
Safety Evaluation Report for the
Renewal of License No. SNM-2014
Watts Bar Nuclear Plant, Unit 2
Spring City, Tennessee

Docket No. 70-7018
Tennessee Valley Authority

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EXECUTIVE SUMMARY

The report documents the U.S. Nuclear Regulatory Commission (NRC) staff's safety and safeguards evaluation of the Tennessee Valley Authority (TVA) application for renewal of a license to possess, inspect, and store an initial core of special nuclear material (SNM) in the form of fresh fuel assemblies at the Watts Bar Nuclear Plant, Unit 2 (WBN-2) located in Spring City, Tennessee (license application). TVA had been issued a license (License No. SNM-2014) for Unit 2 in June 2011, for a duration of 2 years. On August, 23, 2012, TVA submitted its renewal application for their SNM license to extend their license expiration date until September 30, 2016, based on their construction schedule for WBN-2 and extension of the Construction Permit for WBN-2 (CPPR-92). However, the NRC staff is recommending renewing TVA's material license for 3 more years, with expiration date of September 30, 2017. TVA submitted its license renewal application more than 30 days in advance of the license's stated expiration date, June 30, 2013. Therefore, under the provisions of Title 10 of the *Code of Federal Regulations* (10 CFR), Section 70.38(a), the current license does not expire until the Commission makes a final determination on the renewal request. TVA's renewal request is in accordance with the requirements in 10 CFR, Sections 70.21, 70.22 and 70.33. The application was supplemented with additional submittals dated July 1, 2013, and January 15, 2014.

The objective of this review is to evaluate the potential adverse impacts of the continued possession, inspection, and storage of fresh fuel assemblies at WBN-2 on the worker and public health and safety. The NRC's review also considers physical protection of SNM; material control and accounting of SNM; emergency management; and management organization, administrative programs, and financial qualifications provided to ensure the safe and secure possession, inspection, and storage of SNM in the form of fresh fuel assemblies.

There were no major changes in the renewal request from the information provided in the original 2009 license application. This review recognizes minor changes and evaluates the safety and security of the material on site. NRC staff conducted a safety and safeguards review in accordance with 10 CFR Part 20, "Standards for Protection Against Radiation;" 10 CFR Part 70, "Domestic Licensing of SNM;" 10 CFR Part 73, "Physical Protection of Plants and Materials;" 10 CFR Part 74, "Material Control and Accounting of SNM," and other applicable regulations. NRC staff used guidance in NUREG-1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility," (NRC, 2002) and other applicable guidance documents to conduct its review.

The NRC staff concludes, in this Safety Evaluation Report (SER), that TVA's descriptions, specifications, and analyses provide an adequate basis for the safety and safeguards of the storage and handling of SNM at WBN-2; and that the continued possession, inspection, and storage of the licensed material does not pose an undue risk to the worker or public health and safety.

The licensed activities described in the renewal application do not involve enriched uranium processing, fabrication of uranium fuel or fuel assemblies, uranium enrichment, enriched uranium hexafluoride conversion, plutonium processing, fabrication of mixed-oxide fuel or fuel assemblies, or scrap recovery of SNM. Therefore, consistent with 10 CFR 70.60, TVA is not required to meet the requirements in Subpart H (which includes management measures) in support of this license application.

Also, the licensed activities described in the Part 70 license renewal application do not involve the receipt, storage, use, handling, or production of chemicals associated with SNM that could

result in credible accident scenarios. Therefore, a chemical safety review was not conducted for the purposes of this review.

The license application was listed on the NRC's Hearing Opportunities and License Applications public Web site, on August 22, 2013. No requests for a hearing were received. A notice of availability of an Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) was published in the *Federal Register* on December 17, 2013.

LIST OF ACRONYMS AND ABBREVIATIONS

10 CFR	Title 10 of the <i>Code of Federal Regulations</i>
ALARA	As Low as is Reasonably Achievable
ANSI	American National Standards Institute
CAS	Central Alarm Station
CDE	Committed Dose Equivalent
CECC	Central Emergency Control Center
CEDE	Committed Effective Dose Equivalent
CFR	<i>Code of Federal Regulations</i>
DAC-hr	Derived Air Concentration-hour
DDE	Deep Dose Equivalent
EA	Environmental Assessment
EAL	Emergency Action Level
EPIP	Emergency Plan Implementing Procedures
FHA	Fire Hazards Analysis
FONSI	Finding of No Significant Impact
FPR	Fire Protection Report
FSAR	Final Safety Analysis Report
NEI	Nuclear Energy Institute
NP-REP	Nuclear Power Radiological Emergency Plan
NPDES	National Pollutant Discharge Elimination System
NPG	Nuclear Power Group
NRC	U.S. Nuclear Regulatory Commission
NVLAP	National Voluntary Laboratory Accreditation Program
ODS	Operations Duty Specialists
OSC	Operational Support Center
PA	Protected Area
PORC	Plant Onsite Review Committee
PSP	Physical Security Plan
RADCON	Radiation Control
RCA	Radiological Controlled Areas
REP	Radiological Emergency Plan
RP	Radiation Protection
RWP	Radiation Work Permit
SAS	Secondary Alarm Station
SCP	Safeguards Contingency Plan
SEC	Securities Exchange Commission
SED	Site Emergency Director
SM	Shift Manager
SNM	Special Nuclear Material
T&QP	Training and Qualification Plan
TEDE	Total Effective Dose Equivalent
TODE	Total Organ Dose Equivalent
TSC	Technical Support Center
TVA	Tennessee Valley Authority
WBN	Watts Bar Nuclear Plant

1.0 GENERAL INFORMATION

The purpose of this review is to ascertain whether TVA's application for renewal includes an overview of the facility and a summary description of its processes.

1.1 FACILITY AND PROCESS DESCRIPTION

1.1.1 REGULATORY REQUIREMENTS

The regulatory basis for the review of the TVA facility and process description is contained in 10 CFR 70.22, "Contents of Applications."

1.1.2 REGULATORY ACCEPTANCE CRITERIA

The acceptance criteria applicable to the NRC's review of the facility and process description contained in the license application are contained in Section 1.1.4.3 of NUREG-1520 (NRC, 2002).

1.1.3 STAFF REVIEW AND ANALYSIS

In its license application, TVA provided a description of the WBN-2 facility. WBN-2 facility is located in Watts Bar Nuclear Power Plant Site which includes Unit 1 Operating Reactor and construction of the Unit 2 Reactor. WBN-2 is located in Rhea County, Tennessee, and covers an area of approximately 1770 acres. The major structures at the site include: 1) the reactor buildings, 2) the Turbine Building, 3) the Auxiliary Building, 4) the Control Building, 5) the Service and Office Building, 6) diesel generator buildings, 7) an intake pumping station, and 8) two natural draft cooling towers. The SNM that would be authorized by the license renewal would be stored and inspected inside the Auxiliary Building of the WBN-2 facility. In support of the license application, TVA provided a copy of the WBN-2 Final Safety Analysis Report (FSAR)—which is incorporated into the license application by reference. The FSAR provided a description of the facility as well as the layout of the buildings and structures at the site. Figure 9.1-1 of the FSAR describes the fuel array previously approved in 2011. The fuel handling areas are shown in Figures 1.2-3, 1.2-4, and 1.2-8 of the FSAR. The license renewal application described the storage and inspection of the SNM, in the form of fresh fuel assemblies, in sufficient detail to obtain a general understanding of the regulated activity. As stated in the license renewal application, there were a few changes made to this chapter including an update on TVA's Board of Directors, Annual Report on TVA's financial performance Form 10K, authorized users listed, removal of Watts Bar Steam Plant from the site and updates related to meteorology and hydrology.

The NRC staff reviewed the information provided in the WBN-2's license application FSAR, and concludes that the descriptions provided in these documents provide general information about the proposed facility and processes.

1.1.4 EVALUATION FINDINGS

The NRC staff reviewed the general facility description for WBN-2 according to Section 1.1 of the Standard Review Plan. TVA adequately described: (1) the facility and its processes so that the staff has an overall understanding of the relationships of the facility features, and (2) the function of each feature. TVA cross-referenced its general description with the more-detailed

descriptions in the facility's FSAR. Therefore, the NRC staff concludes that TVA complied with the general requirements under 10 CFR Sections 70.22(a) (1)-(3).

1.2 INSTITUTIONAL INFORMATION

1.2.1 REGULATORY REQUIREMENTS

The regulatory basis for the review of TVA's institutional information is contained in 10 CFR 70.22, "Contents of Applications," and 10 CFR 70.23, "Requirements for the Approval of Applications."

1.2.2 REGULATORY ACCEPTANCE CRITERIA

The acceptance criteria applicable to the NRC's review of the institutional information section of the license application are contained in Section 1.2.4.3 of NUREG-1520 (NRC, 2002).

1.2.3 STAFF REVIEW AND ANALYSIS

In the license application, TVA described its corporate structure. TVA is wholly owned and controlled by the U.S. Government. Therefore, there is no foreign control, ownership, or influence over TVA by an alien organization or government. The renewal application also describes TVA's full name and address, as well as the composition of the Board membership and a discussion of leadership position changes and current vacancies. The NRC staff reviewed this information and concludes that the information is adequate to describe the corporate structure of TVA.

TVA referenced a copy of their 2011 Form 10-K report to the Securities and Exchange Commission (SEC) to show incorporation; however, a more recent filing of the financial statements filed with the SEC, which also shows incorporation, was found in the SEC database dated September 30, 2013. The NRC staff reviewed the financial report which provides a description of TVA's financial performance and resources associated with TVA's operations including SNM license activities. Based on its review, the NRC staff concludes that these references demonstrate that TVA is financially qualified to engage in the proposed activities, related to the 10 CFR Part 70 at the WBN-2 site.

The renewal application described the types, quantities, and forms of licensed material requested for the proposed activities. TVA is requesting an extension of SNM license SNM-2014 to possess, inspect, and store an initial core of 193 fuel assemblies. The allowance for additional material at the site will be 2600 kg of U-235. The license renewal application also described the average enrichment level in the fuel assemblies and their average uranium mass content. The NRC staff reviewed the information and concludes that TVA did not make any changes to the types, forms and quantities of licensed materials, and they provided an adequate, narrative description pertaining to the licensed material and its authorized uses. The proposed use is identified as an acceptable use of SNM under Section 53 of the Atomic Energy Act of 1954, as amended. Therefore, the proposed use of the SNM in the form of fresh fuel assemblies is consistent with the Atomic Energy Act of 1954. As discussed below, TVA will continue to possess and store the material consistent with the applicable requirements under 10 CFR part 70.

1.2.4 EVALUATION FINDINGS

The NRC staff reviewed the institutional information provided by TVA for WBN-2 according to Section 1.2 of the Standard Review Plan. There were no changes other than updates on leadership positions, minor plant site changes and updates on financial documents from the original 2009 application. On the basis of the review, the NRC staff determined that TVA adequately described and documented the changes to corporate structure and financial information for the facility, and continues to be in compliance with those parts of 10 CFR 70.22 related to other institutional information. Specially, in accordance with 10 CFR 70.22(a)(2) and (4), TVA adequately described the types, forms, quantities, and proposed authorized uses of licensed materials to be permitted at this facility as follows:

MATERIAL	FORM	QUANTITY	AUTHORIZED USE
Uranium enriched in the isotope U-235 up to 5.00 % by weight	Physical: Solid Chemical: UO ₂	91,800 kg, including up to 2,600 kg of U-235	Receive, possess, inspect, and store an initial core of 193 fresh fuel assemblies for the WBN-2 reactor

1.3 SITE DESCRIPTION

1.3.1 REGULATORY REQUIREMENTS

The regulatory basis for the review of the place where TVA's proposed activities will be performed is contained in 10 CFR 70.22(a)(2). Using the guidance in NUREG-1520 (NRC, 2002), the NRC staff reviewed information in the license application pertaining to the WBN-2's site description.

1.3.2 REGULATORY ACCEPTANCE CRITERIA

The acceptance criteria for the NRC's review of WBN-2's site description section of the license application are contained in Section 1.3.4 of NUREG-1520 (NRC, 2002).

1.3.3 STAFF REVIEW AND ANALYSIS

In its renewal application, TVA provided a description of the WBN-2 facility. The WBN-2 is located inside Watts Bar Nuclear Power Plant Site which includes Unit 1 Reactor and construction of Unit 2 Reactor in Rhea County on the west bank of the Tennessee River, at a mean sea level of 700 feet. The site includes co-located areas (such as the spent fuel pool and storage areas) between Unit 1 and Unit 2 that are under the control of Unit 1 in accordance with the Unit 1 part 50 operating license. The site is located in an area of 1770 acres that is owned by the U.S. Government in the custody of TVA. There are no residential areas in the immediate vicinity of the site, and only one industrial facility, the Watts Bar Steam Plant, which is not currently operating. The Sequoyah Nuclear Plant is located about 31 miles from the site. State Route 68 is the major highway located nearby. TVA also provides a discussion of the site changes, specifically the Watts Bar Steam Plant, which has been dismantled and is no longer operational with the exception of an electrical switchyard. The renewal application was revised from the original application to eliminate discussion on the steam plant.

Regarding the site geography, the license renewal application and Section 2.1 of the FSAR adequately describes the site, including its location, site features, site boundary and controlled area boundary. There have been no changes to the site since the license issuance date, except

the dismantling of the steam plant. The NRC staff also reviewed Figures of the FSAR referenced in the renewal application, and concludes that this figure clearly illustrates the topographic features of the site where TVA stores and inspects the licensed material.

Regarding the site demographics, TVA provided population distribution information for 2000-2060 in Tables 2.1-1 through 2.1-14 of the FSAR. The NRC staff reviewed this information and concludes that the application adequately describes population information on the basis of the most current available census data and projections used over a period of years.

Regarding meteorology, TVA provided short-term and historical data for the WBN-2 site and surrounding areas. The NRC staff reviewed the information in the renewal application and in Section 2.3 of the FSAR, and concludes that the information is consistent in both documents. In addition, TVA revised its license application meteorology section to reflect updates in snowfall data. The NRC staff concludes that the information and evaluation of changes provided by TVA, is adequate because the application addresses appropriate meteorological data, including wind directions, wind speeds, annual amounts of precipitation and severe weather conditions that are applicable to the site.

Regarding hydrology and geology, TVA provided an adequate, narrative discussion on the hydrological and geological characteristics of the site in Sections 1.3.4 and 1.3.5 of the license application. In addition, the NRC staff reviewed Section 2.5 of the FSAR as it relates to the geology of the site, and concludes that the information and updates adequately complements the discussion in the renewal application and is consistent. NRC staff finds the licensee's description acceptable since TVA adequately provides characteristics of nearby bodies of waters, depths and elevations, surface maps, characteristics of soil types and bedrocks, descriptions of geologic hazards.

1.3.4 EVALUATION FINDINGS

The NRC staff reviewed the site description and evaluation of changes submitted by TVA for WBN-2 in accordance with Section 1.3 of the Standard Review Plan. TVA adequately described and summarized general information pertaining to: (1) the site geography, including its location relative to prominent natural and manmade features such as mountains, rivers, airports, population centers, schools, and commercial and manufacturing facilities; (2) population information using the most current available census data at the time of review; and (3) meteorology, hydrology, and geology for the site. The review verified that the site description is consistent with the information provided in the FSAR for Unit 2.

1.4 REFERENCES

(NRC, 2002) NRC, NUREG-1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility," March 2002.

(TVA, 2011) "Organization Topical Report, TVA-NPOD 89-A, Revision 19" August, 2011, (ADAMS Accession Number ML12278A337).

(TVA, 2012) "Watts Bar Nuclear Plant-Unit 2- Request for Renewal of SNM License No. SNM-2014," August 23, 2012 (ADAMS Accession Number ML12278A337).

(TVA, 2012d) March 5, 2012, letter from R. A. Hruby to the U.S. NRC, "Watts Bar Nuclear Plant (WBN) Unit 2 - Final Safety Analysis Report (UFSAR), Amendment 108," (ADAMS Accession Number ML12083A136).

2.0 ORGANIZATION AND ADMINISTRATION

The purpose of the review of TVA's organization and administration is to ensure that their management policies will provide reasonable assurance that TVA plans, implements, and controls site activities in a manner that ensures the safety of the workers, the public, and protection of the environment. The review also ensures that TVA has identified and provided adequate qualification descriptions for key management positions.

2.1 REGULATORY REQUIREMENTS

The regulatory basis for the review of TVA's organization and administration is contained in 10 CFR 70.22, "Contents of Applications," and 10 CFR 70.23, "Requirements for the Approval of Applications."

2.2 REGULATORY ACCEPTANCE CRITERIA

The acceptance criteria for the NRC's review of the organization and administration section of the license application are contained in Section 2.4.3 of NUREG-1520 (NRC, 2002).

2.3 STAFF REVIEW AND ANALYSIS

In the license application, TVA identified and functionally described the specific organizational groups that are responsible for managing the operations associated with the licensed material at the WBN-2 site. TVA is wholly owned by the U.S. Government, and its Board of Directors consists of nine individuals appointed by the U.S. President and confirmed by the U.S. Senate. The corporate organization of TVA is described in Figure 1-0 of Topical Report TVA-NPOD89-A. Section 2.2 of the license application described the roles and responsibilities of these leadership positions. The NRC staff reviewed this information and concludes that it is adequate since TVA provides sufficient information describing the organizational groups responsible for operating and managing the facility, qualifications, and the roles and responsibilities of the corporate leadership that supports the operations of the facility.

TVA submitted a copy of their Topical Report TVA-NPOD89-A Revision 19 as an enclosure to their renewal application; however, a more recent version of the Organization Topical Report Revision 20 was submitted to NRC on a different docket number, under docket 50-0391, which reflects the most updated information, and was used for the purposes of this review associated to their part 70 license.

TVA described the operating organization in Section 2.2.1 of the license renewal application. This information was further supplemented by TVA's Topical Report TVA-NPOD89-A. The license renewal application stated and TVA's Topical Report recent version reflects a few administrative changes in the operating organization since the 2009 submittal such as the removal of the Chief Operating Officer position and other positions. However, TVA discussed these administrative changes in their submittal and NRC found that the changes do not pose any concerns for the management of the licensed activities since the responsibility for and the control of SNM within the on-site organizations has not changed. The NRC staff reviewed Figures 1-0, 2-0, 2-2, 3-2 and 3-3 in the Topical Report and concludes that the organizational charts in these figures illustrate the reporting relationships in TVA that are needed to support the licensed activities. The NRC staff also concludes that the license renewal application defines effective lines of communication and authority among the organizational units involved in the engineering, environmental, safety, and operations functions of the facility.

In the license application, TVA states that the site personnel, as well as members of the Plant Onsite Review Committee (PORC), meet the qualification and training guidance in Regulatory Guide RG (RG) 1.8, "Qualification and Training of Personnel for Nuclear Power Plants," Revision 2. In addition, TVA provides alternatives to qualifications and trainings that are consistent with RG 1.8 and are outlined in TVA's Nuclear Quality Assurance Plan, TVA-NQA-PLN89-A. Committing to RG 1.8 is an acceptable method for demonstrating that the PORC and WBN-2 staff are adequately qualified and trained for the licensed activities. The NRC staff also reviewed Section 13.1.3 of the FSAR and notes that these documents are consistent with TVA's use of RG 1.8. Therefore, the NRC staff concludes that the renewal application adequately describes the training and experience of key management positions in support of the licensed activities at the site.

The licensed activities described in the renewal application do not involve enriched uranium processing, fabrication of uranium fuel or fuel assemblies, uranium enrichment, enriched uranium hexafluoride conversion, plutonium processing, fabrication of mixed-oxide fuel or fuel assemblies, and scrap recovery of SNM. Therefore, consistent with 10 CFR 70.60, TVA is not required to meet the requirements in 10 CFR Part 70, Subpart H (which includes management measures) in support of the license application.

In the renewal application and Section 13.5 of the FSAR, TVA describes the different procedures in place to conduct the proposed operations—including administrative procedures, system operating instructions, etc. The NRC staff notes that these procedures are evaluated by the safety review committee, PORC members (when required) that operate independently from operations conducted for the part 70 requirements before they are implemented in the field. This independent evaluation and approval process provides reasonable assurance that procedures that affect the safety of the workers and the plant are properly assessed before implementation.

In the license renewal application, TVA described written agreements in place with offsite organizations, including government agencies and emergency response entities, to respond to an emergency. This information is discussed further in the areas of fire safety and emergency preparedness, Chapter 5.0 and 6.0, respectively.

2.4 EVALUATION FINDINGS

The NRC staff reviewed the organization and administration of TVA to support the licensed activities at WBN-2 according to Section 2.4.3 of the Standard Review Plan. TVA described its organization and management policies for providing adequate safety management for the licensed activities. The NRC reviewed information concerning: 1) the organizational structure of TVA; 2) the roles and responsibilities of its management, both at the plant and corporate level; and 3) the qualifications of key personnel responsible for the safety of the activities at WBN-2. Based on the information provided in the renewal application, the NRC staff concluded that TVA has an acceptable organization; administrative policies; and sufficient, qualified resources to assure the safety of the licensed activities. Therefore, the information provided meets the requirements under 10 CFR Sections 70.22(a)(6) and 70.23(a)(2), and is acceptable.

2.5 REFERENCES

(NRC, 2002) NRC, NUREG-1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility," March 2002.

(TVA, 2008) September 23, 2008, letter from M. K. Brandon to the U.S. NRC, "Watts Bar Nuclear Plant (WBN), Unit 1 - Updated Final Safety Analysis Report (UFSAR) Amendment 7," (ADAMS Accession Number ML082950191).

(TVA, 2009a) "Organization Topical Report, TVA-NPOD 89-A," September 3, 2013, (ADAMS Accession Number ML13253A075).

(TVA, 2009b) "Application for a SNM License For WBN-2in Accordance with 10 CFR 70, *Domestic Licensing of SNM*," November 12, 2009 (ADAMS Accession Number ML100120487).

(TVA, 2012c) "Watts Bar Nuclear Plant (WBN-2- Request for Renewal of SNM License No. SNM-2014." August 23, 2012 (ADAMS Accession Number ML12278A337).

(TVA, 2012d) March 5, 2012, letter from R. A. Hruby to the U.S. NRC, "Watts Bar Nuclear Plant (WBN) Unit 2 - Final Safety Analysis Report (UFSAR), Amendment 108," (ADAMS Accession Number ML12083A136).

(TVA, 2010) "Nuclear Quality Assurance Program, TVA-NQA-PLN89-A," January 15, 2010, (ADAMS Accession Number ML100210972).

3.0 RADIATION PROTECTION

The purpose of this review is to determine whether the TVA's and WBN Plant Radiation Protection (RP) Program is adequate to protect the radiological health and safety of workers, the public and the environment and complies with the associated regulatory requirements in 10 CFR Parts 19, 20, and 70 at the site.

3.1 REGULATORY REQUIREMENTS

3.1.1 RP PROGRAM IMPLEMENTATION

Regulations applicable to the establishment of a RP program are presented in 10 CFR Part 20, Subpart B, "Radiation Protection Programs."

3.1.2 AS LOW AS IS REASONABLY ACHIEVABLE PROGRAM

Regulations applicable to the as low as is reasonably achievable (ALARA) program are presented in 10 CFR 20.1101, "Radiation Protection Programs."

3.1.3 ORGANIZATION AND PERSONNEL QUALIFICATIONS

The regulation applicable to the organization and qualifications of the radiological protection staff are presented in 10 CFR 70.22, "Contents of Applications."

3.1.4 WRITTEN PROCEDURES

The regulation applicable to RP procedures and radiation work permits (RWPs) are presented in 10 CFR 70.22, "Contents of Applications."

3.1.5 TRAINING

The following regulations apply to the Radiation Safety Training Program:

1. 10 CFR 19.12 "Instructions to workers"
2. 10 CFR 20.2110 "Form of records"

3.1.6 VENTILATION AND RESPIRATORY PROTECTION PROGRAMS

Regulations applicable to the ventilation and Respiratory Protection Programs are presented in 10 CFR Part 20, Subpart H, "Respiratory protection and controls to restrict internal exposure in restricted areas."

3.1.7 RADIATION SURVEY AND MONITORING PROGRAMS

The following NRC regulations in 10 CFR Part 20 are applicable to radiation surveys and monitoring programs:

1. Subpart C "Occupational Dose Limits"
2. Subpart F "Surveys and Monitoring"
3. Subpart L "Records"
4. Subpart M "Reports"

3.1.8 ADDITIONAL PROGRAM REQUIREMENTS

Additional program requirements applicable to this application include 10 CFR 70.74 "Additional reporting requirements."

3.2 REGULATORY ACCEPTANCE CRITERIA

The acceptance criteria for NRC's review of a fuel cycle facility's RP program are outlined in Sections 4.4.1.3; 4.4.2.3; 4.4.3.3; 4.4.4.3; 4.4.5.3; 4.4.6.3; 4.4.7.3; and 4.4.8.3 of NUREG- 1520 (NRC, 2002). While the proposed license for storage of fresh fuel at the Watts Bar site does not encompass the range of fuel cycle processes that are discussed by this guidance, the application addressed each RP subject area identified in the guidance, thus the review also addresses each subject area.

3.3 STAFF REVIEW AND ANALYSIS

As part of the WBN-2 SNM license application, Chapter 4 of the Safety Analysis Report (SAR) (TVA, 2012) describes the RP program for the facility. The RP Program is the same for both Unit 1 and Unit 2 and is under the control of Unit 1 in accordance with the Unit 1 10 CFR Part 50 Operating License. The chapter addresses each major section of NUREG-1520. This chapter is organized to conform to the major sections of the application and NUREG-1520.

3.3.1 RADIATION PROTECTION PROGRAM IMPLEMENTATION

The TVA Nuclear Power Group (NPG) RP program implements the requirements of 10 CFR Parts 19 and 20, applicable to the WBN-2 plant. The RP Program consists of four elements that are directed toward essential support to the WBN plant:

- Radiological impact assessments.
- RP planning and radiological safety evaluation, including preliminary SARs, FSARs, and radiological emergency plans.
- Radiological environmental monitoring.
- Radiological control activities.

The Radiation Control (RADCON) Section will be under the supervision of the Plant Manager. The RADCON Section is responsible for the radiological control activities at the plant. It implements radiation standards and procedures; reviews proposed methods of plant operation; participates in development of plant documents; and assists in the plant training program and provides specialized training in RP. It will provide coverage for all operations involving radiation or radioactive materials including maintenance, fuel handling, waste disposal, and decontamination. It is responsible for personnel and in-plant radiation monitoring, and for maintaining continuing records of personnel exposures, plant radiation, and contamination levels.

Based on the above discussion, the NRC staff reviewed WBN-2's RP program implementation and finds that it adequately outlines the program structure, defines responsibilities of key program personnel, provides an independent function from the facility's operation, and describes the review process that could improve the effectiveness of the overall program. Accordingly, TVA's license application provides sufficient information to meet NRC regulations in Parts 19, 20, and 70, and is, therefore, acceptable.

3.3.2 ALARA PROGRAM

The licensee has an overall commitment to keep occupational radiation exposures ALARA and has specific plans and procedures that would be followed by operating and maintenance staff to assure that ALARA goals are achieved in the operation of the plant. Operational ALARA policy and procedures are formulated at the corporate level at TVA's NPG and implemented at the WBN-2 facility through the issuance of division procedures and plant instructions for the purpose of maintaining Total Effective Dose Equivalent (TEDE) ALARA. These procedures and instructions would be consistent with the intent of Section C.1 of RG 8.8, "Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Stations Will Be as Low as Is Reasonably Achievable" (NRC, 1978) and RG 8.10, "Operating Philosophy for Maintaining Occupational Radiation Exposures as Low as Is Reasonably Achievable" (NRC, 1977). Included in these operating procedures and plant instructions would be the provision that employee radiation exposure trends are reviewed periodically by management staff at the WBN-2 facility and in the NPG central office. Summary reports would be prepared that describe: (a) major problem areas where high radiation exposures are encountered; (b) which worker group is accumulating the highest exposures; and (c) recommendations for changes in operating, maintenance, and inspection procedures or modifications to the plant as appropriate to reduce exposures.

As proposed by the applicant, an ALARA committee, composed primarily of supervisory personnel, would be established to periodically review the effectiveness of implementation of the ALARA Program. Reviews will include the site performance against ALARA goals, employee ALARA suggestions, ALARA planning documents, and trends. Also, the WBN-2 Plant Manager or Assistant Plant Manager will normally serve as chairman of the site ALARA committee, which will provide an independent line of communication for the Radiation Safety program to keep upper level management cognizant of concerns relative to radiation safety.

As discussed above, the staff has reviewed WBN-2's ALARA commitment and procedures, and finds that they are consistent with the requirements in 10 CFR 20.1101, "Radiation Protection Programs" to develop, document, and implement a radiation protection program commensurate with the scope and extent of license activities. Accordingly, the staff finds WBN-2's ALARA commitment and procedures acceptable.

3.3.3 ORGANIZATION AND PERSONNEL QUALIFICATIONS

As discussed in the application, NPG personnel at the WBN-2 facility will meet the qualification and training requirements of NRC RG 1.8, "Qualification and Training of Personnel for Nuclear Power Plants," Revisions 1 and 2 (NRC, 1975/1987). Specifically, the site RP Manager would have the education and experience as described in RG 1.8, Revisions 1 and 2, and the endorsed American National Standards Institute (ANSI) N18.1-1971 (ANSI, 1971) and ANSI/ANS-3.1-1981 (ANSI 1981). The RP Manager will be required to meet the more restrictive of the composite qualifications and training of both documents.

Further, the application clarifies that the RP Manager shall have a bachelor's degree in a science or engineering subject, including formal training in RP. The responsible individual shall have five years of experience in applied RP. At least three of the five years shall be professional-level experience in applied RP work in a nuclear facility dealing with radiological problems similar to those encountered in nuclear power plants, preferably in a nuclear power plant. During the three years, the individual should participate in the RP section of an operating nuclear power plant during the following periods: (1) routine refueling outage (one to two

months); and (2) two months operation above 20 percent power. The RP Manager shall have at least six months experience onsite.

As stated in the license application, the WBN-2 facility has a Plant Onsite Review Committee (PORC) that functions to advise the Plant Manager in matters related to nuclear safety. This advisory function is performed by the PORC acting in a formal meeting periodically and as situations demand. The PORC Chairman and members are appointed in writing by the Plant Manager. PORC members meet the experience requirements of ANSI N18.1-1971 (ANSI, 1971) and ANSI/ANS 3.1-1981 (ANSI, 1981) as endorsed by RG 1.8, Revision 2, April 1987, "Qualification and Training of Personnel for Nuclear Power Plants," (NRC, 1975/1987).

The PORC conducts, as a minimum, reviews of the various documents and programs listed below. The PORC may delegate the performance of reviews, but will maintain cognizance over and responsibility for them (e.g., subcommittees).

- New procedures or changes to existing procedures that require an evaluation in accordance with 10 CFR 50.59.
- The emergency operating procedures which implement NUREG-0737 (NRC, 1980) and NUREG-0737, Supplement 1 (NRC, 1982b), as stated in Generic Letter 82-33 (NRC, 1982a).
- Radiological Emergency Plan.
- Offsite Dose Calculation Manual (ODCM).
- Process Control Program (radwaste packaging and shipping).
- Additional PORC reviews specifically required by site-specific technical specifications or the plant's licensing basis.
- Proposed changes to Technical Specifications; Technical Requirements Manual; their Bases; and amendments to the Operating License.
- Selected 50.59 evaluations and 72.48 evaluations.

The staff reviewed WBN-2's personnel qualifications for the radiation safety organization and finds them acceptable because they are sufficient to meet the NRC requirements in 70.22(a)(6) relative to the possession of new reactor fuel.

3.3.4 WRITTEN PROCEDURES

As discussed in its license application, WBN-2 radiological control instructions are maintained and made available to all WBN-2 site personnel. These instructions are written to implement the requirements of 10 CFR Part 20, applicable codes and standards, and commitments to outside agencies (e.g., American Nuclear Insurers and Institute of Nuclear Plant Operations).

RP procedures are prepared, reviewed and approved to carry out activities related to the RP Program. Procedures are used to control RP activities in order to ensure that the activities are carried out in a safe and effective manner. RP procedures will be reviewed and revised as needed to incorporate facility or operational changes

A RWP system is established to document radiological conditions and prescribe appropriate protective requirements for work in radiologically controlled areas.

Based on the above discussion, the NRC staff finds WBN-2's commitments to use written procedures acceptable because they are sufficient to meet the requirements of the NRC requirements in 20.1101.

3.3.5 TRAINING

As stated in the license application, a RP training program shall be developed, documented, and administered consistent with expectations as outlined in NEI 03-04, "Guideline for General Access Training" (NEI, 2003). This program is implemented in General Employee Training for NPG power plant facilities which include the WBN-2 facility, and activities under this license. All individuals who in the course of employment are likely to receive an occupational exposure to radiation from licensed and unlicensed radiation sources under the control of the applicant in excess of 100 mrem in a year would receive RP training commensurate with their duties and responsibilities (10 CFR 19.12) and instructions on NRC RGs 8.13 (NRC, 1999a) and 8.29 (NRC, 1996).

As described in the license application, TVA commits to establish a training program for RP personnel developed by Nuclear Training. Nuclear Training will issue procedures detailing the program. The Program Manager of Radiological Services shall concur with the initial issuance and any change to procedures for the training of RP personnel. The National Voluntary Laboratory Accreditation Program (NVLAP) Technical Director shall concur with the training requirements and procedures involving NVLAP accredited activities.

Based on the above discussion, the staff finds that WBN-2's commitments to train employees in RP acceptable because they are sufficient to meet the requirements of the NRC requirements in 10 CFR 19.12.

3.3.6 VENTILATION AND RESPIRATORY PROTECTION PROGRAMS

As stated in the license application, internal occupational dose is controlled through facility design, engineering controls, confinement and reduction of contaminated areas, limiting access to radiological controlled areas, and the use of respiratory protective equipment. Personnel will not be routinely monitored for internal deposited radioactive material. Confirmatory monitoring is performed for individuals through the assessment and tracking of derived airborne concentration hours (DAC-HR). Radio-bioassay (in vitro and in vivo measurement and analysis) is employed to confirm and/or evaluate probable intake.

A respiratory protection program will be established and maintained in accordance with 10 CFR 20. Workers will have respiratory protection training before wearing respiratory protection equipment. The licensee notes that intakes of radioactive material would be permissible if evaluations predict that use of respiratory protection equipment would result in a higher TEDE. TVA states in the license application, consistent with the ALARA principle, that other factors could also be considered in the evaluation for maintaining TEDE ALARA. These factors could include, but are not limited to, environmental conditions, safety conditions, accessibility conditions, worker comfort, wear times, and the type of respiratory equipment specified or available. All TEDE ALARA evaluations are documented and retained as a Facility-based Radiological Control Program record. Dose calculations/investigations will be reviewed and approved by RP supervision.

Respiratory Protection Program elements include:

- Air sampling sufficient to identify the potential hazard, permit proper equipment selection, and estimate exposures;
- Surveys and bioassays, as appropriate, to evaluate actual intakes;

- Testing of respirators for operability immediately prior to each use;
- Development of written procedures that address: selection, fitting, issuance, maintenance, and testing of respirators, including testing for operability immediately prior to each use; program audits; minimum qualifications of program supervisors and implementing personnel; limitations on periods of respirator use and relief from respirator use; maintaining TEDE ALARA and performing evaluations; supervision and training of personnel; monitoring (including air sampling and bioassays), and recordkeeping; a description of the applications of respirators for routine, non-routine, and emergency respirator use; and periodic medical evaluation (NRC RG 8.15).
- Determination by a physician prior to the initial fitting of respirators, and annually (quarter ending) thereafter or periodically at a frequency determined by a physician, that the individual user is medically fit to use the respiratory protection equipment.

The applicant's fuel handling area ventilation system is designed to: (1) maintain acceptable environmental conditions for personnel access, operation, inspection, maintenance, and testing, (2) protect mechanical and electrical equipment and controls, and (3) control airborne activity during normal operation. To control airborne activity, ventilation air is supplied to clean areas, then routed to areas of progressively greater contamination potential. The fuel handling area is maintained at a slightly negative pressure to limit out leakage, and can be physically isolated from the outdoors in case of radiological contamination. Exhaust is provided by two 100% capacity fuel handling area exhaust fans. During normal operation, non-accident conditions, one fan will be in operation with the other on standby. Both fans discharge to the Auxiliary Building exhaust stack. An inlet damper furnished with each fuel handling area exhaust fan is used to regulate the volume of air exhausted as required to maintain a ¼-inch negative pressure within the building. These dampers are automatically operated by static pressure controllers. During accident conditions involving the fresh fuel, the fuel handling area ventilation system would be shut down and all environmental control handled by the Auxiliary Building Gas Treatment System. The fuel-handling area ventilation system is located completely within Seismic Category I structures and all safety-related components would be fully protected from floods and tornado-missile damage. During periods of high radiation in the fuel handling area or upon initiation of a containment isolation signal or for high air temperature at the supply intake, the Auxiliary Building supply and exhaust fans and the fuel handling exhaust fans would be automatically stopped and isolation dampers located in the ducts that penetrate the Auxiliary Building Secondary Containment Enclosure would be closed.

Based on the above discussion, the staff finds WBN-2 has established ventilation and respiratory protection programs in accordance with the acceptance criteria identified in NUREG 1520 (NRC,2002), and satisfies the regulatory requirements of 10 CFR Part 20, Subpart H.

3.3.7 RADIATION SURVEY AND MONITORING PROGRAMS

As stated in TVA's license application, prospective monitoring determinations for internal and external dose monitoring are performed for individuals or group of individuals entering the restricted area. Personnel monitoring, for dose from sources external to the body, is conducted using appropriate dosimeters as required by 10 CFR 20. TVA maintains facilities with accreditation as a processing laboratory for dosimeters, as described in ANSI N13.11-1983, "Personnel Dosimeter - Criteria for Performance" (ANSI, 1983). This accreditation is under the NVLAP conducted by the National Institute of Standards and Technology. Dosimeters could be processed onsite by WBN-2, an accredited sub-facility, or by another processing laboratory within the scope of TVA's accreditation. Dose information for whole body (total effective dose equivalent), external exposure of the skin, lens of the eye, and extremities are recorded in a

dose tracking system and retained in a permanent historical database for generating required reports. Real time control is generally implemented using information from direct reading dosimeters. Official doses of record are taken from dosimeters. However, doses are calculated when dosimeter results are either not available or do not accurately represent actual dose received.

Personnel monitoring and confirmatory monitoring for dose from intakes of radioactive material is conducted using DAC-HR tracking and bioassays, including whole body counting. Monitoring shall be performed for each person as required to be monitored by 10 CFR 20. The whole body counter is calibrated with standard radioisotopes in configurations that approximate the human body. The whole body counter is able to detect expected gamma emitting radionuclides per ANSI-N13.30, 1996, Table-C.3, "Direct Radiobioassay Minimum Detectable Quantities" (ANSI, 1996)

Routine radiological surveys to detect radiation, radioactive contamination, and airborne radioactivity are performed throughout the plant on periodic schedules. Survey frequencies are determined by the RADCON Superintendent based upon the actual or potential radiological conditions. Schedules for completion of routine surveys are issued to the technicians. As plant conditions change, the schedule would be updated. Radiological surveys may be performed whenever personnel enter potential or actual radiological areas and there is any doubt as to the existing conditions. Retention of survey records follow the requirements of 10 CFR 20.2103 and the RG 1.88.

As stated in the license application, TVA commits to conduct radiation and contamination surveys on the new fuel shipments by RADCON personnel. The purpose of the survey is to protect personnel from unnecessary exposure to radiation and/or contamination. Smears shall be counted for alpha and beta-gamma radiation.

As stated in the license application, TVA commits to conduct periodic surveys within the storage/handling area. Upon detection of contamination, a personnel monitoring station is established and the area controlled to prevent the spread of the contamination. The work controlling document will describe the protective clothing, dosimetry, and methods to be followed to prevent unnecessary exposure to personnel. The contaminated area or item will be cleaned and/or disposed of appropriately.

Portable survey instruments are calibrated and checked periodically with standard radioactive sources in accordance with instrument specific calibration and maintenance procedures. Accurate records on the performance of each instrument during each calibration are maintained. Each laboratory counting system is checked at regular intervals with standard radioactive sources for proper counting efficiencies, background count rates, and operating parameters.

Controls have been established for entry into and exit from radiological controlled areas (RCA). Prior to entry, workers will be provided training, radiation monitoring devices (thermoluminescent dosimeter and electronic dosimetry) and will be required to have a RWP applicable to the assigned work activity. Upon exiting a RCA, workers will be expected to proceed to the nearest frisker station and perform a self-survey of their hands and feet at a minimum. Once frisking is completed, workers will exit the RCA via a personal contamination monitor. Prior to leaving the WBN-2 protected area, workers will exit through a portal monitor that again measures the individual for contamination.

Each RCA will be posted by yellow and magenta signs bearing the standard radiation warning symbol and the words "Caution - Radiologically Controlled Area." The posting will also state that a monitoring device is required (unless it was determined that monitoring is not required).

Contamination areas will have conspicuous boundaries consisting of such items as rad-ribbon, rad-rope, rad-tape, and step-off pads and be posted by yellow and magenta signs bearing the standard radiation warning symbol and the words "Caution-Contaminated Area" or "Caution-Contamination Area." Where, due to physical space limitations, it will be impractical to post a contaminated area as described above, the area may be noted with radiation tape and/or radiation hazard tags. Physical space limitation will be intended to apply to such areas as floor drains, electrical panels, sample sinks, etc. Radiological postings will be displayed with yellow and magenta colors in accordance with 10 CFR 20.1901.

The staff reviewed WBN-2's monitoring and contamination control program, as discussed above, and finds it acceptable because it is sufficient to meet the requirements of the NRC regulations in 10 CFR 20 Subparts F, G, I, and J.

3.3.8 ADDITIONAL PROGRAM REQUIREMENTS

Based on the its review of the application, the NRC Staff notes that TVA commits to implement a tracking system that will track radiation exposure for purposes of trend analysis and work planning, and provide data for management evaluations of the ALARA program. Once the system is implemented, the exposure control system will:

- Keep up-to-date exposure data from dosimeters, calculated doses, and DAC-hr.
- Compare individual dose data with TVA Administrative Dose Limits and regulatory limits.
- Keep the supervisor informed of workers' exposure.
- Keep employees informed of their own exposure.

A dose record system will be implemented by the RADCON group for purposes of maintaining historical dose records for all persons for whom personnel monitoring or dose calculations are performed. The records maintained will include: the deep-dose equivalent (DDE) to the whole-body, lens dose equivalent (LDE), shallow-dose equivalent (SDE) to the skin, and shallow-dose equivalent to the extremities (SDEME); the estimated intake of radionuclides; the committed dose equivalent (CDE) assigned to the intake of radionuclides; and the specific information used to assess the committed effective dose equivalent pursuant to 10 CFR 20.1204(a) and (c), and when required by 10 CFR 20.2106. DDE, LDE, SDE, SDEME, CEDE, CDE, TEDE, and Total Organ Dose Equivalent dose information will be calculated, maintained, and reported to the NRC and individuals according to NRC RGs 8.7 (NRC, 2005) and 8.34 (NRC, 1992) and 10 CFR 19.

Those individuals who receive occupational exposure and require monitoring per 10 CFR 20.1502 will have their doses reported annually to the NRC. To assure this, those individuals with greater than 100 mrem of TEDE, DDE, LDE, SDE, SDEME, CEDE, or CDE will have their dose documented and reported to the NRC on an NRC FORM-5 or an electronic record containing all the information required by a FORM-5. These reports will be generated and reported by the licensee as required by 10 CFR 20.2206. External exposures, as measured with a NVLAP accredited device, will be recorded and reported at a 10 mrem threshold value.

When determining the dose from airborne radioactive material, WBN-2 will include the contribution to the DDE, LDE, and SDE from external exposure to the radioactive cloud.

External exposures, as calculated for noble gas submersion dose, will be integrated in the RP Records system. Internal exposures, as calculated for DAC-hrs exposures and/or bioassay data, will be integrated in the RP Records system. Doses calculated by the RP computer system will be reported at a 1 mrem threshold.

All plant abnormal occurrences will be investigated in accordance the WBN-2 Corrective Action Program. TVA is required by 10 CFR 50.72 to notify NRC immediately if certain types of events occur. TVA commits to the reporting requirements contained in 10 CFR Part 20 for events involving licensed byproduct, source, or SNM; and, 10 CFR Part 70 which contains reporting requirements for events and conditions involving licensed SNM.

Based on the above discussion, the staff reviewed WBN-2's exposure tracking and reporting program and finds it acceptable because it is sufficient to meet the requirements of the NRC regulations.

3.4 EVALUATION FINDINGS

Based on its review of the application, the staff finds that TVA has established and will maintain an acceptable RP program that includes:

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

The NRC staff concludes based on its review of the application that WBN-2's RP program, as described in the license application, meets the regulatory requirements of 10 CFR Parts 19, 20, and 70 and is acceptable.

3.5 REFERENCES

(ANSI, 1971) American National Standards Institute, ANSI N18.1-1971, "Selection and Training of Nuclear Power Plant Personnel," 1971.

(NRC, 1975/1987) NRC, RG 1.8, "Qualification and Training of Personnel for Nuclear Power Plants," Revisions 1 and 2, September 1975/April 1987.

(NRC, 1977) NRC, RG 8.10, "Operating Philosophy for Maintaining Occupational Radiation Exposures as Low as Is Reasonably Achievable," May 1977.

(NRC, 1978) NRC, RG 8.8, "Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Stations Will Be as Low as Is Reasonably Achievable," June 1978.

(NRC, 1980) NRC, NUREG-0737, "Clarification of TMI Action Plan Requirements," November 1980.

(ANSI, 1981) American National Standards Institute, ANSI/ANS-3.1-1981, "Selection, Qualification, and Training of Personnel for Nuclear Power Plants," 1981.

(NRC, 1982a) NRC, Generic Letter 82-33, "Supplement I to NUREG-0737 - Requirements for Emergency Response Capability," December 1982.

(NRC, 1982b) NRC, NUREG-073, Supplement 1, "Clarification of TMI Action Plan Requirements: Requirements for Emergency Response Capability," December 1982.

(ANSI, 1983) American National Standards Institute, ANSI-N13.11-1983, "Personnel Dosimeter - Criteria for Performance," 1983.

(TVA, 1989) TVA, TVA-NQA-PLN89-A, Nuclear Quality Assurance Plan, 1989.

(NRC, 1992) NRC, RG 8.34, "Monitoring Criteria and Methods To Calculate Occupational Radiation Doses," July 1992.

(NRC, 1996) NRC, RG 8.29, "Instruction Concerning Risks from Occupational Radiation Exposure," February 1996.

(ANSI, 1996) American National Standards Institute, HPS N13.30, "Performance Criteria for Radiobioassay," May 1996.

(NRC, 1999a) NRC, RG 8.13, "Instruction Concerning Prenatal Radiation Exposure," June 1999.

(NRC, 1999b) NRC, RG 8.15, "Acceptable Programs for Respiratory Protection," October 1999.

(NRC, 2002) NRC, NUREG-1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility," March 2002.

(NEI, 2003) Nuclear Energy Institute, NEI 03-04, "Guideline for General Access Training," 2003.

(NRC, 2005) NRC, RG 8.7, "Instructions for Recording and Reporting Occupational Radiation Exposure Data," November 2005.

(TVA, 2009) TVA, "Watts Bar Nuclear Plant Unit 2 10 CFR 70 Safety Analysis Report," November 2009.

(TVA, 2012) August 23, 2012, letter from Raymond A. Hruby, Jr. to the U.S. NRC, "Watts Bar Nuclear Plant (WBN) - Unit 2 - Request for Renewal of SNM License No. SNM-2014," (ADAMS Accession Number ML12264A545).

4.0 NUCLEAR CRITICALITY SAFETY

4.1 REGULATORY REQUIREMENTS

The regulatory basis for the review of TVA's nuclear criticality safety (NCS) is contained in 10 CFR 70.22, "Contents of Applications;" 10 CFR 70.23, "Requirements for the Approval of Applications;" 10 CFR 70.24, "Criticality Accident Requirements;" and 10 CFR 70.52, "Reports of Accidental Criticality."

4.2 REGULATORY ACCEPTANCE CRITERIA

The acceptance criteria for the NRC's review of TVA's NCS program for the WBN-2 site are outlined in Section 5.4 of NUREG-1520 (NRC, 2002).

4.3 STAFF REVIEW AND ANALYSIS

TVA's submission of a request to renew license SNM-2014 (TVA, 2012) contained no modification to the NCS discussion (i.e., Chapter 5 of its revised Part 70 SAR is identical to Chapter 5 of its previously submitted Part 70 SAR). NRC staff verified the absence of modification and also reviewed the previous staff evaluation for NCS (chapter 4 of the SER for license SNM-2014 dated June 2011). Because there were no modifications to the pertinent sections of the licensee's SAR, staff concluded that the previous staff evaluation remains applicable. The discussion in this section of the SER restates the previous staff evaluation.

4.3.1 FUEL STORAGE

The application requests a license to receive, possess, inspect, and store SNM in the form of 193 fresh fuel assemblies. The material to be licensed includes up to 2,600 kilograms of uranium-235 (U-235), enriched to a maximum of 5 percent by weight (wt%). Storage locations will include the new fuel storage vault and the spent fuel pool. Fresh fuel assemblies will be stored in their shipping containers until they can be offloaded to the new fuel storage vault and/or into the spent fuel pool. In the license application, TVA stated that they will use shared systems, structures, and components currently in place for Watts Bar Nuclear Plant, Unit 1 (WBN-1) to support the proposed activities for WBN-2.

As documented in the WBN-2 New Fuel Receipt Response to Request for Additional Information (RAI) (TVA, 2011), TVA planned to store the fuel for the initial Unit 2 core load in either the new fuel vault and the spent fuel pool, or completely in the spent fuel pool. After the SNM license was issued in 2011, TVA received the initial core load in the form of fresh fuel assemblies and are currently, storing the initial core load in the fuel vault and some in the spent fuel pool. Section 5.1.2 of the license application discusses the control methods for prevention of criticality associated with the SNM in the form of fresh fuel assemblies and describes safety controls established in both storage locations. The new fuel storage area, spent fuel pool, and fuel handling equipment are shared by both Unit 1 and Unit 2 and are under the control of Unit 1 in accordance with the Unit 1 10 CFR Part 50 Operating License.

As described in the license renewal application, the new storage vault design has a maximum capacity of 130 available storage cell locations. Their analysis demonstrated that nominal enrichments up to 5.0 wt% U-235 do not result in criticality concerns provided that only 120 specific storage cells of the 130 available locations are utilized. When fresh fuel is stored in the vault, 10 restricting devices such as insert plates will be placed in the proper locations to provide

additional assurance, over procedural controls, that the fuel will only be stored in the 120 analyzed positions. The remaining fuel assemblies may be stored inside the spent fuel storage pool. Also, the analysis of the spent fuel racks confirmed that the fuel assemblies can be stored safely with TVA controls in place, to assure safe configuration inside the pool. Fuel assemblies less than a maximum of 5.0 wt% enriched may be stored in one of four arrangements with the storage conditions below:

- Fuel assemblies may be stored in the racks without further restrictions provided the burn-up of each assembly is in the acceptable domain.
- New and spent fuel assemblies may be stored in a checkerboard arrangement of two new and two spent assemblies, provided the accumulated burn-up of each spent assembly is in the acceptable domain identified in Figure 4.3-47, depending on the specified initial enrichment.
- New fuel assemblies may be stored in 4-cell arrays with 1 of the 4 cells remaining empty of fuel (containing only water or water with up to 75% by volume of nonfuel bearing material).
- New fuel assemblies with a minimum of 32 integral fuel burnable absorber (IFBA) rods may be stored in the racks without further restrictions provided the loading of ZrB₂ in the coating of each IFBA rod is a minimum of 1.25x (1.9625 mg/in).

As documented in Section 2.10 of the SER Related to Amendment 40 to the Operating License of WBN-1 (NRC, 2002b), the NRC staff concluded that TVA's evaluation of the four different configurations of fresh and spent fuel assemblies meets 10 CFR 50.68 requirements and the criticality analysis of the spent fuel pool configuration assures that the maximum K_{eff} will be less than or equal to 0.95 with fuel up to 4.95 ± 0.5 wt% U-235 enrichment. The Part 70 license application for WBN-2 does not present any new or revised information on these configurations since TVA will use the same structures, systems, and components currently in place and licensed for WBN-1 to store the fresh fuel for WBN-2. Therefore, the NRC staff concludes that TVA's evaluation is still applicable and meets the regulatory requirements in 10 CFR 70.22(a)(7) and (a)(8) for the proposed storage of fresh fuel assemblies for WBN-2.

4.3.2 FUEL HANDLING

Conservative and independent calculations performed by the NRC staff during the licensing of WBN-1 (NRC, 1979) have shown that two or more fuel assemblies are required to attain criticality. WBN2 will use the same design in fuel assemblies as Unit 1 Operating Reactor. TVA established controls to assure that no more than one fuel assembly may be out of approved shipping containers or storage locations at any one time as specified below:

- One un-irradiated fuel assembly shall be allowed within the fuel handling area. The fuel handling area includes all areas of the refueling floor where un-irradiated fuel assemblies are handled outside of metal shipping containers. The fuel handling area also includes the new fuel storage vault and the truck bay where metal shipping containers are unloaded.
- One fuel assembly shall be allowed within the spent fuel storage pool boundary (excluding the inspection, reconstitution, or cleaning locations with appropriate evaluation for each configuration that must be performed prior to implementation). The spent fuel storage pool boundary includes the cask loading area, fuel transfer canal (excluding the transfer cart), and spent fuel pool.

- Three fuel assemblies shall be allowed within the refueling canal. The refueling canal includes the fuel transfer tube boundary (including the transfer cart) and the rod cluster control changing fixture. This allows for two fuel assemblies to be in the rod cluster control changing fixture while the third fuel assembly is being transferred through the fuel transfer tube, is in the upender, or is in transit to or from the reactor cavity.
- One fuel assembly shall be allowed within the reactor cavity.
- Loose fuel rods or pellets must be evaluated for criticality before removal from a fuel assembly or storage at the site.

The NRC staff evaluated whether TVA needed criticality accident alarms pursuant to 10 CFR 70.24. In Supplement 5 of NUREG-0847, "Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant, Units 1 and 2," the NRC staff granted TVA an exemption from the requirements of 10 CFR 70.24. On February 27, 2004, TVA updated its FSAR to include a commitment to follow 10 CFR 50.68 in lieu of the exemption from the requirements in 10 CFR 70.24. A 10 CFR 50.59 evaluation was completed by TVA to reflect these changes. In a letter dated July 30, 2010, TVA indicated that the receipt, handling, and storage of SNM for WBN-2 will be in compliance with the requirements of 10 CFR 50.68(b) because these activities will take place in areas shared with WBN-1. This commitment has been incorporated into the license as a license condition, S-2.

To provide for detection of inadvertent releases of radiation due to fuel damage or a nuclear criticality, TVA states in its license application that radiation monitors are provided in the storage and associated handling areas when fuel is present. These radiation monitors are also used as part of the safety strategy to handle fuel for WBN-1. The NRC staff evaluated the adequacy of these monitors during the licensing of WBN-1 and found that these radiation monitors are adequate to detect excessive radiation levels and allow appropriate safety actions to be taken in accordance with plant procedures. Therefore, the NRC staff concludes that these monitors are also adequate for fuel handling activities for WBN-2.

4.3.3 REPORTING REQUIREMENTS

In Section 5.4 of the license application, TVA commits to submit NCS reports pursuant to the requirements in 10 CFR 50.72 and 50.73 instead of 10 CFR 70.52. The NRC staff reviewed the reporting requirements in 10 CFR 50.72 and 50.73, as well as other relevant WBN licensing documents. Controls to prevent criticality events are addressed in WBN-1 Technical Specifications requirements. A criticality event would be a violation of these requirements that would have to be reported within one hour under 10 CFR 50.72(b) which is equivalent to the requirements in 10 CFR part 70.52. Therefore, the NRC staff finds TVA's approach acceptable because it provides reasonable assurance that, should a criticality event occur involving the receipt, possession, inspection, and storage of fresh fuel assemblies at WBN-2, TVA will report such events in a timely manner, consistent with the intent of 10 CFR 70.52.

4.4 EVALUATION FINDINGS

The staff has reviewed the NCS program and requirements for criticality safety for WBN-2 and has reasonable assurance of the following:

Pursuant to 10 CFR 70.24(d)(1), "the requirements in paragraphs (a) through (c) of this section do not apply to a holder of a construction permit or operating license for a nuclear power reactor issued under part 50 of this chapter or a combined license issued under Part 52 of this chapter, if the holder complies with the requirements of paragraph (b) of 10 CFR 50.68." Therefore, with

the license condition that the TVA comply with 10 CFR 50.68(b), the NRC staff concludes that 10 CFR 70.24 is not applicable.

The NRC staff concludes that the NCS program and safety controls are acceptable because, as described in the license application, they provide reasonable assurance that the proposed receipt, possession, inspection, and storage of the SNM in the form of fresh fuel assemblies at WBN-2 will be conducted safely.

4.5 REFERENCES

(NRC, 1979) NRC, "Safety Evaluation Report, TVA Application and Supplement for a License for Fuel for the Watts Bar Nuclear Power Plant, Unit 1," (ADAMS Accession Number ML082110091).

(NRC, 1990) NRC, NUREG-0847, "Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant, Units 1 and 2," Supplement 5, November 1990.

(NRC, 2002) NRC, NUREG-1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility," March 2002.

(NRC, 2002b) NRC, "Watts Bar Nuclear Plant, Unit 1-Issuance of Amendment to Irradiate up to 2304 tritium-producing burnable absorber rods in the reactor core," September 2002. (ADAMS Accession Number ML022540925).

(TVA, 2004) Safety Analysis Report Change Request Performed by TVA pursuant to 10 CFR 50.59, "Changes, Test, and Experiments," (ADAMS Accession Number ML110840608).

(TVA, 2008) September 23, 2008, letter from M. K. Brandon to the U.S. NRC, "Watts Bar Nuclear Plant (WBN), Unit 1 - Updated Final Safety Analysis Report (UFSAR) Amendment 7," (ADAMS Accession Number ML082950191).

(TVA, 2009) "Application for a SNM License For WBN-2 in Accordance with 10 CFR 70, *Domestic Licensing of SNM*," November 12, 2009 (ADAMS Accession Number ML100120487).

(TVA, 2010) July 30, 2010, letter from R. M. Krich to the U.S. NRC, "Response to Request for Additional Information Regarding the Safety Evaluation Report for 10 CFR 70 License Application for WBN-2(TAC No. L32918)," (ADAMS Accession Number ML103570133).

(NRC, 2011) NRC, NUREG-0847, "Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant, Units 1 and 2," Supplement 22, February 2011.

(TVA, 2011) April 29, 2011 letter from D. Stinson to the U.S. NRC, "New Fuel Receipt, Response to Request for Additional Information Regarding the Safety Evaluation Report for 10 CFR 70 License Application for Watts Bar Nuclear Plant, Unit 2," (ADAMS Accession Number ML11136A117).

(NRC, 2011) NRC, "Safety Evaluation Report for the SNM License Application Watts Bar Nuclear Plant, Unit 2, Spring City, Tennessee," June 2011, (ADAMS Accession Number ML110830114).

(TVA, 2012) August 23, 2012, letter from Raymond A. Hruby, Jr. to the U.S. NRC, "Watts Bar Nuclear Plant (WBN) - Unit 2 - Request for Renewal of SNM License No. SNM-2014," (ADAMS Accession Number ML12264A545).

5.0 FIRE SAFETY

The purpose of this review is to determine, with reasonable assurance, that in this license renewal TVA has: (1) maintained the design of a facility that provides adequate protection against fires and explosions that could affect the safety of licensed materials and thus present an increased radiological risk; (2) maintained consideration of the radiological consequences of fires; and (3) continued to institute suitable safety controls to protect workers, the public, and the environment during the proposed activities at WBN-2.

5.1 REGULATORY REQUIREMENTS

The regulatory basis for the fire safety review includes the general and additional contents of the application, as required by 10 CFR 70.22(a)(7). In addition, the fire safety review must demonstrate compliance with 10 CFR 70.23(a)(3) and 10 CFR 70.23(a)(4).

5.2 REGULATORY ACCEPTANCE CRITERIA

The acceptance criteria that the NRC uses for reviews of fire safety are outlined in Sections 7.4.3.1 through 7.4.3.5 of NUREG-1520, Rev 1 (NRC, 2010).

5.3 STAFF REVIEW AND ANALYSIS

The information to support this review was obtained by reference from the license renewal application and "Watts Bar Nuclear Plant Fire Protection Report, Rev. 10," (FPR) dated January 27, 1998, which included the Fire Hazards Analysis (FHA).

The material associated to this part 70 review is collocated with the Watts Bar Power Plant that includes Unit 1 and Unit 2 and is bounded by the Watts Bar Nuclear Power Plant Fire Safety Program. The fire protection review was performed relative to the guidance provided in NUREG-1520, Rev 1 (NRC, 2010) and is limited to the fuel handling areas shown in Figures 1.2-3, 1.2-4, and 1.2-8 of the FSAR. The NRC's Office of Nuclear Reactor Regulation documented their evaluation of WBN-2 in regards to the applicable fire protection regulations and guidance for the safe operation of nuclear power reactors in NUREG-0847, "Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant, Unit 2, Docket 50-391." The staff found no changes in fire safety pertaining to the 10 CFR Part 70 portion of the license renewal.

5.3.1 BUILDING CONSTRUCTION AND FACILITY DESIGN

The WBN-2 facility and its original fire protection systems were designed and constructed to industrial standards that were in effect at the time of construction. TVA commits to meeting the prevailing industrial standards and codes, as referenced in their license application, whenever facilities are expanded or modified. WBN-2 facilities conform to noncombustible masonry or metal construction requirements as specified by the applicable building code. Lightning protection is incorporated into the facility design. Facility exit routes are posted throughout and are unimpeded by physical security requirements. In addition, WBN-2 workers are trained in evacuation procedures, and periodic drills are conducted to verify the adequacy of egress.

5.3.2 PROCESS FIRE SAFETY

Within the Auxiliary Building, which is a Seismic Category I structure pursuant to RG 1.201, "Guidelines for Categorizing Structures, Systems, and Components in Nuclear Power Plants

According to Their Safety Significance,” new fuel bundles are unloaded in the Cask Unloading Area and are transferred for storage on racks within the New Fuel Storage Area. A Seismic Category I structure is designed and built to withstand the maximum potential earthquake stresses for the particular region where a nuclear plant is sited. The process itself utilizes methods and materials that have no fire safety concerns.

5.3.3 FIRE PROTECTION AND EMERGENCY RESPONSE

The fire protection equipment in the fuel handling area of the Auxiliary Building is common to both Units 1 and 2.

As stated in the license application, firefighting equipment available during fuel receipt and movement for the fuel cask receipt area (Auxiliary Building, elevation 729) consists of the following:

1. A minimum of five 10-pound dry chemical fire extinguishers located in the cask receiving area and adjacent nitrogen storage area.
2. Two 1 1/2-inch hose stations equipped with 100 feet of hose and fog nozzles (ABC rated). One hose station is located in the cask fuel receipt area and the other is located in the adjacent nitrogen storage area. A fire pump, with a flow path to the referenced hose stations, is available.

Equipment available during fuel storage inside the new fuel storage vault and/or the spent-fuel storage pit (Auxiliary Building, elevation 757) consists of the following:

1. A minimum of four 10-pound dry chemical fire extinguishers located strategically on the refueling floor.
2. One 100-pound carbon dioxide or dry chemical wheeled extinguisher located in the area.
3. Two 1 1/2 inch hose connections equipped with 100 feet of hose and adjustable fog nozzles (ABC-rated). One hose station is located south of stairway No. 4, and the other is available from the 1 1/2 inch Siamese connection in the Unit 1 Reactor Building access room. A fire pump, with a flow path to the referenced hose stations, is available.

TVA states in their license application that site procedures for the maintenance and surveillance testing of the above-listed equipment, including fire pump, fire mains, standpipes, and hoses have been developed and will be performed as described in the FPR. In addition, the compensatory actions described in the FPR will be used should any of the listed fire equipment become unavailable.

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

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

Firefighting equipment is provided throughout the plant. Fire emergency procedures and pre-fire plans specify actions taken by the individual discovering the fire and by the emergency response organization. A specific pre-fire plan has been prepared for the fuel receipt and fuel storage areas. Discussion of this pre-fire plan is included in the periodic classroom instruction's training program provided for the emergency response team.

5.3.4 FIRE SAFETY MANAGEMENT

As stated in the license application, combustibles are controlled to reduce the severity of a fire which might occur in a given area and to minimize the amount and type of material available for combustion. The use and application of combustible materials at WBN-2 are controlled utilizing the following methods:

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

The use of ignition sources such as welding, flame cutting, thermite welding, brazing, grinding, arc gouging, torch applied roofing, and open flame soldering within safety-related areas are controlled through the approval and issuance of an ignition source permit. Permits are reviewed and approved by appropriate plant personnel. The ignition source permit is valid for one job. Job area inspections are performed and documented at the start of each shift where ignition source activities are being performed.

5.3.5 FIRE HAZARD ANALYSIS

As discussed above, the FHA is part of the FPR. The FHA results are documented on a fire area basis, broken down into separate discussions of classical fire protection features and safe shutdown analysis for each fire area. As stated in the license application, the FHA includes the following:

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

As stated in TVA's renewal application, fire hazards were performed by qualified nuclear, mechanical, electrical, and fire protection engineers. The deviation requests and evaluations applicable to each fire area are also summarized.

Based on the above information, the NRC finds that the FHA and Pre-Fire Plans conforms to the applicable guidance provided in the National Fire Protection Association (NFPA) Standard 801, "Standard for Fire Protection for Facilities Handling Radioactive Materials," (NFPA, 2008).

5.4 EVALUATION FINDINGS

The NRC staff concludes that TVA's capabilities continue to meet the acceptance criteria provided in Chapter 7 of NUREG-1520, Rev 1 (NRC, 2010). Given TVA's conformity with the NUREG-1520, Rev 1 (NRC, 2010) acceptance criteria on fire protection and their use of NFPA 801 (NFPA, 2008) to perform the FHA, the NRC staff find that TVA's equipment, facilities, and procedures continue to provide reasonable assurance that adequate fire protection for the proposed activities described in TVA's license application, will be provided and maintained at WBN-2 to meet the safety requirements of 10 CFR 70.22 (a)(7) and 70.23 (a)(3)-(a)(4).

5.5 REFERENCES

(NFPA, 2008) National Fire Protection Association Standard 801, "Standard for Fire Protection for Facilities Handling Radioactive Materials," (NFPA, 2008).

(NRC, 1996) NUREG-0847, "Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant, Units 1 and 2, Docket Nos. 50-390 and 50-391." (ADAMS Accession Number ML072060498).

(NRC, 2010) NRC, NUREG1520, REV 1, Rev 1, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility," May 2010.

6.0 EMERGENCY MANAGEMENT

In the renewal license application, TVA submitted by reference their Radiological Emergency Plan (REP). The REP consists of two portions: (1) a site-independent Nuclear Power Radiological Emergency Plan (NP-REP) that is applicable to all TVA-licensed nuclear power reactors, and (2) a series of site-specific appendices for each of the TVA nuclear sites—Browns Ferry Nuclear Plant (BFN, Appendix A); Sequoyah Nuclear Plant (SQN, Appendix B); and Watts Bar (WBN, Appendix C). The TVA REP, including the WBN-specific, Appendix C (but omitting Appendices A, B and D), comprises the “emergency plans” for WBN as referred to in 10 CFR 50.34(b)(6)(v), 10 CFR 50.47(b), and 10 CFR Part 50, Appendix E. The generic NP-REP and the WBN-specific, Appendix C are collectively referred to in this SER as the “WBN REP.”

The purpose of reviewing the WBN REP is to determine if TVA has established adequate emergency management facilities and procedures to protect workers, the public and the environment related to the receipt, possession, inspection, and storage of SNM in the form of new fuel assemblies for the WBN-2 site. As part of the license renewal application, TVA states that the proposed activities will utilize shared systems, structures, components and administrative controls currently in place supporting the operation of WBN-1. As a result, the majority of the emergency preparedness information contained or incorporated by reference in the license application has been previously submitted and reviewed by the NRC in either the Final Safety Analysis Report (FSAR) or the REP. The information included in the TVA REP and its Appendices provides emergency planning information specific to each of its three plants.

As part of the original licensing of the WBN site, the NRC staff concluded in NUREG-0847, “Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant, Units 1 and 2, Supplement 20,” (NRC, 1996) that the overall state of onsite and offsite emergency preparedness provides reasonable assurance that, pursuant to 10 CFR 50.47(a), adequate protective measures can and will be taken in the event of a radiological emergency at the WBN site. The following review will describe TVA’s compliance with the 10 CFR part 70 emergency planning requirements.

6.1 REGULATORY REQUIREMENTS

The regulatory basis for the emergency management review is in 10 CFR 70.22(i)(1)(ii) and 10 CFR 70.22(i)(3).

6.2 REGULATORY ACCEPTANCE CRITERIA

The acceptance criteria for the NRC’s review of the Emergency Management Plan are outlined in Section 8.4.3 of NUREG-1520 (NRC, 2002).

6.3 STAFF REVIEW AND ANALYSIS

TVA’s submission of a request to renew license SNM-2014 (dated August 23, 2012) contained no modification to the Emergency Management discussion (i.e., Chapter 8 of its revised Part 70 SAR is identical to Chapter 8 of its previously submitted Part 70 SAR). NRC staff verified the absence of modification and also reviewed the previous staff evaluation for Emergency Management because there were no modifications to the pertinent sections of the licensee’s

SAR, staff concluded that the previous staff evaluation remains applicable. The discussion in this section of the SER restates the previous staff evaluation.

As noted in the 2011 review, NRC staff reviewed and found that TVA adequately identified and provided a description of: (1) the facility; (2) the onsite and offsite emergency facilities; (3) emergency plan classification system; (4) detection of accidents; (5) mitigation of consequences; (6) assessment of releases; (7) emergency response organization; administration and responsibilities; (8) emergency notification procedures; (9) information to be communicated; (10) training; (11) safe shutdown(recovery and facility restoration); and (12) exercise and drills. Additionally, TVA will maintain compliance with the *Emergency Planning and Community Right-to-Know Act of 1986*, in accordance with 10 CFR 70.22(i)(3)(xiii). This is accomplished by providing chemical inventory reports, providing notifications when new chemicals are brought onsite in certain quantities, and reporting releases of these substances to the appropriate agencies.

The NRC staff finds that TVA provided sufficient information to meet the requirements of 10 CFR 70.22(i)(3)(i). The details of the analysis are provided in the 2011 NRC's Safety Evaluation Report for the Special Nuclear Material License Application of Watts Bar Nuclear Plant, Unit 2 (NRC, 2011).

6.4 EVALUATION FINDINGS

In 2011, the NRC staff evaluated the WBN REP for the facility. TVA has an established REP for responding to the radiological hazards resulting from a release of radioactive material relating to the possession and storage of SNM in the form of new fuel assemblies for the WBN-2 in accordance with 10 CFR 70.22(i)(1)(ii). NRC staff reviewed the WBN REP with respect to 10 CFR 70.22(i)(1)(ii), 70.22(i)(3), and the guidance in Section 8.4.3 of NUREG-1520 (NRC, 2002). The NRC staff concluded that the WBN REP continues to be adequate in demonstrating compliance with the regulatory requirements, in that: (1) the facility is properly configured to limit releases of radioactive materials in case of an accident; (2) a capability exists for measuring and assessing the significance of accidental releases of radioactive materials; (3) appropriate emergency equipment and procedures are provided on-site to protect workers against radiological hazards that might be encountered after an accident; (4) a system has been established to notify Federal, State and local government agencies, and to recommend appropriate protective actions to protect members of the public; and (5) necessary recovery actions are established to return the facility to a safe condition after an accident.

The NRC staff finds that there were no changes made to the license application emergency management section and WBN Plant REP since the license was issued 3 years ago. The information provided in the renewal application and latest revision to the REP, Revision 93, is consistent with the NRC review conducted in 2011. The 2011 review of WBN REP for the facility is still valid for the purposes of this renewal therefore TVA continues to satisfy the regulatory requirements of 70.22.

6.5 REFERENCES

(NRC, 1983) NRC, NUREG-0737, Supplement 1, "Clarification of TMI Action Plan Requirements."

(NRC, 1992) NRC, RG 3.67, "Standard Format and Content for Emergency Plans for Fuel Cycle and Materials Facilities."

(NRC, 1996) NUREG-0847, "Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant, Units 1 and 2," Supplement 20 (ADAMS Accession Number ML072060498).

(NRC, 2002) NRC, NUREG-1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility," March 2002.

(TVA, 2009) November 12, 2009 letter from R. M. Krich to the U.S. NRC, "Application for a SNM License for WBN-2in Accordance with 10 CFR 70, 'Domestic Licensing of SNM'."

(TVA, 2010) September 17, 2010 letter from M. Bajestari to the U.S. NRC, "Watts Bar Nuclear Plant (WBN) Unit 2 – Response to NRC Question Regarding WBN, Unit 2 Emergency Plan (TAC No. ME0853)" (ADAMS Accession Number ML102600474).

(NRC, 2011) NRC, "Safety Evaluation Report for the Special Nuclear Material License Application of Watts Bar Nuclear Plant, Unit 2". June 2011 (ADAMS Accession Number ML110830114).

(TVA, 2012c) "Watts Bar Nuclear Plant (WBN)- Unit 2- Request for Renewal of SNM License No. SNM-2014." August 23, 2012 (ADAMS Accession Number ML12278A337).

(TVA, 2012d) March 5, 2012, letter from R. A. Hruby to the U.S. NRC, "Watts Bar Nuclear Plant (WBN) Unit 2 - Final Safety Analysis Report (UFSAR), Amendment 108," (ADAMS Accession Number ML12083A136).

7.0 ENVIRONMENTAL PROTECTION

7.1 REGULATORY REQUIREMENTS

To be considered acceptable, TVA must satisfy the following regulatory requirements regarding environmental protection:

1. 10 CFR Part 20 specifies the effluent control and treatment measures necessary to meet the dose limits and dose constraints for members of the public specified in Subparts B, D, and F; the survey requirements of Subpart F; the waste disposal requirements of Subpart K; the records requirements of Subpart L; and the reporting requirements of Subpart M.
2. 10 CFR 70.22(a)(7) states that the application shall contain a description of the equipment and facilities that will be used by TVA to protect health and minimize danger to life or property.
3. 10 CFR 70.22(a)(8) states that the application shall contain procedures to protect health and minimize danger to life or property (such as procedures for personnel monitoring and waste disposal, etc.);
4. 10 CFR 70.23(a)(3) and (a)(4) specify, in part, that an application for the possession and use of SNM will be granted provided that, among other things, the applicant's equipment and facilities are adequate to protect health and minimize danger to life or property, and that the applicant's proposed procedures to protect health and minimize danger to life or property are adequate.

7.2 REGULATORY ACCEPTANCE CRITERIA

The acceptance criteria for the NRC's review of TVA's Environmental Protection Program are outlined in Section 9.4.3.2, Effluent and Environmental Controls and Monitoring, of NUREG-1520 (NRC, 2010).

7.3 STAFF REVIEW AND ANALYSIS

Subpart B of 10 CFR Part 20 requires each licensee to develop, document, and implement a RP Program commensurate with the scope and extent of licensed activities and sufficient to ensure compliance with the provisions of Part 20. Subpart B also requires the licensee to use, to the extent practicable, procedures and engineering controls based upon sound RP principles to achieve occupational doses and doses to members of the public that are ALARA.

TVA documented and implemented a RP Program commensurate with the receipt, possession, inspection, and storage of WBN-2 fresh fuel; as demonstrated and implemented in their program for similar activities with WBN-1 fresh fuel.

As stated in the license application, an ALARA committee, composed primarily of supervisory personnel, is established to periodically review the effectiveness of implementation of the ALARA program applied to effluent controls and monitoring. Reviews include the site performance against ALARA goals, employee suggestions to implement ALARA, ALARA planning documents, and trends (e.g., stack monitoring results, liquid effluent monitoring data, environmental monitoring data). The Plant Manager or Assistant Plant Manager will normally serve as chairman of the site ALARA committee.

The NRC staff reviewed the ALARA commitment and procedures for the WBN-2 site and finds them acceptable because they are sufficient to meet the public dose limit requirements in 10 CFR Part 20.

Part 20 of 10 CFR Subpart D requires licensees to conduct operations so that the total effective dose equivalent to individual members of the public from the licensed operations does not exceed 0.1 rem (1 millisievert) in a year and that the dose in any unrestricted area from external sources does not exceed 0.002 rem (0.02 millisievert) in any 1 hour. The licensee must make surveys in unrestricted areas and controlled areas and radioactive materials in effluents released to unrestricted and controlled areas to demonstrate compliance with the dose limits by one of two methods: (1) demonstrating that the TEDE to the individual likely to receive the highest dose from the licensed operation does not exceed the dose limits or, (2) demonstrating that the annual average concentration of radioactive material released in gaseous and liquid effluents at the boundary of the restricted area does not exceed the values specified in Table 2 of Appendix B to Part 20, and that the dose from external sources to an individual continuously present in an unrestricted area will not exceed 0.002 rem (0.02 mSv) in an hour and 0.05 rem (0.5 mSv) in a year as specified in 10 CFR 20.1302.

TVA has chosen to use the first method to demonstrate compliance with the dose limits for the nuclear reactors. TVA's methodology is described in the Offsite Dose Calculation Manual (ODCM) (TVA, 2010). TVA will also use the ODCM for offsite dose evaluation for WBN-2, including the activities described in the Part 70 license application. The NRC staff reviewed the ODCM and determined that the effluent controls and monitoring described in the Manual, and TVA's methodology for calculating doses to the public from operation of WBN-1, are adequate to protect the public and the environment from any potential releases from storage of the fresh fuel, in accordance with Subpart D of 10 CFR Part 20, Radiation Dose Limits for Individual Members of the Public. The NRC staff evaluated the proposed activities in the Part 70 license application and concludes that receipt, possession, inspection, and storage of the fresh fuel assemblies are not likely to result in releases during normal handling because the fresh fuel is not irradiated and does not contain fission or activation products, and is sealed in cladding. The NRC staff also finds no credible accident scenarios that could release radioactive material to the environment.

Section 9.2.2 of the renewal application incorporates by reference Section 11.4 of the WBN-2 Plant FSAR (TVA, 2009). This FSAR section describes the Auxiliary Building process and effluent monitoring and sampling system. It includes spent fuel pool accident radiation monitors and the auxiliary building vent monitor assembly. In Section 9.2 of the renewal application, TVA described the effluent and environmental controls and monitoring associated with the receipt, possession, inspection, and storage of the fresh fuel assemblies. NRC staff agrees that the receipt, possession, inspection, and storage of the fresh fuel assemblies will not produce any gaseous effluents because the SNM is sealed in cladding.

The NRC staff finds that the gaseous and liquid effluent controls provided in the Auxiliary Building are adequate to control any potential releases from the stored fresh fuel in accordance with the public dose limits in 10 CFR 20 Subpart D, because the fresh fuel is encapsulated in cladding and is un-irradiated.

7.4 EVALUATION FINDINGS

The NRC staff reviewed the process and effluent control, monitoring and sampling systems; the environmental monitoring actions; the ALARA provisions; and the methodology for calculating public doses, and determined that they acceptable because they are sufficient to control, detect, and measure any potential effluents from the fresh fuel receipt, possession, inspection, and storage. Therefore, the proposed activities meet the requirements in 10 CFR Part 20, Subparts B, D, F, K, L, and M; 10 CFR 70.22(a)(7) and (a)(8); and 10 CFR 70.23(a)(3) and (a)(4).

The NRC staff prepared an EA for the license renewal and reached a FONSI. A draft EA was sent to the State of Tennessee; the State had no comments on the draft EA (TRDH, 2013). The EA and FONSI were published in the *Federal Register* on December 17, 2013 (78 FR 76328).

7.5 REFERENCES

(TVA, 2009) April 30, 2009, letter from M. Bajestani to U.S. NRC, "Watts Bar Nuclear Plant (WBN) – Unit 2 - FSAR, Amendment 93", (ADAMS Accession Number ML091400067).

(NRC, 2010) NRC, NUREG-1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility, Revision 1" May 2010.

(TVA, 2010) April 29, 2010, letter from R. M. Krich to U.S. NRC, "Enclosure 1-Watts Bar Nuclear Plant, 2009 Annual Radioactive Effluent Release Report" and "Offsite Dose Calculation Manual, Revision 22", (ADAMS Accession Number ML102080384).

(NRC, 2011) NRC, "Safety Evaluation Report for the Special Nuclear Material License Application of Watts Bar Nuclear Plant, Unit 2". June 2011 (ADAMS Accession Number ML110830114).

(TVA, 2012) August 23, 2012, letter from Raymond. A. Hruby, Jr., to the U.S. NRC, "Watts Bar Nuclear Plant (WBN) - Unit 2 – Request for Renewal of SNM License No. SNM-2014, (ADAMS Accession Number ML12264A545).

(NRC, 2013) NRC, "Environmental Assessment and Finding of No Significant Impact for Renewal of SNM License Application from TVA for Watts Bar Nuclear Plant, Unit 2, Spring City, Tennessee," (ADAMS Accession Number ML13211A475).

8.0 DECOMMISSIONING

The continued activities involve the possession, inspection and storage of fresh fuel assemblies in the form of sealed SNM. The Part 70 license being renewed is thus not of the type for which a decommissioning funding plan is required under the requirements in 10 CFR 70.25.

9.0 MATERIAL CONTROL AND ACCOUNTING

9.1 REGULATORY REQUIREMENTS

The NRC staff reviewed TVA's renewal application for a license to receive, possess, inspect, and store SNM in the form of fresh fuel assemblies at its WBN-2 facility. Currently, TVA has a construction permit for WBN-2 pursuant to 10 CFR Part 50, and WBN-2 is co-located with the operating WBN-1 reactor. In accordance with 10 CFR 74.31(a)-(b), licensees at sites on which a reactor is authorized to operate are not subject to the requirement to submit a Fundamental Nuclear Material Control Plan. TVA must still satisfy other 10 CFR Part 74 requirements regarding material control and accounting (MC&A).

9.2 REGULATORY ACCEPTANCE CRITERIA

TVA's MC&A program for its WBN-2 facility must meet the recordkeeping requirements specified in 10 CFR Part 74.19(a)-(c), which are summarized as follows:

1. maintain records showing the receipt, inventory (including location and unique identity), acquisition, transfer, and disposal of all SNM possessed;
2. establish, maintain, and follow written MC&A procedures sufficient to account for all SNM possessed under license; and
3. conduct physical inventories of all SNM possessed at least every 12 months.

TVA's MC&A program for its WBN-2 facility is also subject to the MC&A reporting requirements in 10 CFR Sections 74.11, 74.13, and 74.15, which are summarized as follows:

1. 74.11: Notification to the NRC Operations Center within 1 hour of discovery of any loss or theft or other unlawful diversion of SNM;
2. 74.13: Within 60 calendar days of beginning the annual physical inventory, complete and submit in computer-readable format Material Balance Reports concerning all SNM in its possession; and
3. 74.15: Within 10 calendar days of receiving any SNM, complete in computer-readable format a Nuclear Material Transaction Report.

9.3 STAFF REVIEW AND ANALYSIS

The WBN-2 application for an SNM license renewal was received on August 23, 2013, and references Enclosure 3: SNM Control Summary of the original license application dated November 12, 2009. By letter dated, November 12, 2013, the staff sent RAIs to TVA; and by letter dated January 15, 2014, TVA responded to the RAIs. The NRC's staff reviewed the MC&A program procedures, provided by TVA on July 30 for the 2011 license review, and the January 2014 RAIs responses which also provided description for SNM control, accounting and reporting.

Listed below are TVA's written procedures for the MC&A program as required in 10 CFR Part 74:

1. O-PI-RXE-1.0, "Annual SNM Inventory"
2. O-SI-79-1, "Verification of Fuel Storage Configurations"
3. FHI-1, "Receiving, Returning, Inspecting and Storing New Fuel and Inserts"
4. NFTP 109, "Nuclear Fuel Database Updates and SNM Reporting"
5. NFTP-113, "Spent Fuel Management"
6. SPP-3.5, "Regulatory Reporting Requirements"
7. SPP-5.8, "SNM Control"
8. TI-7.006, "Preparing SNM Transfer Forms"

In the January 15, 2014 submittal, TVA also describes in detail the nine elements and appropriate procedures that delineates their MC&A program. Also, TVA stated that there have been no changes to their procedures and program since the license issuance review was conducted.

9.4 EVALUATION FINDINGS

Based on the NRC staff's review of the license application and MC&A procedures for the WBN-2 reactor, the NRC staff determined that the MC&A requirements applied to the WBN-2 reactor are similar and consistent with the previously approved MC&A program elements for the WBN-1 reactor. In addition, the staff determined that TVA provided adequate information pertaining to the MC&A program to control and account for SNM at the WBN-2 reactor in accordance with the requirements in 10 CFR 74.11, 74.13, 74.15, and 74.19(a)-(c). TVA's MC&A program describes acceptable methods for achieving the criteria listed previously which involves the notification of any lost, stolen, unlawfully diverted SNM, maintaining records, establishing procedures, conducting inventory of the SNM, and submitting material balances and transaction reports.

9.5 REFERENCES

(TVA, 2009a) "Application for a SNM License For WBN-2in Accordance with 10 CFR 70, *Domestic Licensing of SNM*," November 12, 2009 (ADAMS Accession Number ML100120487).

(TVA, 2009b) "Supplement to Application for a SNM License for WBN-2in Accordance with 10 CFR 70, *Domestic Licensing of SNM*," November 30, 2009 (ADAMS Accession Number ML093370136).

(TVA, 2010) July 30, 2010, letter from R. M. Krich to the U.S. NRC, "Response to Request for Additional Information Regarding the Safety Evaluation Report for 10 CFR 70 License Application for WBN-2 (TAC No. L32918)" (ADAMS Accession Number ML103570133).

(TVA, 2011) January 25, 2011, letter from M. Bajestani to the U.S. NRC, "Watts Bar Nuclear Plant (WBN), Unit 2 - Submittal Concerning Procedures for Unit 2 SNM (TAC No. L32918)," (ADAMS Accession Number ML110280191).

(NRC, 2011) NRC, "Safety Evaluation Report for the Special Nuclear Material License Application of Watts Bar Nuclear Plant, Unit 2". June 2011 (ADAMS Accession Number ML110830114).

(TVA, 2012) "Watts Bar Nuclear Plant (WBN)- Unit 2- Request for Renewal of SNM License No. SNM-2014." August 23, 2012 (ADAMS Accession Number ML12278A337).

(TVA, 2012) March 5, 2012, letter from R. A. Hruby to the U.S. NRC, "Watts Bar Nuclear Plant Unit 2 - Final Safety Analysis Report (UFSAR), Amendment 108," (ADAMS Accession Number ML12083A136).

(TVA, 2013) "Request for Additional Information Regarding Watts Bar Unit 2 License Renewal Concerning MC&A requirements." November 12, 2013 (ADAMS Accession Number ML13308A872).

10.0 PHYSICAL PROTECTION AND PHYSICAL SECURITY

10.1 REGULATORY REQUIREMENTS

TVA is proposing the use of the site-wide Physical Security Plan (PSP) previously approved for Unit 1 to ensure the security of the SNM for WBN-2 to be held under the Part 70 license. The PSP was evaluated with respect to the requirements in 10 CFR 73.55, "Requirements for Physical Protection of Licensed Activities in Nuclear Power Reactors Against Radiological Sabotage."

The provisions of 10 CFR 73.55(a)(4) require applicants, for an operating license under 10 CFR Part 50, to implement the requirements of this section before the fuel is allowed onsite in the protected area.

The provisions of 10 CFR 73.55(a)(5) require that WBN-2, holding a current construction permit under the provisions of 10 CFR Part 50, shall meet the requirements in 10 CFR 73.55(a) through (r) as applicable to operating nuclear power reactor facilities.

10.2 REGULATORY ACCEPTANCE CRITERIA

Regulatory guidance documents, technical reports, accepted industry codes and standards that an applicant may apply to meet regulatory requirements in 10 CFR 73.55 include, but are not limited to the following:

- RG 5.7, "Entry/Exit Control for Protected Areas, Vital Areas, and Material Access Areas," Revision 1, May 1980.
- RG 5.12, "General Use of Locks in the Protection and Control of Facilities and SNMs," November 1973.
- RG 5.44, "Perimeter Intrusion Alarm Systems," Revision 3, October 1997.
- RG 5.59, "Standard Format and Content for a Licensee Physical Security Plan for the Protection of SNM of Moderate or Low Strategic Significance," Revision 1, February 1983.
- RG 5.62, "Reporting of Safeguards Events," Revision 1, November 1987.
- RG 5.65, "Vital Area Access Controls, Protection of Physical Protection System Equipment and Key and Lock Controls," September 1986.
- RG 5.66, "Access Authorization Programs For Nuclear Power Plant" Revision 1," Revision 1, July 2009.
- RG 5.68, "Protection Against Malevolent use of Vehicles at Nuclear Power Plants," August 1994.
- RG 5.75, "Training and Qualification of Security Personnel at Nuclear Power Reactor Facilities," June 2009.
- RG 5.77, "Insider Mitigation Program," March 2009.

- NUREG-0800, “Standard Review Plan,” Chapter 13, Section 13.6.1, Revision 1, June 15, 2010, “Physical Security – Combined License and Operating Reactors.”
- NUREG 0847, “Safety Evaluation Report related to the operation of WBN Nuclear Plant, Units 1 and 2,” June 1982 and Supplemental Safety Evaluation Reports (SSERs) (SSER 1 September 1982, SSER 2 September 1982, SSER 3 January 1984, SSER 4 March 1985, SSER 10 October 1992, SSER 15 January 1995, SSER 20 February 1996).
- NRO’s Office Instruction LIC 110, Revision 1, Watts Bar, Unit 2, License Application Review, September 28, 2009.
- SECY 07-0096, “Staff Requirements - Possible Reactivation of Construction and Licensing Activities for the Watts Bar Nuclear Plant, Unit 2,” dated July 25, 2007.

The following documents contain security-related or safeguards information and are not publicly available:

- RG 5.69, “Guidance for the Application of Radiological Sabotage Design Basis Threat in the Design, Development, and Implementation of a Physical Security Protection Program that Meets 10 CFR 73.55 Requirements,” June 2006.
- RG 5.76, “Physical Protection Programs at Nuclear Power Reactors,” July 2009.
- Nuclear Energy Institute 03-12, Revision 6, “Template for the Security Plan, Training and Qualification Plan, Safeguards Contingency Plan, and Independent Spent Fuel Installation Security Program,” March 2009 (and endorsed by NRC on April 2009).
- NUREG/CR 6190, “NUREG/CR-6190 Material to Reflect Postulated Threat Requirements,” March 27, 2003.

10.3 STAFF REVIEW AND ANALYSIS

In its renewal application, TVA referenced Enclosure 4 of the 2009 license application (TVA, 2009) which provides a summary of the PSP/Contingency Plan that is current and still in place. TVA stated in its Part 70 license application that “Receipt, handling, inspection and storage of new nuclear fuel for WBN-2 will utilize shared systems, structures, components and administrative controls currently in place supporting the operation of WBN-1. As a result, the majority of the information contained, or incorporated by reference, in this application has been previously submitted and approved by the NRC. This information includes, but is not limited to, the FSAR; Final Environmental Impact Statement (NUREG-0498 and Supplement 1); TVA's Final Supplemental Environmental Impact Statement for the Completion and Operation of Watts Bar Nuclear Plant, Unit 2; Radiological Emergency Plan; Physical Security Plan; and Safeguards Contingency Plan.”

TVA’s submission of a request to renew license SNM-2014 (TVA, 2012a) contained no modification to the Physical Protection Plan/ Contingency Plan Summary (i.e., discussion in the license application states that there have been no changes to the PSP). The NRC reviewed the reference documents and subsequent revisions to the PSP, after the Part 70 license renewal application was filed and found that there have been site changes since the renewal request was submitted but none of which decreases the overall effectiveness of the physical security plan as stated by NRC letter dated May 6, 2013(NRC, 2013). Since there were only site

changes and no modifications to the pertinent sections of the licensee's physical security measures, staff concluded that the previous staff evaluation remains applicable. The discussion in this section of the SER restates the previous staff evaluation

As noted in the 2011 review (NRC, 2011b), NRC staff found that TVA adequately identified and provided a description of: (1) the physical security plan; (2) the physical protection system; (3) response force; (4) physical barriers; (5) intrusion alarm; (6) security organization; and (7) site protective strategies. Therefore, NRC staff determined that the TVA's security measures at the WBN facility provide high assurance that 10 CFR 73.55(a) through (r) are being met. The details of the analysis are provided in NRC's 2011 Safety Evaluation Report (ML110830114).

10.4 EVALUATION FINDINGS

The TVA's PSP information is withheld from public disclosure in accordance with the provisions of 10 CFR 73.21 "Requirements for Protection of Safeguards Information."

The NRC staff concludes that there were no changes made to the WBN-2's PSP, Training and Qualification Plan, or Safeguards Contingency Plan that decrease the overall effectiveness of the plan since the 2011 review. The information provided in renewal application and latest revision to the PSP, Revision 13, is consistent with the NRC review conducted in 2011. Therefore, the 2011 review of WBN REP for the facility is still valid for the purposes of this renewal review.

Based on the review of the PSP and its implementation, the NRC staff concludes that the Plan and security measures continue to meet the applicable requirements because they provided the information describing their physical protection plan, security plans, security organization, physical barriers and all other applicable elements of 10 CFR 73.55(a) through (r). Accordingly, the protection provided will ensure that the health and safety of the public will not be endangered.

10.5 REFERENCES

(TVA, 2008) February 26, 2008, letter from M. K. Brandon to the U.S. NRC, "Watts Bar Nuclear Plant Unit 1 and 2-Security, Training and Qualification Plan, and Safeguards Contingency Plan, Revision 7," (ADAMS Accession Number ML080650319).

(NRC, 2009) April 9, 2009, letter from U.S. NRC to J. Roe, "NRC Staff Review of Nuclear Energy Institute (NEI) 03-12, 'Template for Security Plan, Training and Qualification, Safeguards Contingency Plan, [and Independent Spent Fuel Storage Installation Security Program], (Revision 6)'," (ADAMS Accession No. ML090920528).

(TVA, 2009) "Application for a SNM License For WBN-2 in Accordance with 10 CFR 70, *Domestic Licensing of SNM*," November 12, 2009 (ADAMS Accession Number ML100120487).

(TVA, 2010a) April 5, 2010, letter from M. Bajestani to U.S. NRC, "Response to U.S. Nuclear, Regulatory Commission Request for Additional Information Regarding Physical Security Plans." (ADAMS Accession Number ML100970072).

(TVA, 2010b) May 13, 2010, letter from R. M. Krich to U.S. NRC, "Physical Security Plan, Training and Qualification Plan, Safeguards Contingency Plan and Independent Spent Fuel Storage Installation Security Program, Revision 10" (ADAMS Accession Number ML101380029).

(TVA, 2010c) July 23, 2010, letter from R. M. Krich to U.S. NRC, "Physical Security Plan, Training and Qualification Plan, Safeguards Contingency Plan and Independent Spent Fuel Storage Installation Security Program, Revision 11" (ADAMS Accession Number ML102090059).

(NRC, 2011a) NUREG-0847, Supplement 22, SER Related to Operation of WBN-2 (ADAMS Accession Number ML110390197).

(NRC, 2011b) NRC, "Safety Evaluation Report for the Special Nuclear Material License Application of Watts Bar Nuclear Plant, Unit 2". June 2011 (ADAMS Accession Number ML110830114).

(TVA, 2012a) "Watts Bar Nuclear Plant- Unit 2- Request for Renewal license SNM-2014." August 23, 2012 (ADAMS Accession Number ML12278A337).

(TVA, 2012b) March 5, 2012, letter from R. A. Hruby to the U.S. NRC, "Watts Bar Nuclear Plant (WBN) Unit 2 - Final Safety Analysis Report, Amendment 108," (ADAMS Accession Number ML12083A136).

(NRC, 2013) May 6, 2013, letter from U.S. NRC to J. Shea, "Completed Review for Security Plan, Training and Qualification, Safeguards Contingency Plan (Revision 12 and 13)," (ADAMS Accession No. ML13115A894).

11.0 EXEMPTIONS AND SPECIAL AUTHORIZATIONS

11.1 SPECIAL AUTHORIZATIONS

TVA did not request any special authorizations in support of the renewal license application for the WBN-2 site.

11.2 EXEMPTIONS

TVA did not request any exemptions in support of the renewal license application for the WBN-2 site.

11.3 REFERENCES

(NRC, 2002) NRC, NUREG-1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility," March 2002.

(TVA, 2012) "Watts Bar Nuclear Plant- Unit 2- Request for Renewal license SNM-2014." August 23, 2012 (ADAMS Accession Number ML12278A337).

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