

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS
DIVISION OF FUEL CYCLE SAFETY, SAFEGUARDS, AND ENVIRONMENTAL REVIEW

FINAL ENVIRONMENTAL ASSESSMENT
FOR THE AMENDMENT OF THE U.S. NUCLEAR REGULATORY COMMISSION
LICENSE NUMBER: SNM-2507 FOR THE NORTH ANNA POWER STATION
INDEPENDENT SPENT FUEL STORAGE INSTALLATION IN LOUISA COUNTY, VIRGINIA

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ACRONYMS

ac	acres
ALARA	as low as is reasonably achievable
AQCR	air quality control region
ACHP	Advisory Council on Historic Preservation
BPRAs	Burnable Poison Rod Assemblies
CoC	Certificate of Compliance
CFR	<i>Code of Federal Regulations</i>
DSC	Dry Shield Canisters
DOE	U.S. Department of Energy
EA	environmental assessment
EPRI	Electric Power Research Institute
ESA	Endangered Species Act of 1973
ESP	Early Site Permit
FONSI	Finding of No Significant Impact
FR	<i>Federal Register</i>
FSAR	Final Safety Analysis Report
ft	feet
FWS	U.S. Fish and Wildlife Service
GWd/MTU	gigawatt days per metric ton of uranium
ha	hectares
HSM	Horizontal Storage Modules
in.	inches
ISFSI	independent spent fuel storage installation
Km	kilometers
kW	kilowatt
LAR	license amendment request
mi	miles
mrem	millirem
mSv	miliSievert
MTU	metric tons of uranium
MWD/MTU	megawatt days per metric ton of uranium
NAPS	North Anna Power Station
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service of the U.S. Department of Commerce
NRC	U.S. Nuclear Regulatory Commission
NRHP	National Register of Historic Places
PWR	Pressurized Water Reactor
RAI	Request for Additional Information
REMP	Radiological Environmental Monitoring Program
SER	Safety Evaluation Report
SHPO	State Historic Preservation Officer
SNM	Special Nuclear Materials
TLD	Thermoluminescent dosimeter
TN-32B	Transnuclear-32
TN-32B HBU	Modified TN-32 High Burn-up Cask
TPD	Thimble Plugging Devices
TS	Technical Specifications
USCB	U.S. Census Bureau

**FINAL ENVIRONMENTAL ASSESSMENT
FOR THE PROPOSED LICENSE AMENDMENT OF
U.S. NUCLEAR REGULATORY COMMISSION LICENSE NUMBER: SNM-2507
FOR THE NORTH ANNA POWER STATION
INDEPENDENT SPENT FUEL STORAGE INSTALLATION IN LOUISA COUNTY, VIRGINIA**

1.0 INTRODUCTION

By letter dated August 24, 2015, Virginia Electric and Power Company (Dominion) submitted an application to the U.S. Nuclear Regulatory Commission (NRC) requesting an amendment to Special Nuclear Materials License Number SNM-2507 (license SNM-2507) for the North Anna Power Station (NAPS) Independent Spent Fuel Storage Installation (ISFSI) located in Louisa County, Virginia (Dominion, 2015a). The NAPS specifically-licensed ISFSI stores spent fuel from NAPS Units 1 and 2. Dominion is requesting to amend the Technical Specifications (TS) in license SNM-2507 in accordance with Section 72.56 of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater than Class C Waste."

Currently, neither the license SNM-2507 nor the TS describe the use of an instrumented dry storage cask to store and gather data on high burnup fuel (Dominion 2015b). Accordingly, Dominion is proposing to revise the TS that address the functional and operating limits, the limiting condition for operation, and the design features to reflect the use of one modified and instrumented TN-32B cask (TN-32B HBU) to store and gather data on high burnup spent fuel from NAPS Units 1 and 2.

The TN-32B cask will be modified to insert thermocouples through the cask lid and into the fuel assemblies to monitor fuel temperatures in the cask (Dominion, 2015b). The data gathered through this proposed license amendment will support the High Burnup Dry Storage Cask Research and Development Project (also referred to as the "High Burnup Dry Storage Research Project") sponsored by the U.S. Department of Energy (DOE) under contract to the Electric Power Research Institute (EPRI). The purpose of this project is to gather data from dry storage systems containing high burnup spent fuel to address long-term dry storage of high burnup fuel (EPRI, 2014).

In accordance with NRC regulations at 10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," that implement the National Environmental Policy Act of 1969 (NEPA), as amended,¹ the NRC staff's environmental review of the proposed license amendment is documented in this final environmental assessment (EA). The purpose of this document is to assess the potential environmental impacts of the proposed license amendment and reasonable alternatives. The NRC noticed the license amendment request and opportunity to request a hearing and petition for leave to intervene in the *Federal Register* (FR) on October 13, 2015 (80 FR 61500). The NRC is also conducting a safety evaluation of this license amendment request, which will be documented in a separate Safety Evaluation Report.

¹ 42 U.S.C. 4321 et seq.

1.1 Background

The NRC authorizes construction and operation of ISFSIs by issuance of general and specific licenses. A specifically-licensed ISFSI is licensed separately from the nuclear power plant license and requires an application to perform the licensed activities. In 1995, Dominion submitted an application for a specifically-licensed ISFSI to store spent fuel on the NAPS site. In support of Dominion's application to construct and operate the specifically-licensed ISFSI, the NRC staff prepared a final EA (NRC, 1997) and determined that the construction and operation of the ISFSI would not have a significant impact on the quality of the human environment (62 FR 16202). On June 30, 1998, the NRC issued a 20-year license to Dominion to receive, possess, store, and transfer the NAPS Units 1 and 2 spent fuel to a specifically-licensed ISFSI located on the NAPS site. License SNM-2507 allows Dominion to store 84 TN-32 sealed surface storage casks (TN-32 casks) on three pads (i.e., 28 TN-32 casks per pad). Each TN-32 cask is designed to hold 32 pressurized water reactor (PWR) fuel assemblies (NRC, 1997). Currently, the specifically-licensed ISFSI consists of one pad (Pad 1) with 27 TN-32 casks.

In 2003, the NRC approved a license amendment request to permit the use of the TN-32 storage casks to store NAPS Units 1 and 2 spent fuel with a higher initial enrichment and burnup at the NAPS specifically-licensed ISFSI. Specifically, the amendment requested that the enrichment and burnup limits [i.e., less than or equal to 3.85 percent (weight uranium-235) and less than or equal to 40,000 megawatt days per metric ton of uranium (MWD/MTU), respectively] be revised to allow storage of fuel with initial enrichment less than or equal to 4.35 percent (weight uranium-235), assembly average burnup less than or equal to 45,000 MWD/MTU, and heat generation less than or equal to 1.02 kW/assembly in the TN-32 casks. In support of the NRC's review and approval of this license amendment request, the NRC staff prepared an EA and determined that the amendment would not significantly impact the quality of the human environment (68 FR 35013).

Dominion also operates a generally-licensed ISFSI, referred to as Pad 2. A general license authorizes a nuclear power plant licensee to store spent fuel in NRC-approved casks at a site that is licensed to operate a power reactor under 10 CFR Part 50 or 10 CFR Part 52. Dominion's generally-licensed ISFSI uses the NUHOMS-HD² dry fuel storage system, which has been approved to store low and high burnup spent fuel (NRC, 2011). Dominion's Pad 2 was designed to accommodate 40 horizontal storage modules (HSM) (Dominion, 2016b). Currently, 40 HSMs have been installed and 25 have been loaded with Dry Shield Canisters (DSC) containing low and high burnup spent fuel assemblies (Dominion, 2016b). The NAPS specifically-licensed ISFSI Pad 1 is located west-adjacent to the generally-licensed ISFSI Pad 2. The proposed license amendment only applies to the NAPS specifically-licensed ISFSI Pad 1.

1.2 Proposed Action

License SNM-2507 allows Dominion to store spent fuel from NAPS Units 1 and 2 with burnup less than or equal to 45,000 MWD/MTU in the specifically-licensed ISFSI. In accordance with license SNM-2507, Dominion uses the TN-32B cask, which is certified for storage of spent fuel with burnup less than 45,000 MWD/MTU. Dominion is requesting to amend license SNM-2507 and revise the TS to load and store high burnup spent nuclear fuel (i.e., spent fuel with burnup greater than 45,000 MWD/MTU) from NAPS Units 1 and 2 in a single, modified (and instrumented) TN-32B cask (TN-32B HBU).

² See NRC Certificate of Compliance 1030 under general licenses in 10 CFR 72.214.

Specifically, Dominion is proposing the following changes to the TS: (i) adding the spent fuel assembly limits for the modified TN-32B HBU cask as Table 2.1-1, (ii) adding the decay heat load methodology for the spent fuel to be stored in the modified TN-32B HBU cask as Table 2.2, (iii) clarifying that Figure 2.1-4, which describes the minimum acceptable cooling time in years as a function of burnup and initial enrichment, only applies to the TN-32 casks, not the TN-32B HBU cask, (iv) describing the cooling time requirements for the spent fuel to be stored in the TN-32B HBU cask in Figure 2.1-4, “Zone Heat Load Limits for TN-32B HBU Cask,” (iv) revising surveillance requirement 3.1.2.1 to verify helium backfill every 96 hour interval after the initial 6-hour frequency is met to ensure that the helium backfill pressure is maintained within the limit even during the extended period of thermal testing and cavity gas testing that will be conducted after vacuum drying, (v) revising surveillance requirement 3.1.3.1 to move the frequency for verifying that the combined helium leak rate is within the limit to Table 3-1, which will also address the frequency requirement for the TN-32B HBU cask, and indicate that the combined helium leak rate test for the TN-32B HBU cask will be completed within 23 days after completing the initial helium backfill pressure, (vi) clarify that the technical specification 3.3.1, “SSSC Average Surface Dose Rates,” applies only to TN-32 casks, (vii) adding limiting condition of operation 3.3.2 to reflect a different dose rate limit for the top of the TN-32B HBU, (viii) re-numbering technical specification 3.3.2 to 3.3.3 and clarifying its applicability to both the TN-32 and TN-32B HBU casks, and (ix) adding the TN-32B HBU cask as an available design for spent fuel storage (Dominion, 2015a).

The TN-32B HBU cask will be modified by inserting thermocouples through the cask lid and into the fuel assemblies, which will allow continuous monitoring of fuel temperature as part of the High Burnup Dry Storage Research Project. The TN-32B HBU cask will be placed in the single, vacant location in Pad 1 under license SNM-2507 (Dominion, 2015b).

Dominion anticipates loading the TN-32B HBU cask with high burnup spent fuel, sealing, and placing it in the single remaining space in Pad 1 of the specifically-licensed ISFSI by the end of August 2017 (Dominion, 2015a). Dominion plans to store the TN-32B HBU for a period of approximately ten years, during which fuel temperatures inside the cask will be monitored (Dominion, 2015a). The cask would then be shipped to a fuel examination facility for characterization of the fuel assemblies (Dominion, 2015a). Prior to shipping the fuel, Dominion would coordinate with DOE, EPRI, and other stakeholders, as appropriate, to ensure that all the necessary permits and approvals are obtained (Dominion, 2016a).

1.3 Purpose and Need

With newer fuel technology, reactors are capable of achieving higher burnup, resulting in spent fuel with a higher temperature and greater neutron radiation. High burnup spent fuel is typically defined as spent fuel with a burnup greater than 45 GWd/MTU. High burnup spent fuel is typically cooled longer in a spent fuel pool than low burnup spent fuel before it can be placed into a dry storage system. Low burnup spent fuel has been stored in dry storage casks longer than high burnup fuel and, thus, there are more casks storing low burnup spent fuel than there are storing high burnup spent fuel and therefore there is more data on low burnup spent fuel. With the increased use of high burnup fuel there is a need to better understand the long-term behavior of dry stored high burn-up spent fuel.

Dominion is requesting to amend its specifically-licensed ISFSI to load and store high burnup fuel (greater than 45,000 MWD/MTU) from NAPS Units 1 and 2 in one modified TN-32B HBU cask to support DOE and EPRI’s High Burnup Dry Storage Research Project. As part of this project, Dominion will monitor the fuel temperature in this cask and collect data on the long-term

behavior of high burnup fuel (EPRI, 2014). The project results will be available for the nuclear industry (Dominion, 2015a). The information will be used to inform dry cask designs and ISFSI license renewal and new applications (Dominion, 2015a).

1.4 Scope of the Environmental Analysis

The NRC staff has evaluated the potential environmental impacts associated with the proposed action of amending SNM-2507, and alternatives to the proposed action, and has documented the results of the assessment in this final EA. The NRC staff performed this review in accordance with the requirements of 10 CFR 51 and staff guidance found in NUREG-1748, *Environmental Review Guidance for Licensing Actions Associated with NMSS Programs* (NRC, 2003).

The following documents were reviewed and considered in the development of this final EA:

- Information contained in Dominion’s license amendment request dated August 24, 2015 (Dominion, 2015a);
- Information contained in Dominion’s environmental report dated October 8, 2015 (Dominion, 2015b);
- Responses to NRC’s Requests for Additional Information dated March 22, 2016 (Dominion, 2016a); and
- Information contained in previous NRC environmental review documents for the NAPS site and ISFSI (NRC, 1997, 2006, 2010, and 2015a).

The NRC staff is using the EA prepared for the original license application (NRC, 1997) as a basis for this final EA and is only focusing on changes as a result of the proposed action. The conclusions presented in this final EA are based on all aspects of the proposed action and the affected environment. To limit redundancy and to focus this final EA on the proposed action, the NRC staff refers to past environmental review documents for more detailed descriptions of those aspects of analysis that remain unchanged.

1.4.1 Continued Storage of Spent Nuclear Fuel

On September 19, 2014, the NRC published a final rule at 10 CFR 51.23, “Environmental Impacts of Continued Storage of Spent Nuclear Fuel Beyond the Licensed Life for Operations of a Reactor” (79 FR 56238). That rule, effective October 20, 2014, codified the NRC’s generic determinations in NUREG-2157, “*Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel*” regarding the environmental impacts of the continued storage of spent fuel. In Commission Order CLI-14-08 (NRC, 2014), the Commission held that the revised 10 CFR 51.23 and associated NUREG-2157 cured the deficiencies identified by the court in *New York v. NRC*, 681 F.3d 471 (D.C. Cir., 2012) and stated that the rule satisfies the NRC’s NEPA obligations with respect to continued storage.

In EAs prepared for future reactor and spent fuel storage facility licensing actions, 10 CFR 51.23(b) now requires the NRC to consider the environmental impacts of continued storage, if the impacts of continued storage of spent fuel are relevant to the proposed action. In this case, the proposed action, if approved, will not change the specifically-licensed ISFSI’s authorized capacity or license term (e.g., it will not extend the term of the license), nor will it change the nature of the activities currently licensed by the NRC. Therefore, the NRC has determined that the impacts of continued storage of spent fuel are not relevant to the proposed action.

Accordingly, the NRC has not considered the environmental impacts of continued storage in this final EA.

2.0 ALTERNATIVES TO THE PROPOSED ACTION

The alternatives considered in this final EA are the no-action alternative and use of the NUHOMS canisters under the generally-licensed ISFSI Pad 2. Under the no-action alternative, the NRC would deny the license amendment request. Denial of the request would leave license SNM-2507 as is, and would not allow Dominion to load and store high burnup fuel in Pad 1 of the specifically-licensed ISFSI and gather real time data to support DOE's and EPRI's High Burnup Dry Storage Research Project. The NRC staff does not anticipate any environmental impacts as a result of the no-action alternative.

The use of the NUHOMS canisters under the generally-licensed ISFSI Pad 2 was considered because Dominion stores spent fuel from the NAPS in a generally-licensed ISFSI (Pad 2) using the NUHOMS-HD dry fuel storage system. The NUHOMS-HD dry fuel storage system is approved to store low and high burnup spent fuel (NRC, 2011). In its license amendment request, Dominion explained that the NUHOMS canisters are welded shut and placed inside concrete modules, making the use of thermocouples to monitor and collect real time data about the stored spent fuel challenging (Dominion, 2015b). As a result, real time data gathering about storage of high burnup fuel to support the DOE and EPRI's High Burnup Dry Storage Research Project would be difficult. Therefore, use of the NUHOMS-HD canisters to store high burnup spent fuel with the purpose of gathering this data is not considered a reasonable alternative.

3.0 AFFECTED ENVIRONMENT

The NAPS ISFSI is located within the owner controlled area (OCA) of the NAPS site, approximately 610 meters (2,000 ft.) southwest of the NAPS Units 1 and 2 OCA (NRC, 1997). The closest site boundary to the ISFSI is approximately 2,500 ft. (762 m) south-southwest at the exclusion area (NRC, 2015a). Two operating nuclear generating units, Units 1 and 2, are currently located on the NAPS site, and a small hydroelectric power plant is located at the base of the North Anna Dam (NRC, 2006). The ISFSI occupies approximately 4.4 hectares (ha) (11 acres [ac]) of the approximately 422 ha (1043 ac) of land occupied by the NAPS site (NRC, 1997). The NAPS ISFSI Pad 1 is located west and adjacent to ISFSI Pad 2, a generally-licensed ISFSI.

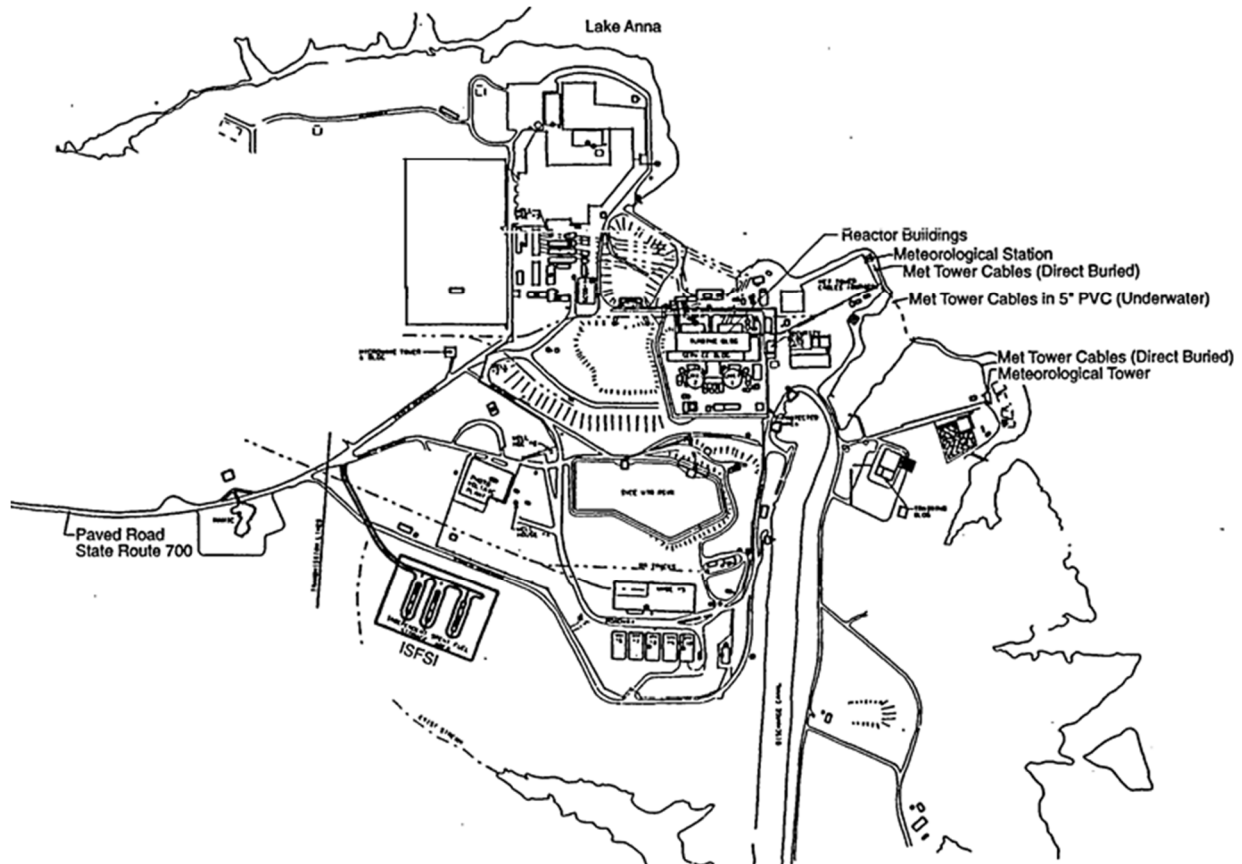


Figure 1. NA Site Layout (NRC, 1997)

The NAPS site is located in rural Louisa County, Virginia, approximately 64 kilometers (km) (40 miles [mi]) northwest of Richmond, Virginia (NRC, 2002) and approximately 22 km (35 mi) southwest of Fredericksburg, Virginia (NRC, 2015d). The NAPS site is located approximately 10 km (6 mi) northeast of the town of Mineral. The NAPS site is located on a peninsula on the southern shore of Lake Anna, a man-made reservoir. The nearest community is the town of Mineral, approximately 10 km (6 mi) southwest of the NAPS site. The nearest permanent resident is located approximately 872 m (2,860 ft.) southeast of the NAPS ISFSI (NRC, 2015a).

Downstream of the North Anna Dam, the North Anna River flows southeasterly, joining the South Anna River to form the Pamunkey River about 43 km (27 mi) southeast of the NAPS site. Lake Anna, which was created as a source of cooling water for NAPS site, has become a popular recreation area, and the dam provides downstream flood control. However, except for water use by Dominion for NAPS Units 1 and 2, the lake is not generally used as a source of potable or industrial water. Water for domestic use at the NAPS site is taken from groundwater wells (NRC, 1997).

The Blue Ridge Mountains lie approximately 73 km (45 mi) northwest of the site. The predominant land use in Louisa County is forestry. As described in the EA for the construction and operation of the NAPS ISFSI (NRC, 1997), the climate of the site is modified continental. The Blue Ridge Mountains act as partial barriers to winter storms, moderating their intensity. As discussed in NUREG-1811, "*Environmental Impact Statement for an Early Site Permit (ESP) at*

the North Anna ESP Site” (NRC, 2006), the site can experience severe weather in the form of thunderstorms, hail, tornadoes, snow and ice, and hurricanes.

Louisa County is located within the Northeastern Virginia Intrastate Air Quality Control Region (AQCR) (40 CFR 81.144). All counties in this AQCR are designated as “in attainment” or “unclassified” for all criteria pollutants for which National Ambient Air Quality Standards have been established (40 CFR 81.347). Attainment areas are areas where the ambient air quality levels are better than the levels designated by the U.S. Environmental Protection Agency.

The socioeconomic region of influence (ROI) is defined as the area in which the NAPS employees and their families reside, spend their income, and use their benefits, thereby affecting economic conditions in the region. The socioeconomic ROI consists of Louisa County, Virginia. Louisa County has two incorporated towns, Louisa and Mineral. Louisa County has a population of approximately 34,602 (USCB, 2015). The town of Mineral has a population of approximately 479 (USCB, 2014).

The area around the NAPS ISFSI is rich in prehistoric and historic Native American and historic Euro-American resources. Section 2.9.2, “*Historic and Cultural Resources at the North Anna ESP Site*,” of NUREG-1811 provides a full discussion about historic and cultural resources (NRC, 2006). However, there are no points in the immediate ISFSI site area of historic, archaeological, or geologic significance (NRC, 1997).

A radiological environmental monitoring program (REMP) has been conducted around the NAPS site since 1976. The NAPS REMP report is submitted to the NRC annually in accordance with NAPS Unit 1 and 2 Technical Specification 5.6.2 and NAPS ISFSI Technical Specification 5.5.2. The environmental radiation doses are measured using thermoluminescent dosimeters (TLDs). According to the 2015 REMP report (Dominion, 2016c), TLD results have remained essentially constant over the years. In the 2015 REMP, the licensee estimated that the maximum total body dose calculated for a hypothetical individual at the site boundary due to liquid and gaseous effluents released during 2015 was 0.0024 milliSievert (mSv) (0.24 millirem [mrem]) (Dominion, 2015c) compared to the approximately 6.2 mSv (620 mrem) an individual can expect to receive from background radiation. On an annual basis, Dominion also submits its Annual Radioactive Effluent Release Report, which provides the results of its radioactive effluent control program conducted in accordance with North Anna Units 1 and 2 Technical Specification 5.6.3 [10 CFR 50.36a] and NAPS ISFSI Technical Specification 5.5.2c [10 CFR 72.44(d)(3)]. In the 2015 report, Dominion reported no radioactive liquid or gaseous effluent releases from the ISFSI during calendar year 2015 (Dominion, 2016d).

4.0 ENVIRONMENTAL IMPACTS

The NRC staff reviewed the applicant’s license amendment request (Dominion, 2015a) and environmental report (Dominion, 2015b) and evaluated the potential environmental impacts to the various resources of the affected environment due to the proposed action and the no-action alternative. The NRC staff used the guidance outlined in NUREG-1748 (NRC, 2003) in its evaluation. In accordance with this guidance, the NRC staff evaluated the direct effects, indirect effects, and cumulative impacts that each resource area may encounter from the proposed action and the no-action alternative. The NRC staff categorizes environmental impacts in terms of small, moderate, or large, defined as follows:

- **SMALL**—environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.

- MODERATE—environmental effects are sufficient to alter noticeably, but not to destabilize important attributes of the resource.
- LARGE—environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

4.1 Proposed Action

The proposed action is described above in Section 1.2. The environmental impacts for the proposed amendment to license SNM-2507, i.e., placing one modified TN-32B HBU cask containing high burnup fuel on Pad 1 of the NAPS specifically-licensed ISFSI, are addressed below. The NRC is conducting a safety evaluation of the proposed license amendment pursuant to 10 CFR part 72, “Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater Than Class C Waste,” and the results will be documented in a separate Safety Evaluation Report.

4.1.1 Radiological Impacts

The specifically-licensed ISFSI is located inside the NAPS owner controlled area (Dominion, 2015b). The closest site boundary is 2,500 ft. (762 m) from the ISFSI (Dominion, 2015b). External exposure to direct and scattered radiation is the primary pathway of radiation exposure from the ISFSI to workers, the public, and biota.

New activities would be expected as a result of this license amendment request. These activities include the installation of seven thermocouple lances and obtaining a cavity gas sample (Dominion, 2016a). The licensee is proposing to make seven new penetrations to the lid's confinement boundary and shield plate and the thermocouple lance assemblies would be secured in each of the seven penetrations (Dominion, 2015a). Each lance would be inserted into a designated guide tube in the spent fuel assembly loaded under each penetration (Dominion, 2015a). When the thermocouple lance is inserted into the cask cavity, the outer lance sheath would become part of the confinement boundary. Dominion is proposing to use double metallic, silver-jacketed O-rings seal for the thermocouple closure assembly (Dominion, 2015a). The licensee would also modify the overpressure monitoring system to monitor for leakage of the inner seal space of each double metallic silver O-ring seal (Dominion, 2015a).

The TN-32B HBU cask would be in a vertical configuration from the beginning of loading operations through storage on the ISFSI pad (Dominion, 2016a). Dominion's response to the RAIs also clarified that changes to routine operations would consist of downloading the data from the data logger on a quarterly basis (Dominion, 2016a). Dominion expects to perform this download during the quarterly ISFSI inspection to minimize unscheduled entries into the ISFSI area (Dominion, 2016a).

Worker dose rates from the loading, placement, and maintenance of the TN-32B HBU cask were estimated by the licensee. The licensee estimated that worker doses would increase for the TN-32B HBU cask when compared to the TN-32 casks analysis because the TN-32B HBU cask will contain spent fuel assemblies with higher enrichment, burnup, and initial uranium weight; and workers would be in close proximity to the cask to install the thermocouple lances, obtain a cavity gas sample, and assemble and install a data package mounted on the cask (Dominion, 2015a). Although doses to workers could be greater than those associated with the TN-32 casks, the estimated doses would be less than the regulatory limits in 10 CFR Part 20

and 10 CFR Part 72. In addition, the licensee indicated that operational techniques would be implemented to reduce the exposure time and increase the distance to maintain does as low as reasonably achievable (ALARA) (Dominion, 2016a).

Dominion calculated the contribution to dose rates around the NAPS specifically-licensed ISFSI as a result of this license amendment request. Dominion assumed that the site boundary would be at distance of 500 meters from the cask (compared to the distance from the ISFSI to closest point to the controlled area boundary, approximately 2,500 ft. (762m)) and determined that the total dose rate would be 0.937 mrem/year (Dominion, 2015a). The NAPS ISFSI safety analysis report indicates that the maximum combined radiation contribution to the nearest permanent resident from the operation of the ISFSI and the NAPS Units 1 and 2 is 5.10 mrem/year. Therefore, adding the total dose rate from the placement of the TN-32B HBU cask would result in a total combined dose rate of 6.037 mrem/year, which is below the 25 mrem/year regulatory limit in 10 CER 72.104 (Dominion, 2015a). In addition, the NRC reviews and oversees casks to ensure these are designed and maintained in accordance with the regulatory limits in 10 CFR Part 20 and Part 72. Furthermore, Dominion maintains a radiation protection program for NAPS Units 1 and 2 and the specifically-licensed and generally-licensed ISFSIs in accordance with 10 CFR Part 20 to ensure that radiation doses are ALARA.

Therefore, the NRC staff concludes that the proposed action would result in SMALL and not significant radiological impacts to workers and the public.

4.1.2 Non-Radiological Impacts

The proposed action does not include any physical modification to the ISFSI. Therefore, the NRC staff finds that there would be no impacts to non-radiological resources, including land use, geology and soils, water resources, ecology, threatened and endangered species, meteorology, climate, air quality, noise, historic and cultural resources, visual and scenic resources, socioeconomic resources, transportation, and waste management. Accordingly, the NRC staff concludes that the proposed action would result in a SMALL and not significant non-radiological impacts to these resources.

4.2 Environmental Justice

Under Executive Order 12898 (59 FR 7629), federal agencies are responsible for identifying and addressing potential disproportionately high and adverse human health and environmental impacts on minority and low-income populations. In 2004, the Commission issued, *Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions* (69 FR 52040). Regarding EAs, the NRC's policy statement on environmental justice states, "...If there will be no significant impact as a result of the proposed action, it follows that an EJ review would not be necessary. However, the agency must be mindful of special circumstances that might warrant not making a FONSI. In most EAs, the Commission expects that there will be little or no offsite impacts and, consequently, impacts would not occur to people outside the facility. However, if there is a clear potential for significant offsite impacts from the proposed action then an appropriate EJ review might be needed to provide a basis for concluding that there are no unique impacts that would be significant. If the impacts are significant because of the uniqueness of the communities, then a FONSI may not be possible and mitigation or an environmental impact statement (EIS) should be considered."

In the “Guidelines for Implementation of NEPA as to Environmental Justice Issues” section (69 FR 52040), the NRC explains that special circumstances arise only where the proposed action has a clear potential for off-site impacts to minority and low-income communities associated with the proposed action.

Sections 2.10 in both NUREG-1811 and NUREG-1917 (NRC, 2006, 2010) contain detailed descriptions of minority and low-income populations around the NAPS site. As discussed in Sections 4.1.1 in this final EA, off-site radiation doses from the NAPS ISFSI Pad 1 would remain unchanged for both the proposed action and the no-action alternatives. As discussed in Sections 4.1.2 in this final EA, there would be no non-radiological impacts associated with the proposed action and impacts would be SMALL and not significant for the no-action alternative. The NRC staff does not expect that the proposed action or the alternatives adversely affect any offsite population and, thus, no special circumstances have been identified.

5.0 CUMULATIVE IMPACTS

The NRC staff considered the impacts of the proposed action, as described in Section 4.0 of this final EA, combined with other past, present, and reasonably foreseeable future actions that could affect the same resources impacted by the proposed action. Because there are no expected off-site environmental impacts associated with the proposed action, the NAPS site is the geographic area considered in this cumulative impacts discussion. The time frame considered for future actions extends through 2018, the expiration year of license SNM-2507 for the specifically-licensed ISFSI.

Other actions considered in this discussion of cumulative impacts include the 2015 license amendment to modify the Technical Specifications (TS) 4.2.3, “Storage Pad,” to revise the minimum center-to-center spacing for the TN-32 casks, normal operation and maintenance of the generally-licensed ISFSI Pad 2 (adjacent to ISFSI Pad 1) and NAPS Units 1 and 2. Because there are no non-radiological impacts expected from the proposed action, this discussion focuses only on radiological impacts.

The analysis for the NAPS specifically-licensed ISFSI considers storage of 28 TN-32 casks, only 27 casks have been placed in Pad 1. Placement of the TN-32B HBU cask in Pad 1 would not change the metric tons of uranium (MTU) licensed limit and the heat load would not affect the other 27 TN-32 casks (Dominion, 2016a). Continued operation of ISFSI Pad 2 (under general license NRC CoC No. 1030) is not expected to significantly contribute to cumulative radiological effects at the NAPS site.

Reasonably foreseeable future actions would include the license renewal application for the NAPS specifically-licensed ISFSI (expected 2016) and a potential licensing action for gas sampling of the TN-32B HBU cask. As discussed in section 4.1.1 of this final EA, Dominion calculated the total dose rate from the proposed action and determined that the total dose rate would be 0.937 mrem/year (Dominion, 2015a).

In addition, Dominion maintains a radiation protection program for NAPS Units 1 and 2 and the ISFSI in accordance with 10 CFR Part 20 to ensure that radiation doses are ALARA. Dominion also performs routine radiological monitoring activities, which includes the REMP for NAPS Units 1 and 2 and the ISFSIs. The NAPS REMP report is submitted to the NRC annually in accordance with NAPS Unit 1 and 2 TS 5.6.2 and NAPS ISFSI TS 5.5.2. The direct exposure pathway measures environmental radiation doses by use of TLDs. According to the 2015 NAPS REMP report (Dominion, 2016c), TLD results have remained essentially constant over

the years. The licensee's estimated maximum dose to a hypothetical individual at the site boundary due to liquid and gaseous effluents released during 2015 was to 0.0024 mSv (0.24 mrem) (Dominion, 2016c), as compared to the approximately 6.2 mSv (620 mrem) an individual can expect to receive from background radiation. Therefore, normal operations of NAPS Units 1 and 2 and the ISFSIs result in radiological doses to members of the public that are a fraction of background levels and are well below regulatory limits.

NUREG-0713, "Occupational Radiation Exposure at NRC Licensed Facilities" (NRC, 2016d), includes a compilation of occupational exposure reports from all NRC-licensed facilities. The review of these data indicates exposure to all workers associated with the NAPS, including the ISFSI, are well below the regulatory limits in 10 CFR 20.1201.

Because the proposed action would result in SMALL and not significant radiological impacts, and Dominion performs routine radiological monitoring and maintains an ALARA program for NAPS Units 1 and 2 and the ISFSI, NRC approval of the proposed license amendment request is not anticipated to significantly contribute to cumulative impacts at the NAPS site.

6.0 FEDERAL, STATE, AND LOCAL AGENCIES

Dominion is responsible for complying with all NRC regulations and other applicable federal, state, and local requirements and statutes. Dominion has stated that no additional regulatory requirements or permits are necessary for this proposed license amendment (Dominion, 2016a).

7.0 CONSULTATIONS

The NRC staff consulted with other agencies regarding the proposed action in accordance with NUREG-1748 (NRC, 2003). These consultations were intended to (i) ensure that the requirements of Section 7 of the Endangered Species Act of 1973 (ESA)³ and Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA)⁴ were met, and (ii) provide the designated state liaison agencies the opportunity to comment on the proposed action.

7.1 National Historic Preservation Act

The NHPA was enacted to create a national historic preservation program, including the National Register of Historic Places (NRHP) and the Advisory Council on Historic Preservation (ACHP). Section 106 of the NHPA requires federal agencies to consider the effects of their undertakings on historic properties. NHPA implementing regulations at 36 CFR Part 800, "Protection of Historic Properties," define an undertaking as "a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a federal agency, including those carried out by or on behalf of a federal agency; those carried out with federal financial assistance; and those requiring a federal permit, license or approval."⁵ Therefore, the NRC's approval of this license amendment request constitutes a federal undertaking. The NRC, however, has determined that the scope of activities described in this license amendment request do not have the potential to cause effects on historic properties, assuming those were present, as the NRC's approval of this license amendment request will not result in construction or land disturbance activities (Dominion, 2016a). Other than the placement of the 28th cask on

³ 16 U.S.C. 1536.

⁴ 54 U.S.C. Sections 300101-307108.

⁵ See 36 CFR 800.16(y).

ISFSI Pad 1 there will be no physical movement of casks. The only changes to routine operations or maintenance activities would be the quarterly downloading of data from the data logger, expected to be performed during the licensee's quarterly ISFSI inspections (Dominion, 2016a). Therefore, in accordance with 36 CFR 800.3(a)(1), no consultation is required under Section 106 of the NHPA. The NRC staff, however, consulted with the Virginia State Historic Preservation Officer (SHPO) by letter dated April 12, 2016 (NRC, 2016a). The NRC staff also consulted with the Pamunkey Tribe of Virginia via letter dated January 21, 2016 (NRC, 2016b).

7.2 The Endangered Species Act

Under Section 7 of the ESA and through its implementing regulations (50 CFR Part 402, Subpart B), prior to taking a proposed action, a federal agency must determine whether: (i) endangered and threatened species or their critical habitats are known to be in the vicinity of the proposed action and if so, whether (ii) the proposed federal action may affect listed species or critical habitats. If the proposed action may affect listed species or critical habitats, the federal agency is required to consult with the U.S. Fish and Wildlife Service (FWS) and/or the U.S. National Marine Fisheries Service (NMFS). The federal agency can either initiate the process to prepare a biological assessment⁶ or alternatively, engage in informal consultation.⁷ Under informal consultation, if the agency determines that the proposed action is not likely to adversely affect endangered or threatened species or their critical habitats, and the FWS or the NMFS, as appropriate, concurs, then the consultation process is terminated and no further action is required on the part of the agency. If the agency cannot make the required informal consultation findings, or if the FWS or the NMFS does not concur with the agency's findings, then the agency must prepare a biological assessment and proceed to formal consultation with either the FWS or the NMFS, as appropriate (50 CFR 402.14). Formal consultation may result in further obligations upon the agency and/or the applicant or licensee.

The proposed action will not result in construction activities or land disturbance and therefore will not affect listed endangered or threatened species or their critical habitats in the vicinity of the NAPS site. The only physical movement of casks will be the placement of the 28th cask on ISFSI Pad 1. Additionally, the only changes to routine operations or maintenance activities will be the quarterly downloading of data from the data logger, expected to be performed by the licensee during the quarterly ISFSI inspections (Dominion, 2016a).

The NRC staff used the FWS Virginia Field Offices' online project review process. This process is intended for use by individuals or organizations requiring the FWS to review or approval their project within the State of Virginia. On April 7, 2016, the NRC staff accessed the FWS Virginia Ecological Services online project review process found at:

<http://www.fws.gov/northeast/virginiafield/endangered/projectreviews.html>.

The Self-Certification Letter stated: "By printing this letter in conjunction with your project review package, you are certifying that you have completed the online project review process for the project named [above] in accordance with all instructions provided, using the best available information to reach your conclusions. This letter, and the enclosed project review package, completes the review of your project in accordance with the Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended (ESA), and the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c, 54 Stat. 250), as amended (Eagle Act). This letter also provides information for your project review under the National Environmental Policy Act of 1969 (P.L. 91-190, 42 U.S.C. 4321-4347, 83 Stat. 852), as amended." A copy of this certification

⁶ See 50 CFR 402.12.

⁷ See 50 CFR 402.13.

letter and the project review package was submitted to FWS Virginia Field Office on May 2, 2016 (NRC, 2016c) in accordance with their certificate validation process.

7.3 Virginia Department of Health

On May 23, 2016, a copy of the draft EA was sent to the Virginia Department of Health (VDH) for comment. VDH responded in an email dated May 31, 2016, from the Director of the Office of Radiological Health for the State of Virginia. The email stated that, "I have read through the Draft Environmental Assessment for the Amendment of the U.S. Nuclear Regulatory Commission License Number: SNM-2507 for the North Anna Power Station Independent Spent Fuel Storage Installation in Louisa County, Virginia (Docket Number: 72-16) and do not have any questions or comments related to this information." (VDH, 2016).

8.0 CONCLUSION AND FINDING OF NO SIGNIFICANT IMPACT

Based on its review of the proposed action, in accordance with the requirements in 10 CFR Part 51, the NRC staff has determined that approval of the license amendment request will not significantly affect the quality of the human environment.

As discussed in this final EA, no significant radiological or non-radiological impacts are expected to result from approval of the license amendment request. Occupational dose estimates associated with the proposed action and continued normal operation and maintenance of the ISFSI are expected to be at ALARA levels and within the limits of 10 CFR 20.1201. Approval of the license amendment request is not expected to result in measurable radiation exposure to a member of the public. Additionally, public exposure associated with normal operation of the ISFSI will be less than the applicable exposure limits in 10 CFR 20 and 10 CFR 72. Therefore, the NRC staff has determined that pursuant to 10 CFR 51.31, preparation of an environmental impact statement is not required for this proposed action, and pursuant to 10 CFR 51.32, a finding of no significant impact (FONSI) is appropriate.

9.0 LIST OF PREPARERS

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