

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 PROPOSED
RENEWAL 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
CFR	<i>Code of Federal Regulations</i>
CoC	certificate of compliance
CVSZ	Central Virginia Seismic Zone
DSC	dry shield canisters
DOE	U.S. Department of Energy
DTS	dry transfer system
EA	environmental assessment
EJ	environmental justice
EPRI	Electric Power Research Institute
ER	environmental report
ESA	Endangered Species Act of 1973, as amended
ESP	early site permit
FONSI	finding of no significant impact
FR	<i>Federal Register</i>
ft	feet
FWS	U.S. Fish and Wildlife Service
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	milliSievert
MTU	metric tons of uranium
MWD/MTU	megawatt days per metric ton of uranium
NAPS	North Anna Power Station
NEPA	National Environmental Policy Act of 1969, as amended
NHPA	National Historic Preservation Act of 1966, as amended
NMFS	National Marine Fisheries Service of the U.S. Department of Commerce
NRC	U.S. Nuclear Regulatory Commission
NUHOMS®	NUHOMS® HD-32PTH dry shield canisters
OCA	owner controlled area
PWR	pressurized water-reactor
RAI	request for additional information
REMP	radiological environmental monitoring program

RPP	radiological protection program
SAR	safety analysis report
SHPO	State historic preservation office
SNM	special nuclear material
TLD	thermoluminescent dosimeter
TN-32	Transnuclear-32 sealed surface storage cask
TN-32B HBU	Modified TN-32B High Burn-up Cask
TS	technical specifications
USCB	U.S. Census Bureau
VDHR	Virginia Department of Historic Resources
WHTF	waste heat treatment facility

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1.0 INTRODUCTION

1.1 Background

By letter dated May 25, 2016, Virginia Electric and Power Company on behalf of itself and the Old Dominion Electric Cooperative (collectively referred to as Dominion) submitted an application to the U.S. Nuclear Regulatory Commission (NRC) requesting renewal of Special Nuclear Materials License Number SNM-2507 (license SNM-2507) for the North Anna Power Station (NAPS) independent spent fuel storage installation (ISFSI) for an additional 40 years (Dominion, 2016). The NAPS specifically licensed ISFSI stores spent nuclear fuel from NAPS Units 1 and 2. On July 21, 2016, the NRC staff accepted Dominion's application for a detailed technical review (NRC, 2016a). The NRC issued a notice in the *Federal Register* (FR) (81 FR 57629; August 23, 2016) providing an opportunity to request a hearing and petition for leave to intervene, and no requests were received. On November 23, 2016, the NRC staff requested additional information (RAI) (NRC, 2016b) regarding the environmental review, and on January 20, 2017, Dominion provided supplemental information in response to the RAIs (Dominion, 2017b).

In accordance with the NRC regulations at Title 10 of the *Code of Federal Regulation* (10 CFR) Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," that implement the National Environmental Policy Act of 1969, as amended, (NEPA)¹ the NRC staff's environmental review of the proposed license renewal is documented in this final environmental assessment (EA). The purpose of this document is to assess the potential environmental impacts of the proposed 40 year license renewal. The NRC is also conducting a safety evaluation of this license renewal request, which will be documented in a separate safety evaluation report.

1.2 North Anna Specifically Licensed ISFSI History

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 nuclear 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 and published the finding of no significant impact (FONSI) on April 4, 1997 (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 Transnuclear-32 (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

¹ 42 U.S.C. 4321 et seq.

(NRC, 1997). Currently, the specifically licensed ISFSI consists of one pad (Pad 1) with 28 spent fuel storage casks.

In 2003, the NRC approved a license amendment request (LAR) 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. 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 LAR, the NRC staff prepared an EA and determined that the amendment would not significantly impact the quality of the human environment and published the FONSI on June 11, 2003 (68 FR 35013).

In 2015, the NRC approved a LAR to revise technical specifications (TS) 4.2.3, "Storage Pad," of the specifically licensed ISFSI, which in part defines the distance between individual casks (center-to-center) on the ISFSI Pad 1. Specifically, the amendment requested that the allowable distance between individual casks be changed from a "nominal 16 feet (ft)" to a "minimum of 14 ft" (center-to-center) for casks with a heat load no greater than 27.1 kW on ISFSI Pad 1. In support of the NRC's review and approval of this LAR, the NRC staff prepared an EA and determined that the amendment would not significantly impact the quality of the human environment and published the FONSI on February 27, 2015 (80 FR 10726).

Finally, while the specifically licensed ISFSI consists of one pad (Pad 1) with 27 TN-32 casks, as currently constructed and operated, the NRC recently approved a LAR (NRC, 2017a) from Dominion to place a 28th cask with high burnup spent nuclear fuel (i.e., spent fuel with burnup greater than 45,000 MWD/MTU) on this specifically licensed ISFSI to support the High Burnup Dry Storage Cask Research and Development Project. This project is being sponsored by the U.S. Department of Energy (DOE) under contract to the Electric Power Research Institute (EPRI). The license amendment allows Dominion to place one modified and instrumented cask with high burnup spent nuclear fuel from NAPS Units 1 and 2 during the fall of 2017 on Pad 1, i.e. a modified TN-32B High Burn-up Cask (TN-32B HBU). As part of NRC's licensing review of this amendment request, the NRC staff prepared an EA in June 2016, and determined that the amendment would not significantly impact the quality of the human environment. The NRC published the FONSI on June 30, 2016 (81 FR 42743). On November 30, 2017, Dominion placed in service the TN-32B HBU cask with high burnup fuel in Pad 1 of the specifically licensed ISFSI.

1.3 North Anna Generally Licensed ISFSI

Dominion also operates a generally licensed ISFSI, referred to as Pad 2. A general license authorizes a nuclear power plant licensee to store spent nuclear fuel in NRC-approved storage 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® HD-32PTH dry shield canisters² dry fuel storage system, which has been approved to store spent fuel with burnup greater than 45 GWD/MTU (i.e., high burnup spent fuel) (NRC, 2011). Dominion's Pad 2 was designed to accommodate 40 horizontal storage modules (HSM) (Dominion, 2017b). Currently, 40 HSMs have been installed and 29 have been loaded with Dry Shield Canisters (DSC) containing spent

² See NRC Certificate of Compliance 1030 under general licenses in 10 CFR 72.214 (NRC, 2011).

fuel assemblies (Dominion, 2017b). The DSCs can hold up to 32 intact PWR fuel assemblies. The NAPS specifically licensed ISFSI Pad 1 is located west and adjacent to the generally licensed ISFSI Pad 2. The proposed license renewal only applies to the NAPS specifically licensed ISFSI Pad 1.

1.4 Proposed Action

License SNM-2507 allows Dominion to store spent nuclear fuel from NAPS Units 1 and 2 with burnup less than or equal to 45,000 MWD/MTU in the specifically licensed ISFSI.³ In accordance with license SNM-2507, Dominion uses the TN-32 cask and a TN-32B HBU cask. Dominion is requesting to renew license SNM-2507 for the NAPS specifically-licensed ISFSI for a 40-year period. The current license will expire on June 30, 2018. The NRC's federal action is the decision whether to renew the license for an additional 40 years. If approved, Dominion would be able to continue to possess, store and continue to load and place casks with spent nuclear fuel at the NAPS specifically-licensed ISFSI in accordance with the requirements in 10 CFR Part 72.

1.4.1 Site Location and Description

The NAPS site is located in rural Louisa County, Virginia, approximately 64 kilometers (km) (40 miles [mi]) northwest of Richmond, Virginia and approximately 22 km (35 mi) southwest of Fredericksburg, Virginia (NRC, 2002). 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 specifically-licensed ISFSI (labeled Pad 1 in Figure 3.1) 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 generally licensed ISFSI is labeled Pad 2 in Figure 3.1. The ISFSI is approximately 2,000 ft southwest of the NAPS Units 1 and 2 protected area and within the boundaries of the North Anna site.

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, the lake is not used as a source of potable or industrial water, except for water use by NAPS Units 1 and 2. Water for domestic use at the NAPS site is taken from groundwater wells (NRC, 1997).

³ The recently approved LAR allows Dominion to store high burnup fuel in one cask to be placed in Pad 1 (NRC, 2017a).



Figure 1.1 View of the ISFSI looking north (Dominion, 2016)

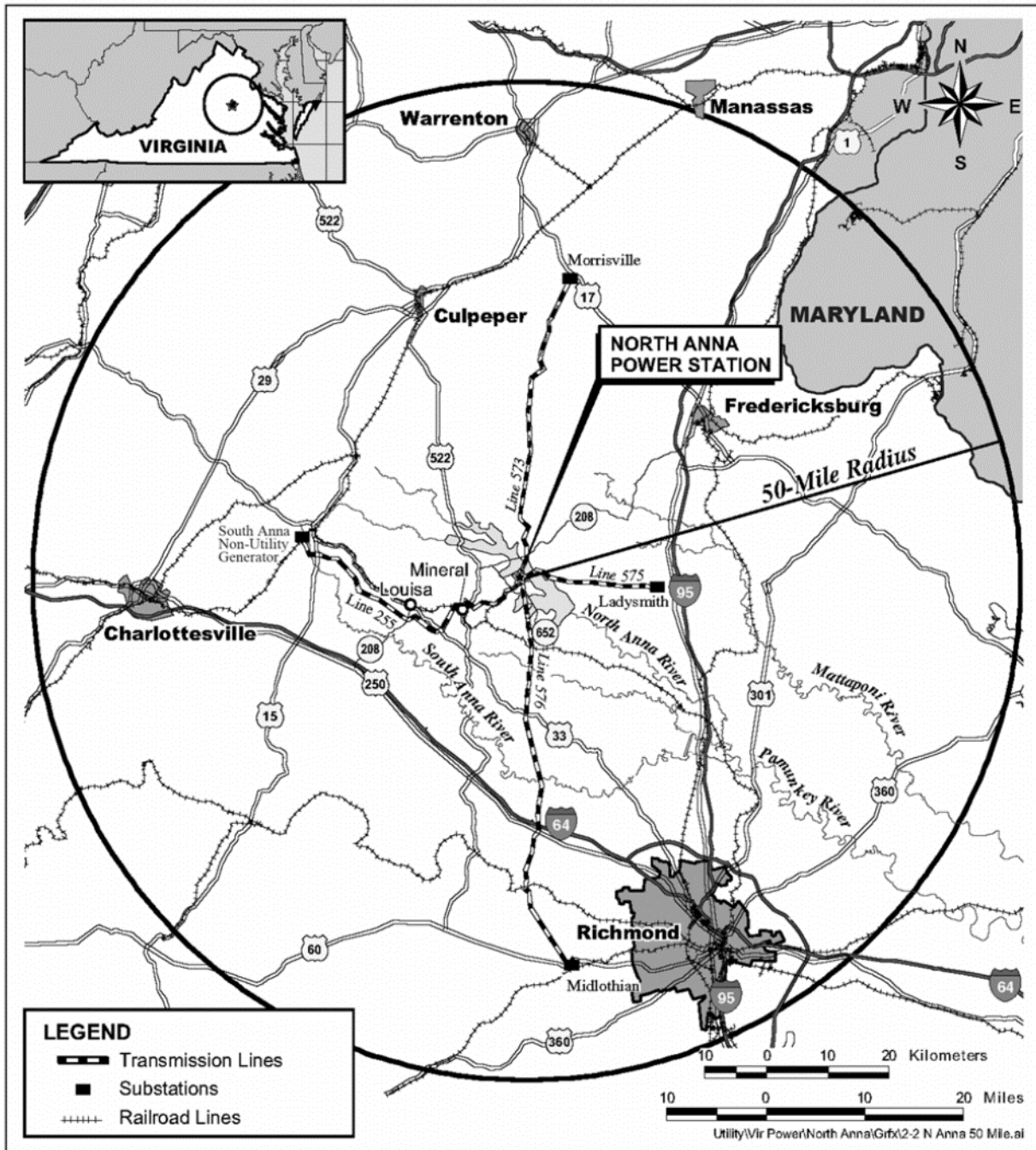


Figure 1.2 Location of North Anna Power Station, 80-km (50-mi) Region (NRC, 2006)

1.4.2 Current ISFSI and Dry Cask Storage System Description

Dominion uses the TN-32 dry storage casks and a TN-32B HBU cask in its specifically licensed ISFSI. The TN-32 is a vertical cylinder that can store up to 32 PWR spent fuel assemblies. An internal fuel basket provides alignment and separation of the spent fuel assemblies (Dominion, 2016). Helium gas provides an inert atmosphere inside the cask. The cask is then sealed. An overpressure system is used to monitor helium leakage through the cask lid seals. The TN-32 storage cask is designed to reduce external radiation levels and to dissipate decay heat and maintain fuel clad temperatures without active cooling systems. The TN-32B HBU cask is an instrumented cask licensed to store high burnup fuel from NAPS Units 1 and 2 to support the High Burnup Dry Storage Cask Research and Development Project sponsored by DOE and EPRI. The NRC recently approved this instrumented cask to be used and placed in the Pad 1 of the specifically licensed ISFSI (NRC, 2017a).

Operations include storage and routine inspections and monitoring of the ISFSI site. The ISFSI does not generate any liquid or gaseous effluents and does not require any water to operate. Low-level radioactive waste is not generated during storage of the spent nuclear fuel in the TN-32 storage casks at the ISFSI (Dominion, 2016). Dominion has indicated that there would be no change in routine operations, and no new construction or land disturbance is being requested as part of this license renewal application (Dominion, 2016). Thus, no additional staff or offsite personnel would be necessary for continued operations during the proposed license renewal period (Dominion, 2016). A security fence surrounds the facility.

Dominion does not anticipate any construction or refurbishment activities beyond normal maintenance and aging management activities (Dominion, 2016). Maintenance activities over the proposed 40-year license renewal period would include cask surface re-coating every 10-15 years; pressure switch calibration every 36 months; maintenance of the security monitoring equipment on a continuous basis and replaced as needed; and periodic inspections. Aging management activities over the same period would include condition monitoring programs such as interseal pressure monitoring, radiation monitoring, and visual inspections (Dominion, 2017b).

1.4.3 Waste Management

Operation of the specifically licensed ISFSI generates no gaseous or liquid wastes, and there are no ventilation or off-gas systems. Although radioactive waste is generated during cask loading operations, the licensee manages this radioactive waste as part of the power plant operations. Operation of the ISFSI does not generate non-radioactive wastes and no sanitary or other wastes are generated (Dominion, 2016).

1.4.4 Decommissioning

10 CFR Section 72.54, titled "Expiration and Termination of Licenses and Decommissioning of Sites and Separate Buildings or Outdoor Areas," identifies the provisions for termination of specific licenses for and decommissioning of ISFSIs. Specifically, 10 CFR 72.54(d) requires each licensee to notify the NRC in writing, and submit within 12 months of this notification, a final decommissioning plan if (1) the licensee has decided to permanently cease principal activities at the entire site or any separate building or outdoor area that contains residual radioactivity such that the building or outdoor area is unsuitable for release in accordance with NRC requirements, or (2) no principal activities under the license have been conducted for a

period of 24 months, or (3) no principal activities have been conducted for a period of 24 months in any separate building or outdoor area that contains residual radioactivity such that the building or outdoor area is unsuitable for release in accordance with NRC requirements. When any of the events in 10 CFR 72.54(d)(1)-(3) occurs, the decommissioning plan would be developed and submitted for NRC review and approval to ensure it is consistent with applicable regulations. Decommissioning would begin upon NRC approval of the plan. The required content of the decommissioning plan is provided in 10 CFR 72.54(g). At that time, the NRC would conduct a separate environmental review associated with the review and approval of the decommissioning plan.

Decommissioning of the ISFSI was discussed in the 1997 EA (NRC, 1997) the NRC prepared as part of the original ISFSI license application review. In that EA, the NRC considered shipment of the casks, either in a shipping container or overpack, or removing the spent nuclear fuel from the casks and transferring them to a shipping container for final offsite disposal. It was noted that Dominion may need to decontaminate the casks, as necessary, and the volume of waste generated during ISFSI decommissioning would be limited to activities associated with surface decontamination of the casks once the spent fuel assemblies are removed. With respect to the pads, fence, and peripheral utility structures, the NRC stated in the 1997 EA that no decontamination or special handling would be required. If decontamination is required, it would be accomplished in accordance with occupational and public dose regulatory limits.

1.5 Purpose and Need for the Proposed Action

ISFSIs are typically used by operating nuclear power plants that require increased spent fuel storage capability because their spent fuel pools have reached capacity. The NAPS spent fuel pool does not have the needed capacity to store all the spent nuclear fuel that the NAPS Units 1 and 2 would generate through the end of their license terms. The NRC issued the operating license for the NAPS Unit 1 on April 1, 1978, and for Unit 2 on August 21, 1980. Both licenses were renewed on March 30, 2003, and will expire April 1, 2038 and August 21, 2040, respectively. Dominion anticipates approximately a total of 5,298 fuel assemblies from NAPS Units 1 and 2 through 2040 (approximately 2,437 metric tons of uranium (MTU) based on 0.460 MTU/assembly) (Dominion, 2017b). In November 2017, Dominion announced its intent to seek a second 20-year license renewal from the NRC in 2020 (Dominion, 2017a). If this second 20-year renewal is approved by the NRC, the NAPS Unit 1 and Unit 2 license terms would be extended through 2058 and 2060, respectively. Therefore, if the NAPS Unit 1 and 2 operate through 2058 and 2060, additional spent fuel would be generated.

To store the spent fuel generated over the license term of the NAPS Units 1 and 2, Dominion has a specifically licensed ISFSI and a generally licensed ISFSI. The NAPS specifically licensed ISFSI and generally licensed ISFSI is needed until a permanent facility (or facilities) is available for offsite final disposition of the spent nuclear fuel. If the NRC renews the NAPS specifically licensed ISFSI as requested, Dominion would be able to continue to possess, store, load, and place casks with spent nuclear fuel generated from the NAPS operations for an additional 40 years at the NAPS specifically licensed ISFSI.

The NAPS specific ISFSI license allows Dominion to construct and operate three pads (each pad can hold 28 spent fuel storage casks); only one of three pads has been constructed. Dominion applied for and was granted a license amendment (Dominion, 2016) to allow a modified and instrumented cask to fill the 28th spot (NRC, 2017a). The 28th cask (TN-32B HBU cask) was placed on November 30, 2017. The single constructed pad currently has 28 spent

fuel storage casks and is filled to its capacity. Dominion does not anticipate expanding the specifically licensed ISFSI, but instead stated that future dry cask storage of spent fuel, including construction of any additional pads would take place under the generally licensed ISFSI (Dominion, 2016). Notwithstanding Dominion's plan to conduct any expansion under the generally licensed ISFSI, as discussed in Section 1.2 of this final EA, the NRC previously evaluated the impacts of construction and operation of three pads in the EA that was conducted for the original license issuance of the specifically licensed ISFSI 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; April 4, 1997).

1.6 Scope of the Environmental Analysis

The NRC staff has evaluated the potential environmental impacts associated with the proposed action of license renewal of license 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 LAR, which included the Environmental Report (ER), dated May 2016 (Dominion, 2016);
- Responses to NRC's RAIs dated January 20, 2017 (Dominion, 2017b); and
- Information contained in previous NRC environmental review documents for the NAPS site and ISFSI (NRC, 1997, 2006, 2010, 2015, 2016).

The NRC staff is using the EA prepared for the original application for the specifically licensed ISFSI (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.

1.6.1 Continued Storage of Spent Nuclear Fuel

On September 19, 2014, the NRC published a revised 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). The rule codifies 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 nuclear fuel beyond a reactor's operating license. In the NRC Memorandum and Order CLI-14-08, 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 satisfied the NRC's NEPA obligations with respect to continued storage. The revised rule requires that EAs prepared for future reactor and spent fuel storage facility licensing actions consider the environmental impacts of continued storage, if the impacts of continued storage of spent fuel are relevant to the proposed action [see 10 CFR 51.23(b)]. In this case, the proposed action, if approved, will extend the term of the license and therefore the impacts of continued storage of spent fuel would be relevant to the proposed action.

Section 4.12 of this EA provides the NRC staff's consideration of the generic environmental impacts of NUREG-2157 for the proposed renewal of the NAPS specifically licensed ISFSI.

2.0 ALTERNATIVES

2.1 Alternatives Considered in Detail

2.1.1 No-Action Alternative

The no-action alternative would consist of denial of Dominion's request to renew the NAPS ISFSI license SNM-2507. The license, however, would continue in effect with respect to possession of licensed material per 10 CFR 72.54(c) until the NRC notifies the licensee in writing that the license is terminated. In addition, Dominion would not be able to place any additional casks on the specifically licensed ISFSI storage pad. Dominion would continue to maintain the stored spent fuel on the ISFSI in a safe and secure condition. Dominion, however, operates a generally licensed ISFSI, where additional spent nuclear fuel from NAPS Units 1 and 2 could be stored.

Impacts from the no-action alternative would only result from activities to continue to ensure the safe and secure operations of the ISFSI. The NRC staff finds that impacts from these activities would be similar in nature and scope to the current maintenance, monitoring, and inspection activities and, thus, would be SMALL and not significant.

Decommissioning of the NAPS ISFSI would commence upon NRC approval of the final decommissioning plan in accordance with 10 CFR 72.54. NRC approval of the decommissioning plan would constitute a federal action under the NEPA and would be subject to a site-specific environmental review.

2.1.2 License Renewal for an Additional 20-Year Term Alternative

The NAPS ISFSI was originally licensed for a 20-year period of operation. For this alternative, the ISFSI license would be renewed for an additional 20-year period consistent with the current license term. The NRC staff considered as an alternative the continued operation of the NAPS ISFSI for an additional 20 years to understand whether the environmental impacts of continued operations for an additional 20 years would differ from those of continued operation for an additional 40 years (proposed action).

For the 20-year alternative, only the potential radiological impacts to public and occupational health are discussed in this EA in Section 4.9. The NRC staff did not separately address the 20-year alternative for the other resource areas, because the staff determined that, for those resource areas, the site operations and the types of potential environmental impacts associated with operation activities during the 20-year interval would be the same as those activities for the proposed action (i.e., the 40-year license renewal).

2.1.3 General License

Dominion also uses its generally licensed ISFSI to store the spent nuclear fuel from the NAPS Units 1 and 2. Dominion's generally licensed ISFSI uses the NUHOMS® HD-32PTH dry fuel storage system, which has been approved to store spent fuel with burnup greater than 45 GWD/MTU (i.e., high burnup spent fuel) (NRC, 2011). Dominion's ISFSI Pad 2 was designed to

accommodate 40 HSMs (Dominion, 2017b) and currently has 29 modules containing spent fuel assemblies (Dominion, 2017b). Dominion could continue to store spent nuclear fuel from the NAPS Units 1 and 2 in the generally licensed ISFSI. Environmental impacts associated with the continued operation of the generally licensed ISFSI would be similar to the environmental impacts of continued operation of the specifically licensed ISFSI as discussed in this EA. If additional storage would be necessary, Dominion could expand the generally licensed ISFSI. Construction and operation impacts from such potential expansion would be similar to those discussed in NRC's 1997 EA for the construction of the NAPS specifically licensed ISFSI (NRC, 1997).

2.2 Alternatives Eliminated from Detailed Consideration

2.2.1 Increase the Storage Capacity of the Onsite Existing Spent Fuel Pool or Construct Additional Onsite Spent Fuel Pool Storage Space

As an alternative to the proposed action, Dominion could increase the storage capacity of the existing spent fuel pool or construct a new spent fuel pool. There would be environmental impacts associated with construction of the new spent fuel pool or expansion of the current spent fuel pool that could be greater in magnitude than continued operation of the specifically licensed ISFSI. Therefore, the NRC staff concludes that increasing the capacity of the NAPS spent fuel pool or constructing an additional onsite spent fuel pool are not reasonable alternatives to renewing the NAPS ISFSI license.

2.2.2 Shipment of Spent Fuel to an Offsite Facility

As an alternative to the proposed action, Dominion could ship its spent fuel to the Surry Power Station (Surry) in Newport News, VA. However, the spent fuel would need to be transferred to the spent fuel pool and then to approved shipping casks. Furthermore, the Surry ISFSI has limited storage capacity and would need to be expanded (i.e., additional construction activities) to store the NAPS spent nuclear fuel (Dominion 2016). In addition to environmental impacts from the transfer of the spent nuclear fuel to the NAPS spent fuel pool and then to the shipping casks, there would also be environmental impacts at the Surry site from the expansion of the Surry ISFSI. Therefore, the NRC staff concludes that this alternative is not reasonable.

Shipment of the spent fuel to a commercial reprocessing facility, a federal repository, or an interim storage facility is not a reasonable alternative, because these facilities are currently not available in the United States. The NRC, however, has received license applications for a consolidated interim storage facility. If approved by the NRC, such a facility could become available during the proposed license renewal period.

3.0 AFFECTED ENVIRONMENT

3.1 Land Use

The NAPS specifically licensed 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, 2015). 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). A third nuclear power unit was

recently licensed by the NRC on May 31, 2017. The unit is designated Unit 3 and would be located north of the ISFSI as shown in Figure 3.1 (Dominion, 2016). The specifically licensed ISFSI occupies approximately 4.4 ha (11 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.

Louisa County also provides a permit for operation of a spent nuclear fuel storage facility consistent with the Louisa County Zoning Ordinances. The permit addresses Pad 1 and Pad 2 and was renewed in 2012 for a seven year period (Dominion, 2016).

The NAPS site zoning is industrial. Land use in the immediate vicinity of NAPS and the areas outside the noted metropolitan areas and transportation corridors is primarily forest and agriculture (Dominion, 2016). The land adjacent to Lake Anna is increasingly residential and Lake Anna, created as a source of cooling water for NAPS site, has become a popular recreation area (Dominion, 2016). The ISFSI is not visible from offsite roads, nearby residences, or recreational users of Lake Anna (Dominion, 2016).

3.2 Transportation

Road access to NAPS is via State Route 700, which intersects State Route 652 approximately one-half mile from the site. The major commuting routes in the immediate vicinity of NAPS are State Routes 700, 652, 208, 618, and U.S. Route 522. These roads all have level of service designation B which means a stable traffic flow with the freedom to select speed but slightly diminished maneuverability (Dominion, 2016).

Dominion does not expect any additional workers beyond those currently working in the nuclear power plant as a result of the proposed additional 40 years of continued operation of the specifically licensed ISFSI. Dominion is licensed to construct and operate three pads in the specifically licensed ISFSI and constructed one pad (Pad 1). Dominion indicated that they do not anticipate constructing additional Pads under the specifically licensed ISFSI (Dominion, 2016). If, however, Dominion decides to expand the capacity of the specifically licensed ISFSI (i.e., it may construct up to two additional pads), additional construction workers could be brought in but would only be temporary and not in significant numbers.

3.3 Geology and Soils

The site is located within the Piedmont Plateau Province, which is characterized by an undulating, rolling topography with as much as 30 m (100 ft) of relief in the general site area. (NRC, 1997). NAPS lies within the Central Virginia seismic zone (CVSZ). Seven bedrock faults of Paleozoic age have been mapped within five miles of the site. The next closest fault is near Mineral, Virginia, six miles west of the site. The CVSZ is an area of persistent, low-level seismicity (Dominion, 2006).

On August 23, 2011, a 5.8 magnitude earthquake was recorded in Mineral, Virginia. During the seismic event, 25 spent fuel storage casks on the NAPS specifically licensed ISFSI Pad 1 shifted from their original positions. A detailed inspection and monitoring was performed by both Dominion and Transnuclear personnel to confirm there was no damage that had any impact on safety-related features (Dominion, 2013). No indications of cracks in the casks or pad were found. Additionally, the NRC inspections found that the casks withstood the

earthquake and concluded there were no immediate safety issues associated with the movement of the casks (NRC, 2011a). The spent nuclear fuel is surrounded by several tons of steel and sealed in an inert helium environment. Radiation surveys indicated no changes to cask surface dose rates (NRC, 2011a).

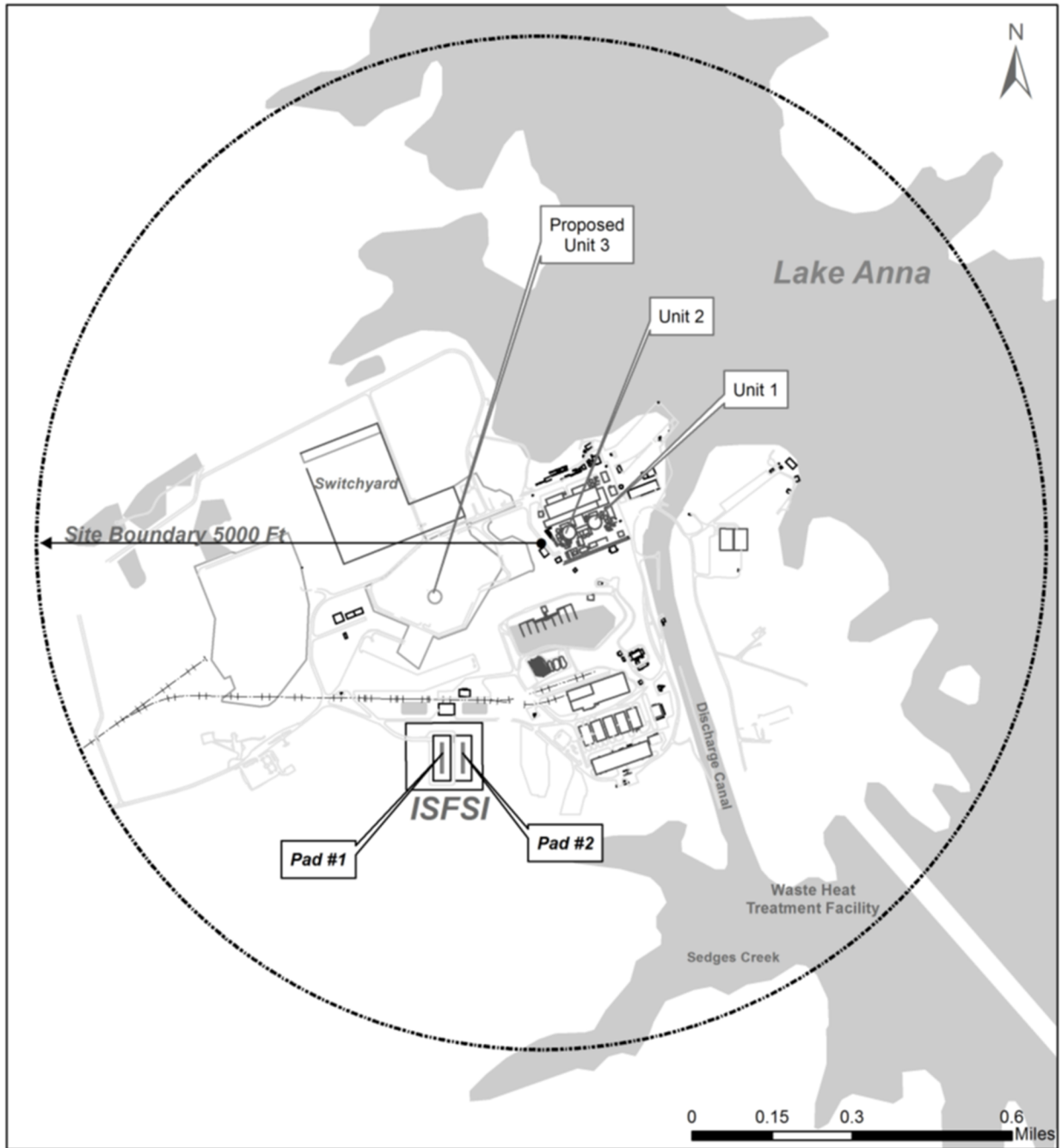


Figure 3.1 NAPS Site Layout (Dominion, 2016)

3.4 Water Resources

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 closest groundwater well to the ISFSI site is approximately 1,500 feet to the west, near the North Anna Nuclear Information Center and the closest offsite residential well is approximately 3,500 feet to the south (Dominion, 2016). In the ER (Dominion, 2016), the licensee notes that precipitation runoff in the vicinity of the ISFSI would drain west to a tributary to Sedges Creek, which drains to the waste heat treatment facility (WHTF). The WHTF is a 3,400-acre facility separated from the North Anna Reservoir by a series of dikes that receives the discharge from the NAPS once-through cooling systems. Dominion also samples shallow groundwater monitoring wells on the NAPS site. Several of these monitoring wells are adjacent to the ISFSI. According to Dominion's ER, sampling of these wells for radionuclides have not identified concentrations in excess of the minimum detectable concentrations (Dominion, 2016).

3.5 Threatened and Endangered Species

Under Section 7 of the Endangered Species Act (ESA),⁴ 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.

In the ER submitted for the license renewal, Dominion described the immediate surroundings of the specifically licensed ISFSI (Dominion, 2016). East of the ISFSI is a narrow forested strip; to the south of the ISFSI there are several hundred acres of hardwood forest that can provide habitat to birds such as blue jay, Northern cardinal, Carolina chickadee, and mammals such as gray squirrel, raccoon, white-tailed deer; west of the ISFSI is a mixed forest bisected by a transmission corridor (Dominion, 2016).

The NRC reached out to the U.S. Fish and Wildlife (FWS) Virginia Ecological Services and completed its online project review process. The results of the review process indicated that a suitable habitat for the Northern long-eared Bat could be present (NRC, 2016c). The licensee, however, has not observed protected species in the vicinity of the ISFSI (Dominion, 2016). The licensee, however, did indicate that state-threatened loggerhead shrikes have been seen in the vicinity, but no breeding pairs have been observed (Dominion, 2016). Also, the licensee indicated that bald eagles have been observed around Lake Anna and one bald eagle was observed nesting on a transmission tower adjacent to the NAPS switchyard in 2015.

3.6 Climate, Meteorology, and Air Quality

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. Summers are generally warm and humid, while winters are generally mild. The Blue Ridge

⁴ 16 U.S.C. 1536.

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.

Based on data collected from the onsite meteorological station (from as early as 1974) the prevailing winds are from the south-southwest at both the 10-m and 48.4-m (33-ft and 159-ft) levels (Dominion 2006), although there is some seasonal variation. Other significant weather events also are associated with several of these events, such as hail and lightning occurring with thunderstorms, and high winds associated with tornadoes. The probability of occurrence of impact from a tropical storm at the site is far greater than a hurricane, given the fact that hurricanes lose intensity and degrade into tropical storms soon after they make landfall.

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.

3.7 Demography, Socioeconomics and Environmental Justice

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 is largely rural with a population of approximately 34,602 (USCB, 2015). The town of Mineral has a population of approximately 479 (USCB, 2015).

The population distribution and projections for Louisa County are based on information from the U.S. Census Bureau website read on October 14, 2016, which relied on 2010 census data and where available updated with 2015 data. Louisa County experienced a 4.2 percent population growth between the years of 2010 and 2015. Employment growth from 2013 to 2014 was 1.7 percent. Louisa County has six schools covering the 511 square miles of land within its borders (USCB, 2015). 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, 2015). Table 3.1 shows the ethnicity breakdown and median income level for both Louisa County and the State of Virginia. Table 3.2 provides information for Louisa County and adjacent counties regarding the percentage of minority and low-income populations.

Table 3.1 Ethnicity and Median Income Levels for Louisa County and State of Virginia^a

Ethnicity Percent, 2010	Louisa County	State of Virginia
White ^b	78.4	68.6
Black ^b	17.7	19.4
American Indian and Alaska Native ^b	0.4	0.4
Asian ^b	0.5	5.5
Native Hawaiian and other Pacific Islander ^b	0.0	0.1
Persons reporting two or more races	2.3	2.9
Persons of Hispanic or Latino origin	2.3	7.9
White persons not Hispanic	77.1	64.8
Median Household Income, 2010	\$57,126	\$64,792

(a) U.S. Census website <https://www.census.gov/quickfacts/chart/PST045215/51109,51>

(b) Includes persons reporting only one race.

(c) Hispanics may be of any race, thus are also included in applicable race categories.

Table 3.2 Percent of Minority and Low-income Populations for Louisa County and Adjacent Counties (data from www.census.gov)

Louisa and Adjacent Counties – Percent 2015 Census Data						Low Income Population
County	Black or African American Alone	Asian Alone	American Indian & Alaska Native Alone	Native Hawaiian and other Pacific Islander Alone	Hispanic or Latino	
Louisa	16.6	0.6	0.5	0.1	2.6	10.6
Orange	13.4	1.1	0.4	0.1	4.5	10.4
Spotsylvania	16.3	2.7	0.4	0.2	8.9	7.7
Caroline*	27.9	0.9	0.8	0.1	4.5	12.0
Hanover	9.5	1.7	0.5	0.1	2.8	6.2
Goochland	17.5	1.4	0.3	0	2.5	7.4
Fluvanna	15.3	0.7	0.3	0.1	3.2	7.8
Albemarle	9.8	4.9	0.4	0.1	5.8	9.5
City of :						
Charlottesville	19.2	7.1	0.4	0.1	5.0	20.7
Richmond	49.4	2.5	0.6	0.2	6.5	24.4
Fredricksburg	24.2	2.9	0.7	0.1	11.5	15.9

*not adjacent but near to Louisa County and near NAPS ISFSI

3.8 Historic and Cultural Resources

Section 106 of the National Historic Preservation Act (NHPA)⁵ requires the NRC staff to take into account the effects of the proposed licensing action on historic properties. The area of potential effect for this proposed action consists of the NAPS specifically licensed ISFSI site. 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).

The NRC staff contacted the Virginia State Historic Preservation Officer (SHPO) and the Pamunkey Native American Tribe. A record of these consultations can be found in Section 4.8 of this EA. Based on this correspondence and past NRC EA's there are no known historic and cultural properties within the NAPS ISFSI.

3.9 Public and Occupational Health and Safety

Risks to occupational health and safety include exposure to radiological and non-radiological hazards. The NAPS specifically licensed ISFSI does not generate any liquid or gaseous effluents to the environment from operation (Dominion, 2016). External radiation from the TN-32 casks could potentially affect workers and members of the public. The cask, however, is a passive system designed to limit exposure to radiation. In its safety analysis report (SAR) (Dominion, 2016), the licensee calculated the doses to workers from external radiation of the ISFSI; doses to workers loading, transporting, and placing the spent nuclear fuel on the ISFSI pad; and doses to workers performing surveillance and maintenance at the ISFSI. The licensee also calculated the annual collective dose assuming full storage capacity of all three Pads licensed under the specifically licensed ISFSI (i.e., 84 TN-32 storage casks); the annual collective dose would be 14.4 person-rem (Dominion, 2016).

The SAR Section 7.5 discusses the licensee's calculation of the annual dose from ISFSI external radiation to the nearest permanent resident as 2.1 millirem per year (mrem/yr), which is below the 25 mrem/yr regulatory limit in 10 CFR 72.104(a). For a U.S. resident, the average annual estimated total effective dose equivalent from natural background and anthropogenic (man-made) radiation sources is about 6.2 milliSieverts (mSv) (620 mrem) (NRC, 2011d). The source of this dose includes cosmic radiation, background radiation (radon and thoron), radiation sources in the Earth (terrestrial sources), naturally occurring radionuclides that exist in the body, medical and occupational sources, industrial sources, and radionuclides present in consumer products.

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 TS 5.6.2 and NAPS ISFSI TS 5.5.2. The environmental radiation doses are measured using thermoluminescent dosimeters (TLDs). The TLD's are placed in two concentric rings around NAPS. The inner ring is located at the site boundary and the outer ring is approximately 5 miles away. Additional TLDs are placed in populated areas and nearby residences. Control TLD's are located at distances considered beyond the measurable influence of NAPS and measure the radiation present due to other causes, both

⁵ 54 U.S.C. Sections 300101-307108.

manmade and natural (Dominion, 2015b). According to the 2014 REMP report (Dominion, 2015b), TLD results have remained essentially constant over the years. In the 2014 REMP, the licensee estimated that the maximum dose to a hypothetical individual at the site boundary due to liquid and gaseous effluents released during 2014 was 0.0039 mSv (0.39 mrem) (Dominion, 2015c) compared to the approximately 6.2 mSv (620 mrem) an individual can expect to receive from background radiation.

Dominion maintains a radiological protection program (RPP) for the NAPS. This program covers both the onsite reactors and the ISFSI. The RPP at the site is carried out by the radiological protection department. Associated procedures include the health physics administrative and technical procedures, such as low as reasonably achievable (ALARA) and the radiological environmental monitoring (Dominion, 2017b). Radiation work permits, surveys, and monitoring are all part of this program and are required for worker access to the ISFSI (Dominion, 2017b). Although the NAPS Unit 1 and 2 license will expire prior to the specifically licensed ISFSI if the proposed ISFSI license renewal is approved, the licensee's RPP will remain in place to meet the radiological protection criteria for the ISFSI (Dominion, 2017b).

3.10 Visual and Scenic

There are no buildings or structures at the North Anna ISFSI that could be visible from outside the site. Therefore, it presents no visual or aesthetic impact on the surrounding area.

3.11 Noise

The NRC's EA developed as part of the NAPS ISFSI original licensing process determined that the only operational noise associated with the ISFSI would result from the transfer of the casks from the NAPS protected area to the ISFSI (NRC, 1997). Dominion is licensed to construct and operate three pads in the specifically licensed ISFSI and has constructed one pad (Pad 1). Dominion indicated that they do not anticipate constructing additional Pads under the specifically licensed ISFSI (Dominion, 2016). If, however, Dominion decides to expand the capacity of the specifically licensed ISFSI (i.e., it may construct up to two additional pads), noise associated with the construction of the pads and placement of any additional casks would occur; however, the noise would only be temporary. The noise associated with the operation of this facility is expected to be minimal.

4.0 ENVIRONMENTAL IMPACTS

The staff reviewed the applicant's ER, collected information from Federal and State agencies and evaluated the environmental impacts to the various resources of the affected environment from the proposed action. The staff used the guidelines outlined in NUREG-1748 (NRC, 2003) in its evaluation. In accordance with this guidance, the staff evaluated the environmental impacts that each resource may encounter from the proposed action. The staff categorizes the impacts in terms of small, moderate, or large.

The definitions are 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 Land Use

Approval of the proposed action will not result in any authorization to construct or expand the specifically licensed ISFSI beyond what was previously approved. Dominion is licensed to construct and operate three pads in the specifically licensed ISFSI and has constructed one pad (Pad 1). Dominion indicated that they do not anticipate constructing additional pads under the specifically licensed ISFSI (Dominion, 2016).

The NRC staff approved a license amendment to add one modified and instrumented cask to store high burnup fuel in the specifically licensed ISFSI (NRC, 2017a). As part of its licensing review for the amendment, the NRC prepared an EA in June 2016 EA (NRC, 2016). The cask, TN-32B HBU cask, was placed on Pad 1 in November 2017. Operation of the specifically licensed ISFSI consists largely of passive maintenance and monitoring activities and primarily involve security monitoring and periodic walk-down surveillance (Dominion, 2016).

Although Dominion has indicated that they do not plan to add pads to the specifically licensed ISFSI, if pads are added, the impacts of the corresponding construction and operation activities would not change the land use. In addition, as discussed in Section 1.2 of this final EA, the NRC previously evaluated the impacts of construction and operation of three pads in the EA that was conducted for the original license issuance of the specifically licensed ISFSI 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). Because there is no new land use as a result of the proposed action, the NRC staff considers the impacts to land use to be SMALL, and would not result in significant environmental impact.

4.2 Transportation

The NRC staff expects that the proposed action would not change the volume of traffic at the NAPS site and surrounding environs. As discussed in Section 3.2 of this EA, Dominion is licensed to construct and operate three pads in the specifically licensed ISFSI and has constructed one pad (Pad 1). The licensee is not requesting any construction or expansion of the existing specifically licensed ISFSI footprint beyond that previously approved. ISFSI workers are part of the general plant population and no additional employees beyond current operational support are needed (Dominion, 2016). If, however, Dominion decides to expand the capacity of the specifically licensed ISFSI (i.e., it may construct up to two additional pads), additional construction workers could be brought in but would only be temporary and not in significant numbers. Based on this information, the NRC staff concludes that the impacts on transportation from the proposed action would be SMALL and would not result in a significant impact.

4.3 Geology and Soils

Dominion is licensed to construct and operate three pads in the specifically licensed ISFSI and has constructed one pad (Pad 1). Dominion indicated that they do not anticipate constructing additional pads under the specifically licensed ISFSI (Dominion, 2016). If, however, Dominion

decides to expand the capacity of the specifically licensed ISFSI (i.e., it may construct up to two additional pads), land disturbance would be expected. The impacts to geology and soil from construction of additional pads were evaluated in the EA for the issuance of the original license, which concluded in a FONSI (NRC, 1997). No impacts beyond those discussed in that EA are expected. In addition, the NRC staff does not expect the continued operation of the specifically licensed ISFSI to impact the underlying geology because the ISFSI has no moving parts that would impact the subsurface. The licensee, in its license renewal application, indicated that no additional impacts to geology or soils are expected from continued operation beyond those described in the NRC's EA for the construction and operation of the NAPS specifically licensed ISFSI (Dominion, 2016). In addition, the specifically licensed ISFSI does not generate any liquid or solid effluents that might impact the geology or soils. Therefore, the NRC staff concludes that the impacts to geology and soils from the proposed action would be SMALL and would not result in a significant impact to such resources.

4.4 Water Resources

The specifically licensed ISFSI does not use, consume, or otherwise generate liquid effluents during normal operation (Dominion, 2016). Water consumption at the NAPS ISFSI is not anticipated to change, and no additional workers beyond the current workforce are required to operate the ISFSI during the proposed license renewal period (Dominion, 2016). Routine operations, surveillance, and maintenance activities would be the only activities that would continue if the license is renewed. Because there are no changes in water consumption or impacts to water quality as a result of the proposed action, the NRC staff concludes that the impacts on water resources from the proposed action would be SMALL and would not be significant.

4.5 Threatened and Endangered Species

Dominion is licensed to construct and operate three pads in the specifically licensed ISFSI and has constructed one pad (Pad 1). Dominion indicated that they do not anticipate constructing additional pads under the specifically licensed ISFSI (Dominion, 2016). If, however, Dominion decides to expand the capacity of the specifically licensed ISFSI (i.e., it may construct up to two additional pads), land disturbance would be expected. If pads are added under the specifically licensed ISFSI, however, the NRC previously evaluated the impacts of such in the EA that was conducted for the original license issuance of the specifically licensed ISFSI. That EA 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; April 4, 1997). Routine operations, surveillance, and maintenance activities would be the only activities that would continue if the license is renewed.

The NRC staff reached out to the FWS Virginia Ecological Services regarding the potential effects that the proposed action could have on the ecology, particularly on endangered and threatened species. The NRC completed the online project review process and the results of the review process indicated that a suitable habitat for the Northern long-eared Bat could be present (NRC, 2016c). The licensee, however, has not observed federal protected species in the vicinity of the ISFSI (Dominion, 2016). The licensee did indicate that state-threatened loggerhead shrikes have been seen in the vicinity, but no breeding pairs have been observed (Dominion, 2016). Also, the licensee indicated that bald eagles have been observed around Lake Anna and one bald eagle was observed nesting on a transmission tower adjacent to the NAPS switchyard in 2015. The proposed action, however, will not authorize new construction

activities beyond what was previously approved. As discussed above, if Dominion decides to construct additional pads under the specifically licensed ISFSI, land disturbance would be anticipated, but would not be expected to affect listed endangered or threatened species or their critical habitats in the vicinity of the NAPS site. Therefore, the NRC concludes that the proposed action would not adversely affect federally-listed threatened and endangered species, nor state-identified rare species or species of special concern.

4.6 Climate, Meteorology, and Air Quality

Dominion has stated that they do not anticipate expanding the capacity of the specifically licensed ISFSI and that the ISFSI does not generate gaseous effluents (Dominion, 2016). Routine operations, surveillance, and maintenance activities are likely the only activities that would continue if the license is renewed. Nonetheless, Dominion is licensed to construct three pads under the specifically licensed ISFSI, although Dominion has only constructed one pad (Pad 1). The environmental impacts of construction of the three pads were evaluated in the EA that NRC prepared for the original issuance of the license and which were found to not have a significant impact on the quality of the human environment (NRC, 1997). Because the proposed action will not result in the authorization of construction activities or other activities that will generate airborne emissions beyond what was previously approved (Dominion, 2016), the NRC staff concludes that impacts on air quality from the proposed action would be SMALL and would not be significant.

4.7 Demography and Socioeconomics

In its license renewal application, Dominion indicated that continued operation of the specifically licensed ISFSI will not require any additional employees to maintain and/or operate the ISFSI (Dominion, 2016). Therefore, the NRC staff does not expect any direct or indirect socioeconomic impacts and concludes that the socioeconomic impacts from the proposed action would be SMALL and would not result in a significant socioeconomic impact.

4.8 Historic and Cultural Resources

As discussed in Section 3.8, there are no known historic or cultural properties within the NAPS ISFSI. Additionally, NRC consulted with the Virginia SHPO and Pamunkey Native American Tribe and no historic or cultural resources that could be affected by the proposed action were identified. Also, Dominion has stated that they do not anticipate expanding the specifically licensed ISFSI (Dominion, 2016). Although Dominion has indicated that they do not plan to add pads to the specifically licensed ISFSI, if pads are added, the NRC previously evaluated the impacts of construction and operation of three pads in the EA that was conducted for the original license issuance of the specifically licensed ISFSI 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; April 4, 1997). Routine operations, surveillance, and maintenance activities would be the only activities that would continue if the license is renewed. Therefore, the NRC staff concludes that the impacts on historic and cultural resources from the proposed action would be SMALL and not adverse and would not result in a significant impact to such resources.

4.9 Public and Occupational Health

4.9.1 Non-Radiological Impacts

Dominion has indicated that they do not plan to add pads to the specifically licensed ISFSI (Dominion, 2016), although the license allows them to construct three pads; only one pad has been constructed (Pad 1). If pads are added, the NRC previously evaluated the impacts of construction and operation of three pads in the EA that was conducted for the original license issuance of the specifically licensed ISFSI 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; April 4, 1997). There are no planned refurbishments beyond normal maintenance or aging management activities. No liquid or gaseous effluents are released due to operation of the ISFSI. Therefore, the NRC staff finds that there would be no significant non-radiological impacts to 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.

4.9.2 Radiological Impacts

The specifically licensed ISFSI is located inside a radiologically controlled protected area located within the North Anna owner controlled area. The closest site boundary (the exclusion area) is 762 m (2500 ft) from the ISFSI (Dominion 2016). External exposure to direct and scattered radiation is the primary pathway of radiation exposure from the ISFSI to workers, the public, and biota (Dominion, 2016). Currently there are 28 spent fuel storage casks stored on the specifically licensed ISFSI. On November 30, 2017, Dominion placed in service the TN-32B HBU cask (the 28th cask) with high burnup fuel in Pad 1 of the specifically licensed ISFSI. Dominion has indicated that there will be no change in routine operations, and no new construction or land disturbance is being requested as part of this license renewal application. Dominion is, however, licensed to construct three pads at the specifically licensed ISFSI and only one pad has been constructed (Pad 1). Operations during the proposed renewal license period would include storage and routine inspections and monitoring of the ISFSI site in accordance with the requirements in 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."

Occupational Dose

NAPS maintains a radiation protection program for the ISFSI in accordance with 10 CFR Part 20 to ensure that radiation doses are maintained ALARA. The dose rate of an individual cask is limited by the ISFSI TS (Dominion, 2015c). For the 27 casks loaded on reinforced concrete Pad 1, the average annual collective dose for loading, transporting, and placing the casks was 2.5 person-rem (Dominion, 2016). Note that this analysis did not consider the recently placed TN-32B HBU cask placed on Pad 1. The NRC, however, does not anticipate a significant change in the annual collective dose due to the placement of this 28th cask. The NRC staff's safety evaluation of the LAR that allowed storage of high burn-up spent fuel in a modified TN-32B cask at the NAPS specifically licensed ISFSI concluded that that the requested amendment of the ISFSI TS met the regulatory requirements of 10 CFR 72 (NRC, 2017a). As discussed in that SER, the NRC staff concluded that Dominion's proposed activities would be carried out in a

manner that would either reduce the dose rates above the cask lid, or limit the time workers spend in higher radiation fields in order to maintain worker exposure ALARA (NRC, 2017a).

Additionally, the annual collective dose assuming full storage capacity of all three Pads licensed under the specifically licensed ISFSI (i.e., 84 TN-32 storage casks) is 14.4 person-rem (Dominion, 2016). This occupational dose is within the required occupational dose limits specified in 10 CFR Part 20. In its response to RAIs, Dominion discussed potential environmental impacts from anticipated maintenance and aging management activities over the proposed 40-year license renewal. These include generation of limited quantities of non-radioactive cleanup or replacement materials (from cask surface re-coating or equipment repair/replacement). Dominion concluded that impacts would not be significant (Dominion, 2017b). Licensees are required to conduct authorized operational, inspection, and maintenance activities in accordance with the occupational dose limits specified in 10 CFR 20.1201 and to have and follow a radiation protection program consistent with 10 CFR 20.1101. Therefore, the NRC staff concludes that the proposed action would not result in significant radiological impacts to workers.

For the 20-year alternative spent fuel would continue to be stored at the ISFSI for an additional 20 years. Operational inspection and maintenance of the NAPS ISFSI would be conducted in the same manner as for the proposed action. Annual radiological doses to workers during the 20-year alternative would be similar to those from the 40 year ISFSI renewal request. Therefore, potential annual radiological doses to workers from the 20-year renewal alternative would be SMALL and would not be significant.

Dose to the Public

No gaseous or liquid effluents are discharged from operation of the NAPS specifically licensed ISFSI. Therefore, only external direct and scatter gamma radiation from the dry storage casks in Pad 1 contribute to potential radiological dose exposure to an offsite member of the public (Dominion, 2016a). Background radiation dose rates prior to construction of the NAPS ranged from 52 – 106 mrem/yr (Dominion, 2016). In 2014, the annual direct radiation dose was calculated at 54 mrem (Dominion, 2016). This operational value is within range of the preoperational background radiation and is below the annual limits in 10 CFR 20.1301. In addition, the NRC evaluated the radiological dose to the public from construction and operation of the specifically licensed ISFSI considering the construction of three pads loaded to its full capacity (84 TN-32 casks), and concluded that the construction and operation of the ISFSI would not have a significant impact on the quality of the human environment (62 FR 16202; April 4, 1997). Therefore, potential annual radiological doses to public from the proposed action would be SMALL and would not be significant.

For the 20-year alternative spent fuel would continue to be stored at the ISFSI for an additional 20 years. The current direct dose rate to the public has been measured and is within the range of the preoperational direct dose rate (Dominion 2014, 2015, 2016). Therefore, the NRC staff concludes that annual radiological doses to members of the public from the ISFSI would be below those expected from the proposed action and be below the annual limits in 10 CFR 20.1301. Therefore, potential radiological impacts to members of the public from the 20-year renewal alternative would be SMALL and would not be significant.

Accidents

Dominion evaluated potential radiological impacts resulting from postulated accident events during off-normal conditions in its safety analysis report (SAR) for the North Anna specifically licensed ISFSI. In accordance with 10 CFR 72.70, Dominion submitted Revision 9 to its SAR for the specifically licensed ISFSI on June 21, 2016 (Dominion, 2016a).

Dominion considered the design basis earthquake as an extreme natural phenomenon (Dominion, 2016a). Dominion's analysis shows that the storage pads would remain intact and the casks would not slide or tip over during an earthquake meeting the parameters of the design basis earthquake. Therefore, Dominion concluded that there would not be release of radioactive material and no dose consequences associated with this event (Dominion, 2016a). As discussed in Section 3.3 of this EA, on August 23, 2011, a 5.8 magnitude earthquake was recorded in Mineral, Virginia. Dominion determined that the earthquake exceeded the design basis earthquake for North Anna Power Station Units 1 and 2, and ISFSI Pad 1 (Dominion, 2016a). Although the casks shifted, Dominion concluded, after inspections and evaluations, that the pad and TN-32 casks remained capable of performing its design and safety functions (Dominion, 2016a). The cask vendor performed thermal, nuclear, and structural evaluations assuming a 14 ft center-to-center spacing between casks and cask heat load less than 27.1kW, which documented the basis for Dominion's decision to leave the casks in their post-seismic location. Accordingly, Dominion submitted a LAR to revise the ISFSI technical specifications that define the distance between individual casks. The NRC approved the LAR in 2015. The associated EA and FONSI were published in the *Federal Register* on February 27, 2015 (80 FR 10726).

Other design basis events Dominion considered to occur as a design basis extreme natural phenomenon include extreme wind and tornado. Dominion concluded that, although there might be minor damages from tornado missiles, the casks seal integrity would not be compromised (Dominion, 2016a). Dominion also postulated a fire event and concluded that the event would not be capable of compromising seal integrity (Dominion, 2016a).

Dominion also analyzed the loading of an unauthorized fuel assembly due to an error and determined that, given the multiple controls, the storage of an unauthorized fuel assembly was not deemed a credible event (Dominion, 2016a). Dominion also stated that the casks are designed to withstand drops of at least 15 inches without compromising their integrity. Accordingly, procedures limit the lifting of the casks any higher (Dominion, 2016a). Dominion analyzed a simultaneous failure of all protective layers of confinement and the resulting radiological dose consequence of a release. The evaluation resulted in a deep dose plus committed dose equivalent to the worst organ (bone marrow) of 13 mrem at the nearest site boundary (Dominion, 2016a), which is below the regulatory limits in 10 CFR 72.106(b).

4.10 Environmental Justice

Under Executive Order 12898 (59 FR 7629; February 11, 1994), 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; August 24, 2004). Regarding EAs, the NRC's policy statement on environmental justice (EJ) 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 should be considered.” (69 FR 52047).

In the section “Guidelines for Implementation of NEPA as to EJ Issues” (69 FR 52048), 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. In its ER, Dominion explained that the closest minority population is approximately 12 miles southwest of the NAPS site (Dominion, 2016) and that Richmond and Charlottesville have low-income populations that are more than 36 miles from the site (Dominion, 2016). As discussed in Section 4.9 in this final EA, off-site radiation doses from the NAPS ISFSI Pad 1 would likely remain unchanged for both the proposed action and the no-action alternatives. In addition, the NRC evaluated the radiological dose to the public from construction and operation of the specifically licensed ISFSI considering the construction of three pads loaded to its full capacity (84 TN-32 casks), and concluded that the construction and operation of the ISFSI would not have a significant impact on the quality of the human environment (62 FR 16202; April 4, 1997). As discussed in Section 4.9 in this final EA, there would be no significant non-radiological impacts associated with the proposed action and impacts would be no impacts for the no-action alternative. The NRC staff does not expect that the proposed action or the alternatives would adversely affect any offsite population.

4.11 Cumulative Impacts

The NRC staff considered the impacts of the proposed action, as described in Section 4.0 of this 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 geographic area considered in this cumulative impacts discussion is the NAPS site. The time frame considered for future actions extends through 2058, the expiration year of the site-specific license SNM-2507 for the NAPS ISFSI, if the license is renewed.

Other actions considered in this discussion of cumulative impacts include (i) the 2016 LAR to modify TS to load and store high burnup spent nuclear fuel in a single modified and instrumented cask, (ii) normal operation and maintenance of the generally licensed ISFSI Pad 2 (adjacent to ISFSI Pad 1), (iii) continued operation of the NAPS Units 1 and 2, including the Dominion’s intent to seek a second 20-year license renewal with the NRC in 2020 (Dominion, 2017a), and (iv) construction and operation of NAPS Unit 3. Because there are no significant non-radiological impacts expected from the proposed action, this discussion focuses only on radiological impacts.

Dominion 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 2014 NAPS REMP report (Dominion, 2015b), 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 2014 was 0.0039 mSv (0.39 mrem) (Dominion, 2015b), as compared to the approximately 6.2 mSv (620 mrem) an individual can expect to receive from background radiation (Dominion, 2015b). 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. Continued operation of ISFSI Pad 2 (under generally licensed NRC CoC No. 1030) is not expected to significantly contribute to cumulative radiological effects at the NAPS site. Similar to Pad 1, the generally licensed ISFSI generates no gaseous or liquid effluents and must meet the regulatory occupational and public dose thresholds in 10 CFR Part 20 and 72. After the August 2011 earthquake, NRC inspections of both storage pads in the ISFSI (specifically-licensed Pad 1 and generally-licensed Pad 2) confirmed that radiological conditions at the ISFSI remain unchanged and the ISFSI is acceptable for continued operation without undue risk to the health and safety of the public (NRC, 2011a). Furthermore, 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.

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

As previously discussed, the NAPS Unit 1 and 2 operating licenses terms expire in 2038 and 2040, respectively. The generally licensed ISFSI Pad 2 uses the NUHOMS® HD HSM and DSC and currently holds 29 casks with a capacity to hold 40 (Dominion, 2017b). The specifically licensed ISFSI currently holds 28 casks and, thus, Pad 1 is filled to capacity. As part of its licensing review of Dominion's LAR to modify the specifically licensed ISFSI TS to place one modified and instrumented cask in Pad 1 to store high burnup spent fuel, the NRC prepared an EA and concluded a finding of no significant impact (NRC, 2016d). Dominion anticipates storing the modified and instrumented cask in Pad 1 for a period of 10 years.

In its response to the RAIs, Dominion explained that a total of 5,298 fuel assemblies could be discharged from NAPS Units 1 and 2 through 2040 (approximately 2,437 MTU). Based on this projection, the capacity of the spent fuel pool, and the capacity of the constructed specifically licensed ISFSI Pad 1 and generally licensed ISFSI Pad 2, Dominion anticipates that an additional pad similar in capacity to the generally licensed ISFSI would be necessary (Dominion, 2017b). The pad would be located within the current ISFSI footprint west of reinforced concrete Pad 1 (Dominion, 2017b). Impacts from construction and operation of this third pad would be similar to the impacts discussed in the EA for the initial license of the ISFSI Pad 1. Construction of a third pad would also take into consideration measures to avoid, minimize and mitigate any potential impacts to the current ISFSI Pad 1 and Pad 2. Similarly, additional pads could be constructed to store any additional spent fuel that is generated as a result of a second 20-year renewal of the NAPS Units 1 and 2. Impacts from construction and operation of additional ISFIS pads would be similar to the impacts the NRC previously evaluated in the EA that was conducted for the original license issuance of the specifically licensed ISFSI 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; April 4, 1997).

The NRC evaluated the cumulative impacts from the construction and operation of NAPS Unit 3 in its environmental impact statements for an early site permit (NUREG-1811) and combined license (NUREG-1917). The NRC staff concluded that the potential cumulative impacts resulting from construction and operation of Unit 3 would be SMALL; however, some areas have the potential for MODERATE impacts (roads, housing, and some public services) if more workers than expected settle in Louisa and Orange Counties during the construction phase. During severe drought, the impacts to aesthetics and recreation during operations may be MODERATE as well as to aesthetic impacts from cooling tower plumes. Impacts on regional economies and tax revenues would be beneficially SMALL to LARGE. The NRC staff also concluded that cumulative radiological impacts of operation of the proposed Units 3 and the existing operating NAPS Units 1 and 2 would be SMALL and mitigation would not be warranted (NRC, 2006, 2010).

Because the proposed action would result in negligible 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 renewal is not anticipated to significantly contribute to cumulative impacts at the NAPS site.

4.12 Continued Storage of Spent Nuclear Fuel

The NRC's licensing proceedings for nuclear reactors and ISFSIs have historically relied upon a generic determination codified in the NRC's regulations at 10 CFR 51.23 to satisfy the agency's obligations under NEPA, with respect to the narrow area of the environmental impacts of storage of spent nuclear fuel (spent fuel) beyond a reactor's licensed life for operation and prior to ultimate disposal (continued storage). The Court of Appeals for the District of Columbia Circuit, in *New York v. NRC*, 681 F. 3d 471 (D.C. Cir. 2012), vacated the NRC's 2010 update to that rule and remanded it to the NRC. Thereafter, the Commission determined that NRC would not issue licenses dependent upon the formerly known Waste Confidence Decision and Temporary Storage Rule until the deficiencies identified by the Courts of Appeals were appropriately addressed (NRC Commission Order CLI-12-16, 2012).

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, codifies the NRC's generic determinations in NUREG-2157 regarding the environmental impacts of the continued storage of spent fuel. In CLI-14-08, 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 and stated that the rule satisfies the NRC's NEPA obligations with respect to continued storage. The rule, however, does not authorize the storage of spent fuel. As discussed in the statements of consideration for the final rule (79 FR 56238; September 19, 2014), the rule does not address the safety of continued storage of spent fuel. Appendix B of NUREG-2157, however, discusses the feasibility of safe storage of spent fuel.

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. The analysis

below documents the required consideration of the environmental impacts of continued storage, as determined in NUREG–2157, for the proposed renewal of the NAPS ISFSI license.

Overview of 10 CFR 51.23 and NUREG–2157

NUREG–2157 supports the revised rule at 10 CFR 51.23 and includes, among other things, the staff's analyses related to the particular deficiencies identified by the D.C. Circuit in the vacated Waste Confidence decision and rule. The information in NUREG–2157 was developed using an open and public process.

The NRC staff's evaluation of the potential environmental impacts of continued storage of spent fuel presented in NUREG–2157 identifies an impact level, or a range of impacts, for each resource area for a range of site conditions and timeframes. The timeframes analyzed in NUREG–2157 include the short-term timeframe (60 years beyond the licensed life of a reactor), the long-term timeframe (an additional 100 years after the short-term timeframe), and an indefinite timeframe (see NUREG–2157 Section 1.8.2).

The NRC concluded in NUREG–2157 that the potential impacts of spent fuel storage at the reactor site in both a spent fuel pool and in an at-reactor ISFSI would be SMALL during the short-term timeframe (see NUREG–2157 Section 4.20). However, for the longer timeframes for at-reactor storage, and for all timeframes for away-from-reactor storage, the analysis in NUREG–2157 has determined a range of potential impacts that are greater than SMALL in some resource areas (see NUREG–2157 Sections 4.20 and 5.20, respectively). The analysis in NUREG–2157 also presents an assessment of cumulative impacts for continued storage with ranges of potential impacts for most resource areas (see NUREG–2157 Section 6.5). These ranges reflect uncertainties that are inherent in analyzing environmental impacts to some resource areas over long timeframes. As explained in NUREG–2157 (Appendix D, page D–96), those uncertainties exist regardless of whether the impacts are analyzed generically or site-specifically.

Appendix B of NUREG–2157 provides an assessment of the technical feasibility of a deep geologic repository and continued safe storage of spent fuel. That assessment concluded that a deep geologic repository is technically feasible and that a reasonable timeframe for its development is approximately 25 to 35 years. The assessment in NUREG–2157 referenced the U.S. Department of Energy's *Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste* published in January 2013, which stated that DOE's goal "is to have a repository by 2026; the site characterized, and the repository designed by 2042; and the repository constructed and its operations started by the year 2048." Based on the evaluation of international experience with geologic repository programs—including the issues some countries have overcome—and the affirmation by the Blue Ribbon Commission of the geologic repository approach, the NRC continues to believe that 25 to 35 years is a reasonable period for repository development (i.e., candidate site selection and characterization, final site selection, licensing review, and initial construction for acceptance of waste).

At-Reactor Storage

The analysis in NUREG–2157 concluded that the potential impacts of at-reactor storage during the short-term timeframe would be SMALL (see NUREG–2157 Section 4.20). Further, the analysis in NUREG–2157 stated that disposal of the spent fuel by the end of the short-term timeframe is the most likely outcome (see NUREG–2157, Section 1.2). In this EA, the NRC staff determined that impacts from the proposed renewal for 40 years would be SMALL and not

significant for all environmental resource areas. This is due to the passive nature of the ISFSI in that it emits no gaseous or liquid effluents during operation. Also, the ISFSI is designed to minimize radiological doses to workers and members of the public. Dominion did not propose any significant changes in authorized operations for the NAPS ISFSI or request approval of any new construction or expansion of the existing ISFSI footprint beyond that previously approved as part of the original license. Thus, the potential impacts of at-reactor continued storage during the short-term timeframe are consistent with the evaluation of the environmental impacts for the proposed NAPS ISFSI license renewal as documented in this EA.

The analysis in NUREG-2157, however, evaluated the potential impacts of continued storage if the fuel is not disposed of by the end of the short-term timeframe. During the long-term and indefinite timeframes, the analysis in NUREG-2157 determined that impacts to all resource areas would be SMALL, except for historic and cultural resources and nonradioactive waste management. NUREG-2157 determined that the potential impacts to historic and cultural resources from at-reactor storage during the long-term timeframe and the indefinite timeframe are dependent on factors that are unpredictable this far in advance and therefore concluded those impacts would be SMALL to LARGE (see NUREG-2157 Section 4.12). Among other things, as discussed in NUREG-2157, the NRC cannot determine at this time what resources may be present or discovered at a continued storage site a century or more in the future and whether those resources will be historically or culturally significant to future generations. Additionally, potential impacts greater than SMALL could occur if the activities to replace the ISFSI and construct and replace a dry transfer system (DTS) adversely affect cultural or historic resources and the effects cannot be mitigated. The analysis in NUREG-2157 recognized that ground disturbing activities occurred during initial construction of the nuclear power plant and, thus, the land within and immediately surrounding the power block has been extensively disturbed. The analysis in NUREG-2157 also explained that if replacement of the ISFSI and construction and replacement of a DTS occur within the previously disturbed areas or there are no historic or cultural resources present, then impacts would likely be SMALL. If these facilities, however, are located in less-developed or less-disturbed portions of a power plant site outside of the power block with historic and cultural resources present, then impacts to historic and cultural resources could be greater than SMALL (see NUREG-2157 Sections 4.12.2 and 4.12.3). In Section 4.8 of this EA, the NRC staff concluded that potential impacts to historic and cultural resources as a result of the proposed action would be SMALL and not significant.

As discussed in NUREG-2157, given the minimal size of an ISFSI and DTS, and the large land areas at nuclear power plant sites (e.g., the NAPS site is approximately 1803 acres, and the land area developed for the ISFSI is approximately 11 acres), licensees should be able to locate these facilities away from historic and cultural resources. Potential adverse effects on historic properties or impacts on historic and cultural resources could also be minimized through development of agreements and implementation of the licensee's historic and cultural resource management plans and procedures to protect known historic and cultural resources and address inadvertent discoveries during construction and replacement of these facilities. However, the analysis in NUREG-2157 recognized that it may not be possible to avoid adverse effects on historic properties under NHPA or impacts on historic and cultural resources under NEPA and, therefore, concluded that impacts would be SMALL to LARGE (see NUREG-2157 Section 4.12.2).

NRC also concluded in NUREG-2157 that the impacts of nonradioactive waste management in the indefinite timeframe would be SMALL to MODERATE, with the higher impacts potentially occurring if the waste from repeated replacement of the ISFSI and DTS exceeds local landfill capacity (see NUREG-2157 Section 4.15). Although the NRC concluded that non-radioactive

waste disposal would not be destabilizing (or LARGE), the range reflects uncertainty regarding whether the volume of non-radioactive waste from continued storage would contribute to noticeable waste management impacts over the indefinite timeframe when considered in context of the overall local volume of non-radioactive waste.

As previously discussed, the NRC found in NUREG–2157 that disposal of the spent fuel is most likely to occur by the end of the short-term timeframe. Therefore, disposal during the long-term timeframe is less likely, and the scenario depicted in the indefinite timeframe—continuing to store spent nuclear fuel indefinitely—is highly unlikely. As a result, the most likely impacts of the continued storage of spent fuel are those considered in the short-term timeframe. In the unlikely event that fuel remains on site into the long-term and indefinite timeframes, the associated impact ranges in NUREG–2157 reflect the accordingly greater uncertainties regarding the potential impacts over these very long periods of time. Taking into account the impacts that the NRC considers most likely, which are SMALL and consistent with the environmental impacts discussed in this EA; the greater uncertainty reflected in the ranges in the long-term and indefinite timeframes compared to the greater certainty in the SMALL findings; and the relative likelihood of the timeframes, the NRC staff finds that the impact determinations for at-reactor storage from NUREG–2157 do not change the staff’s evaluation of the potential environmental impacts from the proposed 40-year renewal of the NAPS ISFSI license.

Away-From-Reactor Storage

In NUREG–2157, the NRC concluded that a range of potential impacts could occur for some resource areas if the spent fuel from multiple reactors is shipped to a large (roughly 40,000 MTU) away-from-reactor ISFSI (see NUREG–2157 Section 5.20). The ranges for resources such as air quality, terrestrial resources and aesthetics are driven by the uncertainty regarding the location of such a facility and the local resources that would be affected. For example, regarding terrestrial resource impacts, the analysis in NUREG–2157 explained that the impacts would likely be SMALL. However, it also stated that “it is possible that the construction of the project could have some noticeable, but not destabilizing, impacts on terrestrial resources, depending on what resources are affected.” Therefore, in NUREG–2157, for away-from reactor storage, the NRC concluded that the impacts to terrestrial resources would be SMALL to MODERATE (see Section 5.9.1) for the short-term timeframe, based primarily on the potential impacts of construction activities. In addition, there are uncertainties associated with the longer timeframes that contribute to the ranges for historic and cultural resources and for nonradioactive waste management, for the same reasons discussed above for at-reactor storage.

As discussed in Chapter 2 of this EA, the NRC staff considered the storage of the spent fuel at an away-from-reactor storage as an alternative. The NRC determined, however, that it was not a reasonable alternative, because no such facility is available in the United States. There is no such ISFSI currently in existence in the United States; however, there are two license applications that have been submitted to the NRC for the construction and operation of such a facility. A facility could become available during the continued storage period. If so, an ISFSI of the size considered in NUREG–2157 could store the fuel from up to 25 reactors, which means that only a small portion of the overall impacts of the ISFSI would be attributable to the fuel from any individual reactor.

Based on the factors discussed above, there is uncertainty whether an away-from-reactor storage would be constructed, uncertainty where it might be located, and uncertainty regarding

the impacts in the short-term and the longer timeframes, leading to ranges of impacts. As a result, consideration of the generic impacts from continued storage at away-from-reactor storage provides limited insights to the decision-maker in the overall picture of the environmental impacts from the proposed renewal of the NAPS ISFSI license.

Cumulative Impacts

In NUREG–2157, the NRC examined the incremental impact of continued storage on each resource area analyzed in NUREG–2157 in combination with other past, present, and reasonably foreseeable future actions. The analysis in NUREG–2157 presented ranges of potential cumulative impacts for multiple resource areas (see Section 6.5). These ranges, however, are primarily driven by impacts from activities other than the continued storage of spent fuel at the reactor site; the impacts from these other activities would occur regardless of whether spent fuel is stored during the continued storage period.

Similarly, the NRC evaluated the incremental impact of the proposed renewal of the NAPS ISFSI license on each resource area in combination with other past, present, and reasonably foreseeable future actions. The NRC staff concluded that the potential impacts of the proposed NAPS ISFSI license renewal are not a significant contributor to cumulative impacts. The analysis in NUREG–2157 concluded that, in the short-term timeframe, which is the most likely timeframe for the disposal of the fuel in a deep geologic repository, the potential impacts of continued storage for at-reactor storage are SMALL and would, therefore, not be a significant contributor to the cumulative impacts. Therefore, the NRC staff has determined that there would be no significant change to the cumulative impacts analysis in this EA.

5.0 AGENCIES AND PERSONS CONSULTED

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 ESA and Section 106 of the NHPA were met, and (ii) provide the designated state liaison agencies the opportunity to comment on the proposed action.

5.1 National Historic Preservation Act

The NHPA was enacted to create a national historic preservation program, including the National Register of Historic Places and the Advisory Council on Historic Preservation. 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.”⁶ Therefore, the NRC’s approval of this license renewal request constitutes a federal undertaking. The NRC, however, has determined that the scope of activities described in this license renewal request do not have the potential to cause effects on historic properties, assuming those were present, as the NRC’s approval of this license renewal will not result in construction or land disturbance activities (Dominion, 2016). 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 SHPO by letter dated

⁶ See 36 CFR 800.16(y).

October 18, 2016 (NRC, 2016f). The Virginia Department of Historic Resources (VDHR) responded via letter dated December 30, 2016, that based on information provided they concurred that the undertaking will not impact historic properties (VDHR, 2016). The NRC staff also consulted with the Pamunkey Tribe of Virginia via letter dated October 26, 2016 (NRC, 2016g). The Pamunkey Tribe responded via email dated November 11, 2016, that they were not aware of any historic or cultural resources that would be affected and requested NRC to contact them if potential cultural sites are identified (Pamunkey, 2016).

5.2 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 FWS and/or the U.S. National Marine Fisheries Service (NMFS). The federal agency can either initiate the process to prepare a biological assessment⁷ or alternatively, engage in informal consultation.⁸ 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.

Approval of the proposed action is not expected to result in any new construction activities. Dominion, however is licensed to construct three pads under the specifically licensed ISFSI; only one pad has been constructed (Pad 1). If additional pads are constructed under the specifically licensed ISFSI, land disturbance would be anticipated. The NRC evaluated impacts from the construction of the three pads in its EA for the original license and concluded that the construction and operation of the ISFSI would not have a significant impact on the quality of the human environment and would not impact threatened and endangered species (62 FR 16202; April 4, 1997).

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 approve their project within the State of Virginia. On October 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

⁷ See 50 CFR 402.12.

⁸ See 50 CFR 402.13.

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 letter and the project review package was submitted to FWS Virginia Field Office on October 18, 2016 (NRC, 2016c) in accordance with their certificate validation process.

Routine operations, surveillance, and maintenance activities would be the only activities that would continue if the license is renewed. The proposed action will not authorize new construction activities beyond what was previously approved. As discussed, if Dominion decides to construct additional pads under the specifically licensed ISFSI, land disturbance would be anticipated, but would not be expected to affect listed endangered or threatened species or their critical habitats in the vicinity of the NAPS site. Therefore, the NRC concludes that the proposed action would not adversely affect federally-listed threatened and endangered species, nor state-identified rare species or species of special concern, or their critical habitat.

5.3 Virginia Department of Health

The NRC staff consulted with the Virginia Department of Health (VDH) via letter dated October 19, 2016 (NRC, 2016f). VDH responded in an email dated October 28, 2016, from the Director of the Office of Radiological Health for the State of Virginia. The email stated that, “The Office of Radiological Health takes no position regarding the Virginia Electric and Power Company (Dominion) request to renew Materials License No. SNM-2507 which, if approved, will allow continued interim storage of spent nuclear fuel at their specifically licensed ISFSI beginning on July 1, 2018.” (VDH, 2016).

On September 21, 2017, a copy of the draft EA and draft FONSI was sent to the Virginia Department of Health (VDH) for comment (NRC, 2017b). VDH concurred with NRC’s conclusions and draft FONSI via e-mail dated September 28, 2017 (VDH, 2017).

6.0 CONCLUSION AND FINAL FINDING OF NO SIGNIFICANT IMPACT

Based on its review of the proposed action, in accordance with the requirements 10 CFR Part 51, the NRC staff has preliminarily determined that renewal of NRC SNM License 2507, authorizing continued operation of Dominion’s specifically licensed ISFSI for an additional 40 years, will not significantly affect the quality of the human environment. In its license renewal request, Dominion is proposing no changes in how it handles or stores spent fuel at the NAPS ISFSI. No significant changes in Dominion’s authorized operations for the NAPS ISFSI were requested as part of the license renewal application. Approval of the proposed action would not result in any new construction or expansion of the existing ISFSI footprint beyond that previously approved. The ISFSI is a passive facility that produces no liquid or gaseous effluents.

No significant radiological or nonradiological impacts are expected from continued normal operations. 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. The estimated annual dose to the nearest potential member of the public from ISFSI activities is 0.021 mSv/yr (2.1 mrem/yr) (Dominion, 2016), which is below the 0.25 mSv/yr (25 mrem/yr) limit specified in 10 CFR 72.104(a) and the 1 mSv/yr (100 mrem/yr) limit in 10 CFR 20.1301(a)(1). Therefore, the NRC staff has determined that pursuant to 10 CFR 51.31, preparation of an environmental impact statement is not required for the proposed action, and pursuant to 10 CFR 51.32, a FONSI is appropriate.

7.0 LIST OF PREPARERS

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