workers, the public, and the environment.

The regulatory basis for the fire safety review includes the general and additional contents of the application, as required by 10 CFR 70.22. In addition, the fire safety review must provide reasonable assurance of compliance with 10 CFR 70.23(a)(3) and 10 CFR 70.23(a)(4). The acceptance criteria that the NRC uses for reviews of fire safety of licensed material are outlined in Sections 7.4.3.1 through 7.4.3.5 of NUREG-1520.

The facility and its original fire protection systems are designed and will be constructed to industrial standards currently in effect. The licensee commits to meeting the prevailing codes whenever facilities are expanded or modified. Facilities are generally concrete, noncombustible masonry, or metal construction. Lightning protection is incorporated into the facility design. Facility exit routes are posted throughout and are unimpeded by physical security requirements. In addition, workers are trained in evacuation and periodic drills are conducted to verify the adequacy of egress.

Within the fuel building (FB), which is a seismic Category I structure, new fuel bundles are brought in through the rail car bay, uncrated, raised to the refueling floor, and transferred for storage on racks in the buffer pool within the reactor building, also a seismic Category I structure. The process itself utilizes methods and materials that have no fire safety concerns. The fire protection equipment in the fuel handling area of the FB includes fire detection, portable fire extinguishers, and hose stations for manual firefighting.

Site procedures for the maintenance and surveillance testing of the above-listed equipment, including fire pump, fire mains, standpipes, and hoses, have been developed and will be performed as described in the FPP and in accordance with applicable codes and standards. In addition, the compensatory actions described in the FPP will be used should any of the listed fire equipment become unavailable.

The staff has proposed the following license conditions regarding the FPP which requires:

- The fire protection measures in accordance with RG 1.189 for designated storage building areas (including adjacent fire areas that could affect the storage area) be implemented before initial receipt of byproduct or SNMs that are not fuel (excluding exempt quantities as described in 10 CFR 30.18).
- The fire protection measures in accordance with RG 1.189 for areas associated with new fuel (including all fuel handling, fuel storage, and adjacent fire areas that could affect the new fuel) be implemented before receipt of fuel onsite.
- Prior to the receipt of fuel onsite, a formal letter of agreement shall be in place with the local fire department specifying the nature of arrangements in support of the FPP.
- All FPP features be implemented before initial fuel load.

These license conditions are included in Subsection 1.5.4.6, Parts 30, 40, and 70 License Conditions, above.

Effective handling of fire emergencies is accomplished by trained and qualified emergency responders. The fire response organization is staffed and equipped for firefighting activities. The fire brigade is composed of a fire brigade leader and at least four fire brigade members. The fire brigade does not include the Shift Manager or other members of the minimum shift crew necessary for safe shutdown of the unit, nor any personnel required for other essential functions during a fire emergency or members of the fire brigade for Units 1 and 2. Additional support is available when needed through an agreement with the local fire department.

Training ensures that the fire brigade's capability to combat fires is established and maintained. The training program consists of initial (classroom and field) training and recurrent training which includes periodic instruction, fire drills, and annual fire brigade training.

Firefighting equipment is provided throughout the plant. Fire emergency procedures and pre-fire plans specify actions to be taken by the individual discovering the fire and by the emergency responders. Discussion of this pre-fire plan is included in the periodic classroom instruction's training program provided for the emergency responders.

Combustibles are controlled to reduce the severity of a fire which might occur in a given area and to minimize the amount and type of material available for combustion. The use and application of combustible materials at North Anna 3 are controlled utilizing the following methods:

- Instructions/guidelines provided during general employee training/orientation programs;
- A chemical control program;
- Periodic plant housekeeping inspections/tours by management and/or the plant fire protection organization;
- Design/modification review and installation process; and
- Administrative procedures (e.g., Transient Combustible Control Program).

The use of ignition sources such as welding, flame cutting, brazing, grinding, and soldering within safety-related areas are controlled through the approval and issuance of an ignition source permit. Permits are reviewed and approved by appropriate plant personnel. The ignition source permit is valid for 24 hours during plant operation and for the duration of one job during plant shutdown. Job area inspection will be performed and documented at the start of each shift that ignition source activities are being performed.

The Fire Hazards Analysis (FHA) is part of the FPP. The FHA results are documented on a fire area basis, broken down into separate discussions of classical fire protection features and safe shutdown analysis for each fire area. The FHA is required to be updated, prior to receipt of the new fuel, as part of the License Condition previously mentioned. The FHA includes the following:

- A summary of the evaluation performed to determine the adequacy of the fire protection features for each fire area; and
- A discussion of the ability to achieve safe shutdown in case of a fire in each fire area.

The fire hazards and safe shutdown evaluation were performed by qualified nuclear, mechanical, electrical, and fire protection engineers. FHA and Pre-Fire Plans conform to the applicable guidance provided in National Fire Protection Association (NFPA) 801, "Standard for Fire Protection for Facilities Handling Radioactive Materials" (NFPA, 2003) and NFPA 804, "Standard for Fire Protection for Advanced Light Water Reactor Electric Generating Plants" (NFPA, 2006).

The staff concluded that the licensee's capabilities meet the criteria in Chapter 7 of NUREG-1520. The staff determined that the licensee's equipment, facilities, and procedures provide reasonable assurance that adequate fire protection will be provided and maintained to meet the criteria of 10 CFR 70.23.

### **Emergency Preparedness**

The staff's evaluation of the applicant's request for a 10 CFR Part 70 license, with regard to EP, is provided below in SER Section 1.5.5.9, "Parts 30 and 40 License Staff Review." In this review, the staff also evaluated the applicant's request for 10 CFR Parts 30 and 40 licenses in regards to EP. In regards to the 10 CFR Part 70 license request, the staff found that the applicant has met the emergency planning-related requirements of 10 CFR 70.22(i)(1) for SNM (fuel and non-fuel), such that prior to implementation of the North Anna 3 Emergency Plan (i.e., during the period of time between issuance of the COL and implementation of the North Anna 3 Emergency Plan, which will occur prior to the Commission's 10 CFR 52.103(g) finding), an emergency plan that meets 10 CFR 70.22(i)(3) is not required.

### **Effluent Controls and Monitoring Programs**

The staff's complete reviews of environmental protection for the licensing and operation of North Anna 3 under 10 CFR Part 51 are in NUREG-1811 and NUREG-1917.

With respect to the applicant's request for a 10 CFR Part 70 license, the staff performed the following review: The regulatory basis for the review of the North Anna 3 program applicable to the fresh fuel assemblies for the first reactor core before beginning operation is in 10 CFR Part 20, Subpart D and 10 CFR 70.22 and 70.23. The North Anna 3 facility will also use fission chamber detectors containing SNM for the reactor startup and neutron flux monitoring during reactor operations. The staff evaluated the use and handling of these fission chamber detectors for compliance with the applicable requirements in 10 CFR Parts 20 and 70.

The acceptance criteria for the NRC review of the portion of the North Anna 3 application for a 10 CFR Part 70 license described above are outlined in Section 9.4 of NUREG-1520, Revision 1. Although most portions of the acceptance criteria in Section 9.4 of NUREG-1520 are directly applicable to this review, other portions are not because of the scope of the proposed activities. For example, a review of an applicant's Integrated Safety Analysis of accidents is conducted for fuel cycle facilities but not for reactors. In addition, certain regulatory guides and other documents referenced in Section 9.4 of NUREG-1520 are specific to fuel cycle facilities.

The radiological impacts assessment is based, in part, on information in the ESBWR DCD, Revision 10. The DCD is incorporated by reference into Revision 6 of the North Anna 3 FSAR, which was prepared to be consistent with the guidance in the SRP. This staff review focused on the incremental impact, if any, of the North Anna 3 application for the receipt, possession, inspection, and storage of SNM in the form of fresh fuel assemblies for the first reactor core loading, as applicable under 10 CFR Part 70. This review also evaluated the receipt, storage, use, and disposal of fission chamber detectors containing SNM. These detectors will be used for the reactor start up and neutron flux monitoring during reactor operations.

The staff reviewed FSAR Sections 11.4, 11.5, 12.1, 12.2, and 13.1, in addition to FSAR Table 13.4-201. These sections describe the RP and waste management program to be used for the entire facility, which includes the proposed activities that are within the scope of this review. The staff noted that several elements of Dominion's effluent controls and monitoring programs will be in place before the onsite receipt of fuel or initial fuel loading. These elements include but are not limited to the radiological environmental monitoring program, waste management program, offsite dose calculation manual, and the process and effluent monitoring and sampling program. The staff also noted that the incremental effects related to the fresh fuel assemblies for the first core loading, and the use of fission chamber detectors, do not change Dominion's ALARA goals or controls for liquid or air effluents. These goals include an analysis of the total effective dose equivalent to the maximally exposed individual member of the public who would receive the greatest radiation dose. Population dose estimates are also unaffected. Dominion's monitoring of liquid and air discharges, including monitoring locations and samples, will not be affected by receipt of fresh fuel.

As stated in FSAR Section 1.4.2.2 and Table 13.1-201, Dominion's plant personnel includes those involved in the proposed activities who will be qualified to meet the requirements in American National Standard Institute (ANSI)/American Nuclear Society 3.1-1993, "American National Standard for Selection, Qualification, and Training of Personnel for Nuclear Power Plants," as endorsed by RG 1.8, Revision 3, "Qualification and Training of Personnel for Nuclear Power Plants." FSAR Appendix 13BB, Training Program, references the NRC-approved NEI guidance NEI 06-13A, "Technical Report on a Template for an Industry Training Program Description." The staff recognizes that compliance with these documents is an acceptable method for ensuring that the facility's staff will have adequate education and training to engage in the proposed activities. The staff finds that the quality control procedures related to the collection and analyses of environmental monitoring samples will not be affected by the receipt of fresh fuel. ALARA reviews and reports to management will not be affected by activities involving the fresh fuel assemblies or the fission chamber detectors. Because the fresh fuel assemblies and fission chamber detectors contain SNM in the form of encapsulated material (i.e., not dispersible), they result in a low risk of environmental releases. Dominion's implementation of the effluent controls and monitoring programs as described in the North Anna 3 FSAR are commensurate with the activities and impacts associated with fresh fuel handling and storage and provide reasonable assurance that any releases or waste generated during the proposed activities will be adequately handled to protect the public health and safety.

Dominion has provided adequate measures including (1) environmental and effluent monitoring, (2) effluent controls to maintain public doses ALARA as part of the RP Program, and (3) waste management programs. The staff concludes, with reasonable assurance, that Dominion's conformance to the application and license conditions is adequate to protect public health and safety and complies with the regulatory requirements imposed by the Commission in 10 CFR

Parts 20 and 70. The staff finds that Dominion's effluent controls and monitoring programs, including sampling locations and frequency, staff training and qualifications, waste minimization practices, and proposed action levels for the proposed activities as described in the COLA adequately address the applicable acceptance criteria in Subsection 9.4.3.2 of NUREG-1520, Revision 1, and is therefore acceptable.

### **Special Nuclear Materials Material Control and Accounting Review**

The staff conducted a review of the applicant's MC&A Program description. The purpose of this review was to determine whether the applicant had provided a description of an MC&A Program that would be capable of satisfying the regulatory requirements in 10 CFR Part 74, Subpart B. The staff's full evaluation has been provided in a non-publicly available Safety Related Information (SRI) Safeguards Evaluation Report (ADAMS Accession No. ML14262A315). The information below summarizes the conclusions made by the staff:

In accordance with 10 CFR 70.22(b), current applicants requesting a license to possess SNM must submit a full description of their program for the control and accounting of SNM in the applicant's possession and to show compliance with 10 CFR 74.31, 74.33, 74.41, or 74.51, as applicable. Also in accordance with 10 CFR 70.32(c), applicants requesting a license to possess SNM are subject to a license condition to maintain and follow a program for controlling and accounting for source material and SNM. Decreases in the program's effectiveness will be submitted as an amendment pursuant to 10 CFR 70.34. However, the requirements in 10 CFR 70.22(b) and 70.32(c) contain an exclusion for licensees governed by 10 CFR Part 50, including existing nuclear power plants. Moreover, the Dominion North Anna 3 COLA was submitted and accepted as a licensing action for a nuclear power plant under 10 CFR Part 52 instead of 10 CFR Part 50.

The 10 CFR Part 70 and 74 exclusions described above do not include 10 CFR Part 52 applicants, even though for purposes of the requirement, the applicants are the same facility type. For both 10 CFR Parts 50 and 52 applicants, 10 CFR Part 74, Subpart B (excluding 74.17) contains the appropriate MC&A performance requirements. An adequate applicant submittal would describe the licensee program elements that would meet the 10 CFR Part 74 requirements. Additionally, because the primary roles of the MC&A Program are to control and account for SNM, the licensee program elements would have to be developed and implemented before receiving SNM and be maintained as long as any SNM was onsite.

Since there was not any specific regulatory guidance related to MC&A licensing submittals by 10 CFR Parts 50 or 52 applicants, a process was developed that would be acceptable for this applicant and for other 10 CFR Part 52 applicants referencing the same design ESBWR. An ANSI publication, N15.8-2009, which specifically discusses MC&A methods for nuclear power plants, was identified as a resource for the applicant to use. The goal was for the applicant's MC&A description to provide assurance that the implemented program would meet the performance requirements of 10 CFR Part 74, Subpart B, excluding 74.17.

As a result it was determined that:

- (a) The applicant would provide a description of the MC&A Program and its related elements. The form and format submitted by the applicant would be informed by ANSI N15.8-2009;

(b) The applicant would request an exemption from 10 CFR 70.22(b), 70.32(c), and 10 CFR 74.31, 74.41, and 74.51, the purpose being to seek an exception for this application so that the same requirements would be applied to this program as to other reactors licensed under 10 CFR Part 50;

(c) The applicant would provide information relevant to the nuclear material they propose to possess (i.e. Category I-formula quantity, Category II-moderate strategic significance, Category III-low strategic significance);

(d) The MC&A Program will be an operational program, meaning that a formal process of ITAAC should not be necessary if the program and its implementation are fully described in the application;

(e) A licensing condition would be proposed that would require the implementation of the MC&A Program prior to the receipt of SNM on site.

### MC&A Program Description

In the submittal dated July 31, 2013, the applicant's proposed Appendix 13CC titled, "Special Nuclear Material (SNM) Material Control and Accounting Program Description", provided a narrative of the MC&A Program that would be developed for the North Anna facility. The review of the applicant's proposed SNM MC&A Program in Appendix 13CC encompassed requirements in 70.22(a)(4); 74.11, "Reports of loss or theft or attempted theft or unauthorized production of special nuclear material"; 74.13, "Material status reports"; 74.15, "Nuclear material transaction reports"; and 74.19, "Recordkeeping."

The staff concluded that the scope and detail of the submittal provided reasonable assurance of program acceptability. The approaches, procedures, and commitments as outlined in the MC&A program description are likely to meet the 10 CFR Part 74, Subpart B, excluding 74.17, regulatory requirements.

### Exemption Requests from 70.22(b), 70.32(c), 74.31, 74.41, and 74.51

In order for the applicant to have the same requirements applied to their SNM MC&A Program as are applied to other reactors licensed under 10 CFR Part 50, the applicant submitted requests for exemption from 10 CFR 70.22(b), 70.32(c), 74.31, 74.41, and 74.51 that are detailed in Part 7 of the application. The staff finds that these exemptions are justified and should be granted. The staff's reviews of these exemption requests are in SER Section 1.5.4.

### Nuclear Material Category

The applicant's declaration that (1) the facility would be Category III as defined by the regulations and (2) the purpose of the facility was to engage in commercial power operations using small quantities of non-fuel SNM in support of that activity, provided assurance that the

correct regulatory requirements for MC&A were being addressed in the submittal. For the purposes of this MC&A review, this portion of the submittal is acceptable.

### MC&A Program Description and Operation Programs

Section 13 of the FSAR should address the addition of the MC&A Program to the COL application. During the review of the applicant's submittal of July 2013, it was noted that the applicant agrees with this approach. In Part 2 of the FSAR, the applicant has included a proposed Appendix 13CC, which discusses material control and SNM MC&A procedures. In addition, in FSAR Table 13.4-201, "Operational Programs Required by NRC Regulations", was revised to include item 23, SNM Material Control and Accounting Program." The table listed the implementation milestone as "prior to receipt of SNM" and the implementation requirement as "license condition." The staff agrees with the applicant's proposals, in particular that MC&A will be an operational program and that the development of MC&A procedures are formally annotated.

### SNM MC&A License Condition

The staff included the following license condition previously for other applicants, as it relates to the MC&A requirements in 10 CFR Part 74. The following condition should be added to the applicant's license:

- **License Condition** - Prior to initial receipt of special nuclear materials (SNM) onsite, the licensee shall implement the SNM Material Control and Accounting program. No later than 12 months after issuance of the Combined Operating License, the licensee shall submit to the Director of Office of New Reactors (NRO) a schedule that supports planning for and conduct of NRC inspections of the SNM Material Control and Accounting program. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until the SNM Material Control and Accounting program has been fully implemented.

This license condition is included in the Subsection 1.5.5.6, Parts 30, 40, and 70 License Conditions, above.

### Conclusion

The staff reviewed Dominion's submitted description of the proposed MC&A Program for SNM for the North Anna 3 facility, the category of material to be possessed, and a licensing exemption request. The staff concluded that the scope and detail of the submittal provided reasonable assurance of program acceptability. The approaches, procedures, and commitments as outlined in the MC&A Program description are likely to meet the 10 CFR Part 74, Subpart B, excluding 74.17, regulatory requirements. The staff also concluded that the exemption request from certain Parts of 10 CFR Parts 70 and 74 met the criteria for exemptions as stated 10 CFR 70.17(a), 74.7, and 52.7, thus making the applicant subject to the same MC&A requirements as the existing commercial reactor fleet. Furthermore, the staff agreed that making the MC&A Program an operational program and proposing a license condition covering the implementation of the MC&A Program is consistent with the policy established in SECY-05-0197, "Review of Operational Programs in a Combined License Application and Generic Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria." The staff concludes that this MC&A description and approach is sufficient and is acceptable as described.

## Fixed Site and Transportation Security for SNM in Regards to the 10 CFR 73.67 Review

This portion of the 10 CFR Part 70 materials review pertains to 10 CFR 73.67. The full technical evaluation on these topics can be found in ADAMS Access No. ML16061A038. The staff reviewed the application to determine if all fixed-site and in-transit physical protection guidance and requirements for SNM of low strategic significance were met as appropriate. The following sections represent a summary of the specific areas of the review and the staff's conclusions.

### Introduction and Background

In developing the FSER for North Anna 3, the staff reviewed the ESBWR DCD to ensure that the combination of the information in the DCD and the information in the COLA represents the complete scope of information relating to a particular review topic. The staff finds that the applicant plans to bring SNM of low strategic significance in the form of new fuel assemblies on-site before the protected area is declared operational in accordance with 10 CFR 73.55(a) will be acceptable because the fresh fuel will be subject to the applicable portions of 10 CFR 73.67 and the applicable post September 11, 2001, security order measures for SNM of low strategic significance, and the applicant's plans are adequate for these purposes, as discussed below.

### Regulatory Guidance and Evaluation

Fixed site and in-transit physical protection requirements:

- 10 CFR 73.67
- 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 (1983)."
- NRC RIS 2005-22, "Requirements for the Physical Protection During Transportation of Special Nuclear Material of Moderate and Low Strategic Significance: 10 CFR Part 73 vs. Regulatory Guide 5.59 (1983)."

### Technical Evaluation

A technical evaluation of the North Anna 3 COL FSAR against applicable 10 CFR 73.67 fixed site and in- transit: 1) general performance objectives, 2) general requirements, and 3) physical protection requirements for SNM of low strategic significance, was performed. In addition, the post September 11, 2001, security order measures for SNM of low strategic significance were sent to the applicant to be addressed. The letter conveying those order measures was sent on August 27, 2015 (ADAMS Accession No. ML15224B618) and the SGI containing order measures were sent under separate cover (Safeguards Local Area Network Electronic Safe (SLES) ADAMS Accession No. NS113220). Subsequently, the applicant submitted a letter dated October 9, 2015, which provided a reviewer's aid matrix that covered the applicable 10 CFR 73.67 requirements. The reviewer's aid matrix pointed out the text of the application that described the intent of meeting each element of the applicable portions of 10 CFR 73.67 (ADAMS Accession No. ML15288A072). In addition, the applicant submitted, in the same

letter dated October 9, 2015, a revised Special Nuclear Material Physical Protection Program (SNMPPP) description and a response to the post September 11, 2001, security order measures for SNM of low strategic significance. The revised SNMPPP was labeled as: Revision 2, draft dated October 8, 2015, and is noted by the applicant, in the letter dated October 9, 2015, that it will be included in the next revision of the FSAR submitted to the NRC.

#### Fixed Site General Performance Objectives

The applicable physical protection requirements specified in 10 CFR 73.67, had general performance objectives described. The staff found that the applicant met the specified requirements.

#### Fixed Site General Requirements

The applicable requirements specified in 10 CFR 73.67, had general requirements. The staff found that the applicant met the specified requirements.

#### Fixed Site Physical Protection Requirements

The applicable requirements specified in 10 CFR 73.67, had fixed site physical protection requirements for SNM of low strategic significance. The staff found that the applicant met the specified requirements.

#### In-transit General Performance Objectives

The applicable requirements specified in 10 CFR 73.67, had general performance objectives described. The staff found that the applicant met the specified requirements.

#### In-transit General Requirements

The applicable requirements specified in 10 CFR 73.67, had general requirements. The staff found that the applicant met the specified requirements.

#### In-transit Physical Protection Requirements

The applicable requirements specified in 10 CFR 73.67, had in-transit physical protection requirements described. The staff found that the applicant met the specified requirements.

#### Post September 22, 2011 Security Order Measures for SNM of Low Strategic Significance

Applicable Requirement: "General Performance Objectives and Requirements," described in the post September, 11, 2001, security order for SNM of low strategic significance, dated 2003 and titled, "Interim Compensatory Measures for Category-3 Fuel Cycle Facilities," has an analysis required. The applicant considered the order and assessed that only parts C and D of those order must be addressed. The discussion of the analysis that justified only Part C and D of the order needed to be addressed was within a letter sent to the NRC dated October 9, 2015, specifically in "Enclosure 2, Response to NRC RAI, Question 01.05-04, Part 2" (ADAMS Accession No. ML15288A072). In addition, in Section 1 "Scope" of the SNMPPP there is a statement reflecting that Sections A and B of the order were not applicable for particular reasons. Therefore, the analysis requirement presented in the beginning of the order, is met.

### Conclusion

The staff reviewed North Anna 3 COLA and finds that the applicable requirements specified in 10 CFR 73.67 and the post September 11, 2001, security order measures for SNM of low strategic significance, are met.

### **Physical Protection Program in FSAR Section 13.6 in Regards to the 10 CFR 73.55 Review**

Part 8 of the application contains the North Anna 3 security plan that is referenced in Part 2, FSAR Chapter 13, Section 13.6. This information includes the Physical Security Plan that contains SGI as defined by 10 CFR 73.21; its disclosure to unauthorized individuals is prohibited in Section 147 of the AEA. The staff's safety review of this information under 10 CFR Part 52 for the licensing and operation of North Anna 3 is in SER Chapter 13, Subsection 13.6. Because of information security requirements, the staff's evaluation of the physical security protection program is presented in the publicly available SER Section 13.6, but does not contain the same level of details as the SGI version. Those persons with the correct access authorization and a need to know basis may view the SGI version of the North Anna 3 COLA.

Per 10 CFR 73.55, "Requirements for physical security protection of licensed activities in nuclear power reactors against radiological sabotage," the staff reviewed the applicant's proposed security plan in Part 2 of FSAR Chapter 13, Subsection 13.6 and Part 8 of the application. The staff finds that the applicant has satisfied the regulatory requirements and provided the required information relating to physical security. The staff concludes that the applicant has provided the necessary programmatic elements in the physical security plan, the training and qualification plan, and the safeguards contingency plan, which provide a high assurance that activities involving SNM are not inimical to common defense and security and do not constitute an unreasonable risk to public health and safety.

#### **1.5.5.9 Parts 30 and 40 License Staff Review**

In order to satisfy NRC regulations and requirements for the receipt, possession, and use of byproduct and/or source materials, the applicant needed to address the following main areas for review per the guidance in NUREG-1556, Volume 7, Section 8:

- General Information – License action type, legal identities, address, points of contact.
- Materials to be possessed and used.
- Financial assurance and recordkeeping.
- Individuals responsible for the radiation safety program and training and experience, etc.
- Training for workers in restricted areas.
- Facilities and equipment.
- Radiation Safety Program.
- Waste management.
- Physical security.
- EP.

## **General Information**

The 10 CFR Parts 30 and 40 licenses requested by the applicant are described above in Subsection 1.5.5.3, Parts 30, 40 and 70 License Request Clarifications, and in Subsection 1.5.5.6, Parts 30, 40, and 70 License Conditions. The legal identities, addresses, and points of contact are described in Part 1 of Section 2(a-d). The staff finds that the applicant has adequately addressed this information.

## **Materials To Be Possessed and Used**

The possession and proposed uses of 10 CFR Parts 30 and 40 materials are described above in the Subsection 1.5.5.5, Parts 30, 40, and 70 Materials and Use Clarifications, in addition to the Subsection on 1.5.5.3, Parts 30, 40, and 70 License Request Clarifications. The staff finds that the applicant has adequately identified the possession and proposed uses of materials.

## **Financial Assurance and Recordkeeping for Decommissioning**

In the application, the applicant describes this information in Part 1, Section 2(k), including Attachment E, "Decommissioning Funding Assurance Report." This information is discussed and reviewed in Section 1.5.1 of this SER. In addition, the QAPD in FSAR Appendix 17AA describes the decommissioning record keeping processes. The QAPD is reviewed in SER Chapter 17. The staff finds that the applicant has adequately addressed these items.

## **Individuals Responsible for the Radiation Safety Program: Qualifications, Training, and Experience**

The RP Program for North Anna 3 is described in FSAR Section 12.5, Appendices 12AA and 12BB. In SER Chapter 12, the staff finds the applicant's programs acceptable. In regards to RP managers, supervisors, and technicians, FSAR Section 13.1 describes the job and function for these positions. In addition, qualifications and training for these positions are described in FSAR Sections 13.1 and 13.2. The staff reviewed this information in SER Chapter 13 and finds it acceptable.

## **Training for Workers in Restricted Areas**

The RP Program for North Anna 3 is described in FSAR Section 12.5, Appendices 12AA and 12BB. In SER Chapter 12, the staff finds the applicant's programs acceptable. The training criteria for workers in restricted areas are described in FSAR Section 13.2. The staff reviewed this information in SER Chapter 13 and finds it acceptable.

## **Facilities and Equipment**

The physical arrangement and design features for RP is described in FSAR Section 12.3. In addition, in FSAR Sections 12.5, Appendices 12AA and 12BB describe the programs, facilities, instrumentation, and equipment provided to support the implementation of the RP Program. The staff reviewed this information in SER Chapter 12 and finds it acceptable.

## **Radiation Safety Program**

The applicant describes the Operational RP Program in FSAR Section 12.5. The staff finds the applicant's RP Program acceptable in SER Chapter 12. Qualifications, training, and experience for managers, supervisors, and technicians are described in FSAR Sections 13.1 and 13.2. The staff reviewed this information in SER Chapter 13. Radiation control procedures and the maintenance of radiation records will be established by the applicant's QAPD, as presented in FSAR Appendix 17AA. The QAPD is reviewed in SER Chapter 17. In addition, FSAR Table 13.4-201 provides the applicant's commitments to implement the RP programs. The staff reviewed this information in SER Chapters 12 and 13 and finds it acceptable. The staff finds that the applicant has adequately addressed these items.

## **Waste Management**

The radioactive waste management system includes the liquid waste management system (LWMS, Section 11.2); gaseous waste management system (GWMS, Section 11.3); solid waste management system (SWMS, Section 11.4); and process effluent radiation monitoring and sampling systems (PERMS, Section 11.5) as described in the FSAR. The staff evaluated these systems and associated programs and information supplied by the applicant. The staff concludes that the information pertaining to the applicant's waste management systems and programs in Chapter 11 is acceptable.

## **Physical Security**

The applicant's physical security program is described in FSAR Section 13.6. The staff reviewed the Physical Security Program in SER Section 13.6 and finds it acceptable.

## **Emergency Preparedness (10 CFR Parts 30, 40, and 70 (SNM, Fuel and Non-Fuel Materials))**

The following regulations address emergency planning requirements associated with issuance of licenses to receive, possess, and use source, byproduct, or SNM:

- 10 CFR 30.32(i)(1) requires that each application to possess radioactive materials in unsealed form, on foils or plated sources, or sealed in glass in excess of the quantities in 10 CFR 30.72, "Schedule C—Quantities of radioactive materials requiring consideration of the need for an emergency plan for responding to a release," must contain either: (1) an evaluation showing that the maximum dose to a person offsite due to a release of radioactive materials would not exceed 1 rem effective dose equivalent or 5 rems to the thyroid; or (2) an emergency plan for responding to a release of radioactive material, that provides the information identified in 10 CFR 30.32(i)(3).
- 10 CFR 40.31(j)(1) requires that each application to possess uranium hexafluoride in excess of 50 kilograms in a single container or 1000 kilograms total must contain either: (1) an evaluation showing that the maximum intake of uranium by a member of the public due to a release would not exceed 2 milligrams; or (2) an emergency plan for responding to the radiological hazards of an accidental release of source material and to any associated chemical hazards directly incident thereto, that provides the information identified in 10 CFR 40.31(j)(3).

- 10 CFR 70.22(i)(1) requires that each application to possess enriched uranium or plutonium for which a criticality accident alarm system is required, uranium hexafluoride in excess of 50 kilograms in a single container or 1000 kilograms total, or in excess of 2 curies of plutonium in unsealed form or on foils or plated sources, must contain either: (1) 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 (2) an emergency plan for responding to the radiological hazards of an accidental release of SNM and to any associated chemical hazards directly incident thereto, that provides the information identified in 10 CFR 70.22(i)(3).

In COLA Part 1, Section 1, "Introduction," the applicant stated that Dominion applies for a COL of North Anna 3, as well as such other licenses as would be required to possess and use byproduct, source, and SNM in connection with the operation of North Anna 3. Pursuant to Section (a) of 10 CFR 52.8, the applicant further stated in COLA Part 1, Section 2(e), "Class of License, Use of Facility, Period of Time for which the License is Sought, and Other Licenses Issued or Applied for in Connection with the Proposed Facility," that the application also seeks licenses to receive, possess and use source, byproduct, and SNM in connection with operation of North Anna 3.<sup>7</sup> Finally, in COLA Part 10, Section 3.3, "License Conditions for Byproduct, Source and Special Nuclear Material," the applicant proposed four license conditions for byproduct, source, and SNM, which reflect the respective requirements in 10 CFR Parts 30, 40, and 70.<sup>8</sup> The staff's proposed license conditions for the North Anna 3 COL, as they relate to authorization pursuant to the regulations in 10 CFR Parts 30, 40, and 70, are provided above in SER Section 1.5.5.6, "Parts 30, 40, and 70 License Conditions."

The staff previously examined byproduct, source, and SNM associated with the ESBWR standard design, and discussed these materials in Section 12.3.3.1, "Contained Sources," of NUREG-1966, Volume 3 (Chapters 9-15) (ADAMS Accession No. ML14099A532). The discussion identified COL Information Item 12.2-4-A, and stated that the addition of this COL information item ensures that any radiation sources containing byproduct, source, or SNM will either be described in the DCD or by the COL applicant, as specified in SRP Section 12.2, "Radiation Sources."

DCD Tier 2, Section 12.2, "Plant Sources," describes radiation sources associated with the ESBWR design, and DCD Tier 2, Section 12.2.4, "COL Information," includes COL Information Item 12.2-4-A, which states that "[t]he COL applicant will address any additional contained radiation sources (including sources for instrumentation and radiography) not identified in [DCD Tier 2] Subsection 12.2.1.5." In COLA Part 2, FSAR Section 12.2, "Plant Sources," the COL applicant described the various types and quantities of radiation sources that may be used on the site, and incorporated by reference DCD Tier 2 Section 12.2 (with various departures and/or supplements). In addition, FSAR Section 12.2.1.1.2, "Other Radioactive Sources," describes the Cf-252 reactor startup source (identified as STD SUP 12.2-1), which supplements the radioactive sources identified in DCD Tier 2, Section 12.2.1.1.2, "Other Radioactive Sources."

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<sup>7</sup> See also, 10 CFR 52.77 and its referenced Section (e) of 10 CFR 50.33, which requires the applicant to list other licenses, except operator's licenses, issued or applied for in connection with the proposed facility.

<sup>8</sup> SECY-00-0092 dated April 20, 2000, and the associated September 5, 2000, Staff Requirements Memorandum address the form and content of the generic COL, issued pursuant to 10 CFR Part 52, which includes generic (standard) license conditions for 10 CFR Parts 30, 40, and 70 materials.

The applicant replaced DCD Tier 2 [Sub]section 12.2.1.5 with FSAR Section 12.2.1.5, "Other Contained Sources," which addresses COL Information Item 12.2-4-A (identified as COL Item CWR COL 12.2-4-A<sup>9</sup>) by describing additional contained (byproduct, source, or SNM) sources that may be maintained on the North Anna 3 site, and includes specific limitations (listed below) for these byproduct, source, and SNM that would apply during the period of time prior to the implementation of the Emergency Plan (i.e., between issuance of the COL and implementation of the North Anna 3 Emergency Plan, which will occur prior to the Commission's 10 CFR 52.103(g) finding). Specifically, the applicant stated that prior to the implementation of the North Anna 3 Emergency Plan, no emergency plan will be necessary because:

1. No byproduct material will be received, possessed, or used in a physical form that is "in unsealed form, on foils or plated sources, or sealed in glass," that exceeds the quantities in Schedule C in 10 CFR 30.72;
2. No 10 CFR [Part] 40 specifically licensed material, including natural uranium, depleted uranium, and uranium hexafluoride, will be received, possessed, or used during this period; and
3. The SNM to be received, possessed, or used does not involve enriched uranium for which a criticality accident alarm system is required, uranium hexafluoride in excess of 50 kilograms in a single container or 1000 kilograms total, or in excess of 2 curies of plutonium in unsealed form or on foils or plated sources.

The North Anna 3 Emergency Plan is included in COLA Part 5, "Emergency Plan," and the staff's evaluation of the Emergency Plan is addressed in SER Section 13.3, "Emergency Planning." The resolution of DCD COL Information Item 12.2-4-A is addressed in SER Section 12.2, "Radiation Sources."

In its December 18, 2013, letter (ADAMS Accession No. ML14013A113), the applicant provided the results of its review and disposition of RAs and responses that are associated with the updated COLA content in the December 2013 COLA submission. These review results addressed whether an emergency plan that meets the requirements in 10 CFR 30.32(i)(3), 10 CFR 40.31(j)(3), or 10 CFR 70.22(i)(3) is required, in relation to the requested 10 CFR Parts 30, 40, and 70 (SNM, fuel and non-fuel) materials license applications, respectively. Specifically, in Enclosure 25, Attachment 1, of the December 18, 2013, letter, the applicant stated that the materials to be possessed and proposed uses are described in COLA Part 1, Section 2(e), and FSAR Chapter 12, including the portions of ESBWR DCD Chapter 12 incorporated by reference.

In Enclosure 25, Attachment 2, of the December 18, 2013, letter, the applicant further stated that an emergency plan that meets 10 CFR 70.22(i)(3) is not required because the request for a 10 CFR Part 70 license does not involve authorization to possess enriched uranium for which a criticality accident alarm system is required, uranium hexafluoride in excess of 50 kilograms in a single container or 1000 kilograms total, or in excess of 2 curies of plutonium in unsealed form or on foils or plated surfaces.

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<sup>9</sup> As defined in FSAR Table 1.1-201, "Left Margin Annotations," CWR COL.X.Y-#-A identifies FSAR information that addresses a DCD COL Item and is similar to information presented in the R-COL application (i.e., Fermi 3 Reference COL application) for the same ESBWR DCD.

The staff reviewed the DCD and COLA information (described above) against the applicable requirements in 10 CFR 30.32(i)(1), 10 CFR 40.31(j)(1), and 10 CFR 70.22(i)(1), and concludes that the applicant's identified quantities of byproduct, source, and SNM do not exceed the respective threshold quantities that would require an emergency plan – that meets the respective requirements in 10 CFR 30.32(i)(3), 10 CFR 40.31(j)(3), and 10 CFR 70.22(i)(3) – prior to the implementation of the North Anna 3 Emergency Plan.

When the 10 CFR 52.103(g) finding is made, the North Anna 3 Emergency Plan will have been fully implemented, as reflected in the implementation milestones in FSAR Table 13.4-201, "Operational Programs Required by NRC Regulations" (i.e., Item 14, "Emergency Planning") and SER Section 13.3.4.19, "Implementation Milestones." In addition, completion of the emergency planning ITAAC in SER Table 13.3-1, "NAPS Unit 3 ITAAC," which address full implementation of the North Anna 3 Emergency Plan, is required prior to the Commission's 10 CFR 52.103(g) finding.

Therefore, the staff finds that the applicant has met the requirements of 10 CFR 30.32(i)(1), 10 CFR 40.31(j)(1), and 10 CFR 70.22(i)(1), such that prior to implementation of the North Anna 3 Emergency Plan, an emergency plan that meets 10 CFR 30.32(i)(3), 10 CFR 40.31(j)(3), or 10 CFR 70.22(i)(3) is not required.

#### **1.5.5.10 Part 37 Staff Review**

On March 19, 2013, a new 10 CFR Part 37, "Physical Protection of Category 1 and Category 2 Quantities of Radioactive Material," rule was published in the FR. The NRC amended its regulations to establish security requirements for the use and transport of Category 1 and Category 2 quantities of radioactive material. The NRC considers these quantities to be risk significant and, therefore, to warrant additional protection. Category 1 and Category 2 thresholds are based on the quantities established by the International Atomic Energy Agency (IAEA) in its Code of Conduct on the Safety and Security of Radioactive Sources, which the NRC endorses. The objective of the 10 CFR Part 37 rule is to provide reasonable assurance of preventing the theft or diversion of Category 1 and Category 2 quantities of radioactive material. The regulations also include security requirements for the transportation of irradiated reactor fuel that weighs 100 grams or less in net weight of irradiated fuel. The 10 CFR Part 37 rule affects any licensee that possesses an aggregated Category 1 or Category 2 quantity of radioactive material, any licensee that transports these materials using ground transportation, and any licensee that transports small quantities of irradiated reactor fuel. The 10 CFR Part 37 rule compliance date was March 19, 2014.

Upon further review by the staff, it was determined that the regulations of 10 CFR Part 37 do not require COL applicants to address 10 CFR Part 37. After COL issuance, a COL licensee becomes subject to the requirements of this regulation upon taking possession of an aggregated Category 1 or Category 2 quantity of radioactive material.

#### **1.5.5.11 Conclusion**

Based on the reviews discussed above, the staff finds that the applicant has used a combination of the information in the referenced ESBWR DCD and the information in the COLA, including supplemental COL information, in order to demonstrate compliance with the requirements of 10 CFR Part 52. The applicant's compliance with 10 CFR Part 52 licensing encompasses the necessary requirements to support granting 10 CFR Parts 30, 40, and 70 licenses consistent

with operating licenses for nuclear power plants licensed in accordance with 10 CFR Part 50. The staff used the guidance in the SRP, NUREG–1520, and NUREG–1566.

The privileges to be granted under the 10 CFR Parts 30, 40, and 70 licenses are detailed by the staff in the proposed License Conditions specified above in Section 1.5.5.6. Therefore, the applicant for the North Anna 3 COL will also be authorized to receive, possess, and use source, byproduct, and SNM in accordance with the Commission's regulations in 10 CFR Parts 30, 40, and 70; including 10 CFR Sections 30.33, 40.32, 70.23, and 70.31. The applicant complies with all applicable regulations of 10 CFR Parts 30, 40, and 70; as well as the regulations in 10 CFR Parts 20, 50, 51 and 52.

## References

1. 10 CFR 140.11, "Amounts of financial protection for certain reactors."
2. 10 CFR 140.13, "Amount of financial protection required of certain holders of construction permits and combined licenses under 10 CFR part 52."
3. 10 CFR 140.20, "Indemnity agreements and liens."
4. 10 CFR 140.21, "Licensee guarantees of payment of deferred premiums."
5. 10 CFR 2.390, "Public inspections, exemptions, and request for withholding."
6. 10 CFR 30.18, "Exempt quantities."
7. 10 CFR 30.32, "Application for specific licenses."
8. 10 CFR 30.72, "Schedule C-Quantities of radioactive materials requiring consideration of the need for an emergency plan for responding to a release."
9. 10 CFR 40.31, "General domestic licenses for byproduct material."
10. 10 CFR 40.32, "General requirements for issuance of specific issues."
11. 10 CFR 50.12, "Specific exemptions."
12. 10 CFR 50.2, "Definitions."
13. 10 CFR 50.33, "Contents of applications; general information."
14. 10 CFR 50.34, "Contents of construction permit and operating license applications; technical information."
15. 10 CFR 50.34a, "Design objectives for equipment to control releases of radioactive material in effluents-nuclear power reactors."
16. 10 CFR 50.38, "Ineligibility of certain applicants."
17. 10 CFR 50.43, "Additional standards and provisions affecting class 103 licenses and certifications for commercial power."
18. 10 CFR 50.54, "Conditions of licenses."
19. 10 CFR 50.59, "Changes, tests and experiments."
20. 10 CFR 50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants."
21. 10 CFR 50.75, "Reporting and recordkeeping for decommissioning plan."
22. 10 CFR 51.50, "Environmental report-construction permit, early site permit, or combined license stage."

23. 10 CFR 52.103, "Operation under a combined license."
24. 10 CFR 52.39, "Finality of early site permit determinations."
25. 10 CFR 52.47, "Contents of applications; technical information."
26. 10 CFR 52.63, "Finality of standard design certification."
27. 10 CFR 52.7, "Specific exemptions."
28. 10 CFR 52.77, "Contents of applications; general information."
29. 10 CFR 52.79, "Contents of applications; technical information in final safety analysis report."
30. 10 CFR 52.8, "Combining licenses; elimination of repetition."
31. 10 CFR 52.80, "Contents of applications; additional technical information."
32. 10 CFR 52.81, "Standards for review of applications."
33. 10 CFR 52.83, "Finality of referenced NRC approvals; partial initial decision on site suitability."
34. 10 CFR 52.85, "Administrative review of applications; hearings."
35. 10 CFR 52.87, "Referral to the Advisory Committee on Reactor Safeguards (ACRS)."
36. 10 CFR 52.97, "Issuance of combined licenses."
37. 10 CFR 70.17, "Specific exemptions."
38. 10 CFR 70.22, "Contents of applications."
39. 10 CFR 70.23, "Requirements for the approval of applications."
40. 10 CFR 70.25, "Financial assurance and recordkeeping for decommissioning."
41. 10 CFR 70.31, "Issuance of licenses."
42. 10 CFR 70.32, "Conditions of licenses."
43. 10 CFR 70.34, "Amendment of licenses."
44. 10 CFR 70.52, "Reports on accident criticality."
45. 10 CFR 70.60, "Applicability."
46. 10 CFR 73.21, "Protection of safeguards information: performance requirements."
47. 10 CFR 73.54, "Protection of digital computer and communication systems and networks."

48. 10 CFR 73.55, "Requirements for physical protection of licensed activities in nuclear power reactors against radiological sabotage."
49. 10 CFR 73.58, "Safety/security interface requirements for nuclear power reactors."
50. 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."
51. 10 CFR 74.11, "Reports of loss or theft or attempted theft or unauthorized production of special nuclear material."
52. 10 CFR 74.13, "Material status reports."
53. 10 CFR 74.15, "Nuclear material transaction reports."
54. 10 CFR 74.19, "Recordkeeping."
55. 10 CFR 74.31, "Nuclear material control and accounting for special nuclear material of low strategic significance."
56. 10 CFR 74.33, "Nuclear material control and accounting for uranium enrichment facilities authorized to produce special nuclear material of low strategic significance."
57. 10 CFR 74.41, "Nuclear material control and accounting for special nuclear material of moderate strategic significance."
58. 10 CFR 74.51, "Nuclear material control and accounting for strategic special nuclear material."
59. 10 CFR 74.7, "Specific exemptions."
60. 10 CFR Part 100, "Reactor Site Criteria."
61. 10 CFR Part 140, "Financial Protection Requirements and Indemnity Agreements."
62. 10 CFR Part 19, "Notices Instructions and Reports to workers: Inspection and Investigation."
63. 10 CFR Part 20, "Standards for Protection Against Radiation."
64. 10 CFR Part 30, "Rules of General Applicability to Domestic Licensing of Byproduct Material."
65. 10 CFR Part 37, "Physical Protection of Category 1 And Category 2 Quantities of Radioactive Material."
66. 10 CFR Part 40, "Domestic Licensing of Source Material."
67. 10 CFR Part 50 Appendix C, "A Guide for the Financial Data and Related Information Required To Establish Financial Qualifications for Construction Permits and Combined Licenses."
68. 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities."

69. 10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."
70. 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants."
71. 10 CFR Part 52, Appendix E, "Design Certification Rule for the ESBWR Design."
72. 10 CFR Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants."FR Part 52, Subpart C, "Combined Licenses."
73. 10 CFR Part 55, "Operators' Licenses."
74. 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material."
75. 10 CFR Part 73, "Physical Protection of Plants and Materials."
76. 10 CFR Part 74, "Material Control and Accounting of Special Nuclear Material."
77. 10 CFR Part 74, Subpart B, "General Reporting and Recordkeeping Requirements."
78. ANSI N15.8-2009, "Nuclear Material Control Systems for Nuclear Power Plants." 2009.
79. ANSI/ANS-3.1-1993, "American National Standard for Selection, Qualification, and Training of Personnel for Nuclear Power Plant."
80. DOE/EIA-0383(2012) (U.S. Department of Energy/U.S. Energy Information Administration's), "Annual Energy Outlook 2012 with Projections to 2035."
81. *Federal Register*, 79 FR 52357-52359, "Final Standard Review Plan on Foreign Ownership, Control and Domination," September 28, 1999.
82. *Federal Register*, 79 FR 61944, "Final Rule: Economic Simplified Boiling-Water Reactor Design Certification," October 15, 2014.
83. *Federal Register*, 81 FR 24900, "North Anna Unit 3 combined license (COL) application from Dominion Virginia Power (Dominion)," April 27, 2016.
84. *Federal Register*, 81 FR 26837, "North Anna Unit 3 combined license (COL) application from Dominion Virginia Power (Dominion)," May 4, 2016.
85. *Federal Register*, 81 FR 29308, "North Anna Unit 3 combined license (COL) application from Dominion Virginia Power (Dominion)," May 11, 2016.
86. *Federal Register*, 81 FR 31263, "North Anna Unit 3 combined license (COL) application from Dominion Virginia Power (Dominion)," May 18, 2016.
87. GEH ESBWR Design Control Document (DCD), Revision 10, April 2014 (ADAMS Accession No. ML14104A929).
88. Keystone Center report entitled Nuclear Power Joint Fact-Finding, 2007.
89. MIT (Massachusetts Institute of Technology), Interdisciplinary study entitled The Future of Nuclear Power, 2003.

90. NEA (Nuclear Energy Agency) of the Organization for Economic Cooperation and Development 2005 update on Projected Costs of Generating Electricity.
91. NEI 06-13A, Revision 2, "Template for an Industry Training Program Description," March 2009 (ADAMS Accession No. ML090910554).
92. NEI 07-03A, Revision 0, "Generic FSAR Template Guidance for Radiation Protection Program Description," May 2009 (ADAMS Accession No. ML091490684).
93. NEI 07-08, Revision 3, "Generic FSAR Template Guidance for Ensuring that Occupational Radiation Exposures are as Low as is Reasonably Achievable (ALARA)," November 2008 (ADAMS Accession No. ML083380351).
94. NEI 07-08A, "Generic FSAR Template Guidance for Ensuring that Occupational Radiation Exposures Are As Low As Is Reasonably Achievable (ALARA)," October 2009 (ADAMS Accession No. ML093220178).
95. NFPA 801, "Standard for Fire Protection for Facilities Handling Radioactive Materials," 2008.
96. NFPA 804, "Standard for Fire Protection for Advanced Light Water Reactor Electric Generating Plants," 2006.
97. NRC BL 2005-02, "Emergency Preparedness and Response Actions for Security-Based Events," July 18, 2005 (ADAMS Accession No. ML051740058).
98. NRC GL 1981-38, "Storage of Low-Level Radioactive Wastes at Power Reactor Sites," November 10, 1981 (ADAMS Accession No. ML031110064).
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