



NUREG-0847  
Supplement 27

# **Safety Evaluation Report**

Related to the Operation of  
Watts Bar Nuclear Plant, Unit 2

Docket Number 50-391

**Tennessee Valley Authority**

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## **ABSTRACT**

This report supplements the safety evaluation report (SER), NUREG-0847 (June 1982), with respect to the application filed by the Tennessee Valley Authority (TVA), as applicant and owner, for a license to operate Watts Bar Nuclear Plant (WBN) Unit 2 (Docket No 50-391).

In its SER and Supplemental SER (SSER) Nos. 1 through 20 issued by the Office of Nuclear Reactor Regulation (NRR) of the U.S. Nuclear Regulatory Commission (NRC), the NRC staff documented its safety evaluation and determination that WBN Unit 1 met all applicable regulations and regulatory guidance. Based on satisfactory findings from all applicable inspections, on February 7, 1996, the NRC issued a full-power operating license (OL) to WBN Unit 1, authorizing operation up to 100-percent power.

In SSER 21, the NRC staff addressed TVA's application for a license to operate WBN Unit 2, and provided information regarding the status of the items remaining to be resolved, which were outstanding at the time that TVA deferred construction of WBN Unit 2, and were not evaluated and resolved as part of the licensing of WBN Unit 1. SSERs 22 to 26 documented the NRC staff's ongoing evaluation and closure of open items in support of TVA's application for a license to operate WBN Unit 2.

In this and future SSERs, the NRC staff continues its documentation of its review of open items in support of TVA's application for an operating license for WBN Unit 2.



## TABLE OF CONTENTS

	Page
ABSTRACT.....	iii
TABLE OF CONTENTS.....	v
ABBREVIATIONS.....	vii
1 INTRODUCTION AND DISCUSSION .....	1-1
1.1 Introduction .....	1-1
1.7 Summary of Outstanding Issues .....	1-2
1.8 Confirmatory Issues.....	1-26
1.9 License Conditions.....	1-26
1.9.1 Flooding License Condition.....	1-26
1.9.2 Cyber Security License Condition.....	1-27
1.9.3 Core Operating Limits License Condition.....	1-27
1.9.4 Electrical Design License Condition.....	1-27
1.13 Implementation of Corrective Action Programs and Special Programs.....	1-28
1.13.1 Corrective Action Programs.....	1-28
1.13.2 Special Programs.....	1-29
1.14 Implementation of Applicable Bulletin and Generic Letter Requirements.....	1-30
2 SITE CHARACTERISTICS.....	2-1
2.4 Hydrologic Engineering.....	2-1
2.4.10 Flooding Protection Requirements.....	2-1
3 DESIGN CRITERIA.....	3-1
3.9 Mechanical Systems and Components .....	3-1
3.9.6 Inservice Testing of Pumps and Valves.....	3-1
3.11 Environmental Qualification of Mechanical and Electrical Equipment .....	3-1
3.11.2 Evaluation.....	3-1
4 REACTOR.....	4-1
4.2 Fuel System Design.....	4-1
4.2.2 Thermal Performance.....	4-1
6 ENGINEERED SAFETY FEATURES.....	6-1
6.1 Engineered Safety Features Material.....	6-1
6.1.1 Metallic Materials.....	6-1
7 INSTRUMENTATION AND CONTROLS.....	7-1
7.2 Reactor Trip System .....	7-1
7.2.1 Description.....	7-1
7.5 Safety-Related Display Instrumentation.....	7-3
7.5.2 Post-Accident Monitoring System .....	7-3
7.5.3 IE Bulletin 79-27.....	7-4
7.7 Control Systems .....	7-5
7.7.1 Description.....	7-5

	Page
8	ELECTRICAL POWER SYSTEMS..... 8-1
8.1	Introduction .....8-1
8.2	Offsite (Preferred) Electric Power System .....8-2
8.2.2	Analysis..... 8-2
8.3	Onsite (Standby) Power system.....8-3
8.3.1	AC Power System..... 8-3
9	AUXILIARY SYSTEMS .....9-1
9.2	Water Systems.....9-1
9.2.1	Essential Raw Cooling Water System.....9-1
9.2.2	Component Cooling System..... 9-1
9.2.5	Ultimate Heat Sink..... 9-1
10	STEAM AND POWER CONVERSION SYSTEM .....10-1
10.4	Other Features .....10-1
10.4.6	Condensate Cleanup System ..... 10-1
11	RADIOACTIVE WASTE SYSTEM.....11-1
11.3	Gaseous Waste Management.....11-1
12	RADIATION PROTECTION.....12-1
12.5	Dose Assessment .....12-1
12.7	NUREG-0737 Items .....12-1
12.7.1	Plant Shielding (TMI Action Item II.B.2).....12-1
13	CONDUCT OF OPERATIONS.....13-1
13.1	Organizational Structure of Applicant.....13-1
13.1.3	Plant Staff Organization .....13-1
25	QUALITY OF CONSTRUCTION, OPERATIONAL READINESS, AND QUALITY ASSURANCE EFFECTIVENESS.....25-1
25.9	Program for Maintenance and Preservation of the Licensing Basis for Units 1 and 2 .....25-1
APPENDIX A	CHRONOLOGY OF RADIOLOGICAL REVIEW OF WATTS BAR NUCLEAR PLANT, UNIT 2, OPERATING LICENSE REVIEW.....A-1
APPENDIX E	PRINCIPAL CONTRIBUTORS TO SSER 27 .....E-1
APPENDIX Z	SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION REGARDING THE PRESERVICE INSPECTION PROGRAM.....Z-1
APPENDIX HH	WATTS BAR UNIT 2 ACTION ITEMS TABLE .....HH-1



## ABBREVIATIONS

ABB	ASEA Brown Boveri
ABGTS	auxiliary building gas treatment system
AC or ac	alternating current
ACR	auxiliary control room
ADAMS	Agencywide Documents Access and Management System
AFW	auxiliary feedwater
ALARA	as low as reasonably achievable
ANSI	American National Standards Institute
ANS	American Nuclear Society
AOO	abnormal operational occurrence
AOP	abnormal operating procedure
APCSB	Auxiliary Power Conversion Systems Branch (of NRR)
ASME	American Society of Mechanical Engineers
AST	alternative source term
ASTM	American Society for Testing and Materials
AV	analysis volume
BEACON	Westinghouse Best Estimate Analyzer for Core Operations—Nuclear
BHP	brake horsepower
BL	bulletin
BTP	Branch Technical Position
BWR	boiling-water reactor
CAP	corrective action program
CCP	centrifugal charging pump
CCS	component cooling system
CET	core exit thermocouple
cfm	cubic feet per minute
CFR	<i>Code of Federal Regulations</i>
CI	confirmatory issue
Ci	curie
CLB	current licensing basis
CMEB	Chemical Engineering Branch (of NRR)
CO <sub>2</sub>	carbon dioxide
COMS	cold overpressure mitigation system
COT	channel operability test
CPU	central processor unit
CR	control room
CRC	Cyclic Redundancy Check
CRDR	control room design review
CSST	common station service transformer
CST	condensate storage tank
CT	current transformer
C <sub>v</sub>	Charpy V-notch
CVCS	chemical and volume control system
DBA	design basis accident
DC or dc	direct current
DCF	dose conversion factor

DCN	design change notice
DCS	distributed control system
DEI	dose equivalent iodine-131
DF	decontamination factor
DG	diesel generator
D/Q	deposition factor
DNB	departure from nucleate boiling
DNBR	departure from nucleate boiling ratio
EAB	exclusion area boundary
EAL	emergency action level
ECCS	emergency core cooling system
EDCR	Engineering Document Construction Release
EDG	emergency diesel generator
EGTS	emergency gas treatment system
EMC	electromagnetic compatibility
EMI/RFI	electromagnetic interference/radiofrequency interference
EOF	emergency operations facility
EOI	emergency operating instruction
EOP	emergency operating procedure
EPA	Environmental Protection Agency or electrical penetration assemblies
EPRI	Electric Power Research Institute
EQ	environmental qualification
ERCW	essential raw cooling water
ERD	Electronic Resources Division (Westinghouse)
ERDS	emergency response data system
ERFBS	electrical raceway fire barrier system
ESF	engineered safety feature
FHA	fuel handling accident
FHA	fire hazard analysis
FM	Factory Mutual
FPR	fire protection report
FSAR	final safety analysis report
FSSD	fire safe shutdown
FW	feedwater
GA	General Atomics
GDC	general design criterion/criteria
GL	generic letter
gpm	gallons per minute
GSI	generic safety issue
HDLC	high-level data link control
HEPA	high efficiency particulate air
HPFP	high pressure fire protection
HRCAR	high range containment air radiation
HTH	high-temperature heat treatment
HVAC	heating, ventilation, and air conditioning
Hz	hertz
ICC	inadequate core cooling
ICRP	International Commission on Radiological Protection
ICS	integrated computer system

IE	Office of Inspection and Enforcement
IEB	Office of Inspection and Enforcement Bulletin
IEEE	Institute of Electrical and Electronics Engineers
IIS	in-core instrumentation system
IITA	in-core instrumentation thimble assembly
IN	Information Notice
IP	internet protocol
IPE	individual plant examination
IPEEE	individual plant examination of external events
IPS	intake pumping station
IST	inservice testing
JFD	joint frequency distribution
kHz	kilohertz
kV	kilovolt
kVA	kilovolt ampere
kW	kilowatt
LAR	license amendment request
LCP	loop calculation processor
LOCA	loss-of-coolant accident
LOOP	loss-of-offsite power
LPMS	loose part monitoring system
LPZ	low-population zone
LTOP	low-temperature overpressure protection
LWR	light-water reactor
MCC	motor control center
MCR	main control room
MHIF	multiple high impedance faults
MI	Mineral Insulated
MIC	microbiologically induced corrosion
MIL-STD	military standard
MOV	motor operated valve
MSIV	main steam isolation valve
MSLB	main steam line break
MSO	multiple spurious operation
MTEB	Materials Engineering Branch (of NRR)
MTP	maintenance and test panel
MVA	megavolt-ampere
MWt	megawatts thermal
NEI	Nuclear Energy Institute
NFPA	National Fire Protection Association
NGDC	New Generation Development and Construction
NPP	Nuclear Performance Plan
NP-REP	Nuclear Power Radiological Emergency Plan
NRC	Nuclear Regulatory Commission
NRR	Office of Nuclear Reactor Regulation
NSSS	nuclear steam supply system
NUREG	report prepared by NRC staff
OBE	operating-basis earthquake

ODCM	Offsite Dose Calculation Manual
OL	operating license
OM	operation and maintenance
OMA	operator manual action
OPC	open phase condition
OSG	original steam generator
PAD	performance analysis and design
PAMS	postaccident monitoring system
PARS	publicly available records system
PC	personal computer
PDR	public document room
PER	problem evaluation report
PMF	probable maximum flood
PORV	power-operated relief valve
ppm	parts per million
PRT	pressurizer relief tank
PSI	preservice inspection
PTLR	Pressure and Temperature Limits Report
PWR	pressurized-water reactor
QA	quality assurance
RAI	request for additional information
RBPVS	reactor building purge ventilation system
RCCA	rod cluster control assembly
RCB	reactor coolant pressure boundary
RCP	reactor cooling pump
RCS	reactor coolant system
RCW	raw cooling water
RES	radiant energy shield
RG	Regulatory Guide
RHR	residual heat removal
RPM	radiation protection manager
RPV	reactor pressure vessel
RTD	resistance temperature detector
RV	reactor vessel
RVI	reactor vessel internals
RWST	refueling water storage tank
scfm	standard cfm
SDD	software design description
SDOE	Secure Development and Operational Environment
SE	safety evaluation
SEC	serial-to-ethernet converter
SER	safety evaluation report, NUREG-0847, dated June 1982
SFP	spent fuel pool
SG	steam generator
SIS	safety injection system
SP	special program
SPM	software program manual
SPND	self-powered neutron detector
SRS	software requirements specification

SPS	signal processing system
SRO	senior reactor operator
SRP	Standard Review Plan, NUREG-0800
SSC	systems, structures, and components
SSE	safe shutdown earthquake
SSER	Supplemental SER
Std.	Standard
SV	safety valve
SysRS	System Requirements Specification
TCD	thermal conductivity degradation
THR	total heat release rate
TI	Technical Instruction
TID	total integrated dose
TMI	Three Mile Island
TPBAR	tritium production burnable absorber rod
TS	technical specification
TSP	test sequence processor
TSTF	Technical Specification Task Force
TVA	Tennessee Valley Authority
UFSAR	Updated FSAR
UHS	ultimate heat sink
UL	Underwriters Laboratories
V	volt
VAC	volt alternating current
VDC	volt direct current
V&V	verification and validation
VCT	volume control tank
VPA	ventilation and purge air
WBA	Web-based ADAMS
WBN	Watts Bar Nuclear Plant
WCAP	Westinghouse Commercial Atomic Power (report)
WEC	Westinghouse Electric Corporation
WINCISE	Westinghouse INCore Information, Surveillance, and Engineering system
WO	work order
$\chi/Q$	atmospheric dispersion estimate



# 1 INTRODUCTION AND DISCUSSION

## 1.1 Introduction

The Watts Bar Nuclear Plant (WBN or Watts Bar) is owned by the Tennessee Valley Authority (TVA) and is located in southeastern Tennessee approximately 50 miles (80 kilometers) northeast of Chattanooga. The facility consists of two Westinghouse-designed four-loop pressurized-water reactors (PWRs) within ice condenser containments.

In June 1982, the U.S. Nuclear Regulatory Commission staff (NRC staff) issued safety evaluation report (SER), NUREG-0847, "Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant Units 1 and 2," regarding TVA's application for licenses to operate WBN Units 1 and 2. In SER Supplements (SSERs) 1 through 20, the NRC staff concluded that WBN Unit 1 met all applicable regulations and regulatory guidance and on February 7, 1996, the NRC issued an operating license (OL) to Unit 1. TVA did not complete WBN Unit 2, and the NRC did not make conclusions regarding it.

On March 4, 2009, TVA submitted an updated application in support of its request for an OL for WBN Unit 2, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, "Domestic Licensing of Production and Utilization Facilities."

In SSER 21, the NRC staff provided information regarding the status of the WBN Unit 2 items that remain to be resolved, which were outstanding at the time that TVA deferred construction of Unit 2, and which were not evaluated and resolved as part of the licensing of WBN Unit 1. In SSERs 22, 23, 24, 25, and 26, the NRC staff documented its evaluation and closure of open items in support of TVA's application for a license to operate WBN Unit 2.

In this and future SSERs, the NRC staff will continue the documentation of its evaluation and closure of open items in support of TVA's application.

The format of this document is consistent with the format and scope outlined in the "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR [Light-Water Reactor] Edition (NUREG-0800)," dated July 1981 (SRP, NUREG-0800). The NRC staff added additional chapters to address the overall assessment of the facility, Nuclear Performance Plan issues, and other generic regulatory topics.

Each of the sections and appendices of this supplement is numbered the same as the SER section that is being updated, and the discussions are supplementary to, and not in lieu of, the discussion in the SER, unless otherwise noted. For example, Appendix E continues to list the principal contributors to the SSER. However, the chronology of the safety review correspondence previously provided in Appendix A has been discontinued, and a reference is provided instead to the NRC's Agencywide Documents Access and Management System (ADAMS) or the Public Document Room (PDR). Public correspondence exchanged between the NRC and TVA is available through ADAMS or the PDR. References listed as "not publicly available" in the SSER contain proprietary information and have been withheld from public disclosure in accordance with 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Appendix HH includes an Action Items Table. This table provides a status of all the open items, confirmatory issues, and proposed license conditions that must be resolved prior to completion of an NRC finding of reasonable assurance on the OL application for WBN Unit 2. The NRC

staff will maintain the Action Items Table and revise Appendix HH in future SSERs, and add new appendices, as necessary.

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More information regarding ADAMS and help for accessing documents may be obtained on the NRC Public Web site at <http://www.nrc.gov/reading-rm/adams/faq.html#1>.

All WBN documents may be accessed using WBN docket numbers 05000390 and 05000391 for Units 1 and 2, respectively.

The WBN Unit 2 Project Manager is Justin C. Poole, who may be contacted by calling (301) 415-2048, by e-mail to [Justin.Poole@nrc.gov](mailto:Justin.Poole@nrc.gov), or by writing to the following address:

Mr. Justin Poole  
Mail Stop O-8G9A  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

## 1.7 Summary of Outstanding Issues

The NRC staff documented its previous review and conclusions regarding the OL application for WBN Unit 1 in the SER (NUREG-0847, dated June 1982) and its Supplements 1 through 20. Based on these reviews, the NRC staff issued an OL for WBN Unit 1 in 1996. In the SER and SSERs 1 through 20, the NRC staff also reviewed and approved certain topics for WBN Unit 2, though no final conclusions were made regarding an OL for WBN Unit 2. To establish the remaining scope and the regulatory framework for the NRC staff's review of an OL for WBN Unit 2, the NRC staff reviewed the SER and SSERs 1 through 20. Based on this review, the NRC staff identified "resolved" topics (i.e., out of scope for review) and "open" topics (i.e., in scope for NRC staff review) for WBN Unit 2. Where it was not clear whether the SER topic applied to Unit 2 or not, the NRC staff conservatively identified it as "open" pending further evaluation. It should be noted that these were not technical evaluations of each topic; rather, it was a status review to determine whether the topic was "open" or "resolved." The NRC staff documented this evaluation in SSER 21 as the baseline for resumption of the review of the OL application for Unit 2. Thus, SSER 21 reflects the status of the NRC staff's review of WBN Unit 2 up to 1995. The NRC staff notes that a subsequent, more detailed assessment may find some topics conservatively identified in the initial assessment as "open" that should be redefined as "closed." Conversely, the NRC staff notes that there may be circumstances that could result in the need to reopen some previously closed topic areas that may have been adequately documented and that are considered closed in SSER 21. Such cases will be identified by a footnote in future SSERs to document that previous "open" topics have been recategorized as "closed" without requiring further review, or vice versa.



The SER and SSERs 1 through 20 evaluated the changes to the final safety analysis report (FSAR) until Amendment 91. FSAR Amendment 91 was the initial licensing basis for WBN Unit 1. At this time, the FSAR was applicable to both Units 1 and 2. As part of its updated OL application for WBN Unit 2, TVA split the FSAR Amendment 91 into two separate FSARs for WBN Units 1 and 2. TVA has submitted WBN Unit 2 FSAR Amendments 92 through 112 to address the “open” topics in support of its OL application for WBN Unit 2. These FSAR amendments reflect changes that have occurred since 1995. These FSAR amendments are currently under NRC staff review. The NRC staff’s review of these FSAR changes is documented in SSERs 22, 23, 24, 25, 26, and 27.

Additional general topics (e.g., financial qualifications that were not included in SSER 21, but that should be resolved prior to issuance of an OL) are also identified in SSER 22 and subsequent supplements.

SSER 21 initially provided the table below documenting the status of each SER topic. The relevant document in which the topic was last addressed is shown in parenthesis. This table will be maintained in this and future supplements to reflect the updated status of review for each topic.

#### **ISSUE STATUS TABLE**

	<u>Issue</u>	<u>Status</u>		<u>Section</u>	<u>Note</u>
(1)	Site Envelope			2	
(2)	Geography and Demography	Resolved	(SSER 22)	2.1	
(3)	Site Location and Description	Resolved	(SER)	2.1.1	3
			(SSER 22)		
(4)	Exclusion Area Authority and Control	Resolved	(SER)	2.1.2	3
			(SSER 22)		
(5)	Population Distribution	Resolved	(SER)	2.1.3	
			(SSER 22)		
(6)	Conclusions	Resolved	(SER)	2.1.4	
			(SSER 22)		
(7)	Nearby Industrial, Transportation, and Military Facilities	Resolved	(SSER 22)	2.2	
(8)	Transportation Routes	Resolved	(SER)	2.2.1	
			(SSER 22)		
(9)	Nearby Facilities	Resolved	(SER)	2.2.2	
			(SSER 22)		
(10)	Conclusions	Resolved	(SER)	2.2.3	
			(SSER 22)		
(11)	Meteorology	Resolved	(SER)	2.3	
			(SSER 22)		
(12)	Regional Climatology	Resolved	(SER)	2.3.1	
			(SSER 22)		
(13)	Local Meteorology	Resolved	(SER)	2.3.2	
			(SSER 22)		
(14)	Onsite Meteorological Measurements Program	Resolved	(SER)	2.3.3	
			(SSER 22)		
			(SSER 25)		

	<u>Issue</u>	<u>Status</u>		<u>Section</u>	<u>Note</u>
(15)	Short-Term (Accident) Atmospheric Diffusion Estimates	Resolved	(SER) (SSER 14) (SSER 22)	2.3.4	
(16)	Long-Term (Routine) Diffusion Estimates	Resolved	(SER) (SSER 14) (SSER 22)	2.3.5	
(17)	Hydrologic Engineering	Open	(SSER 27)	2.4	
(18)	Introduction	Resolved	(SER)	2.4.1	
(19)	Hydrologic Description	Resolved	(SER)	2.4.2	
(20)	Flood Potential	Resolved	(SER)	2.4.3	
(21)	Local Intense Precipitation in Plant Area	Resolved	(SER)	2.4.4	1
(22)	Roof Drainage	Resolved	(SER)	2.4.5	1
(23)	Ultimate Heat Sink	Resolved	(SER)	2.4.6	
(24)	Groundwater	Resolved	(SER)	2.4.7	1
(25)	Design Basis for Subsurface Hydrostatic Loading	Resolved	(SER) (SSER 3)	2.4.8	
(26)	Transport of Liquid Releases	Resolved	(SER) (SSER 22)	2.4.9	2
(27)	Flooding Protection Requirements	Open (NRR)	(SER) (SSER 24) (SSER 27)	2.4.10	
(28)	Geological, Seismological, and Geotechnical Engineering	Resolved	(SER) (SSER 24)	2.5	
(29)	Geology	Resolved	(SER)	2.5.1	
(30)	Seismology	Resolved	(SER)	2.5.2	
(31)	Surface Faulting	Resolved	(SER)	2.5.3	
(32)	Stability of Subsurface Materials and Foundations	Resolved	(SER) (SSER 3) (SSER 9) (SSER 11)	2.5.4	
(33)	Stability of Slopes	Resolved	(SER)	2.5.5	
(34)	Embankments and Dams	Resolved	(SER) (SSER 22)	2.5.6	
(35)	References		(SER) (SSER 22)	2.6	
(36)	Design Criteria - Structures, Components, Equipment, and Systems			3	
(37)	Introduction			3.1	
(38)	Conformance With General Design Criteria	Resolved	(SER)	3.1.1	
(39)	Conformance With Industry Codes and Standards	Resolved	(SER)	3.1.2	
(40)	Classification of Structures, Systems and Components	Resolved	(SSER 14) (SSER 22)	3.2	

	<u>Issue</u>	<u>Status</u>		<u>Section</u>	<u>Note</u>
(41)	Seismic Classifications	Resolved	(SER) (SSER 3) (SSER 5) (SSER 6) (SSER 8)	3.2.1	
(42)	System Quality Group Classification	Resolved	(SER) (SSER 3) (SSER 6) (SSER 7) (SSER 9) (SSER 22)	3.2.2	
(43)	Wind and Tornado Loadings			3.3	
(44)	Wind Loading	Resolved	(SER)	3.3.1	
(45)	Tornado Loading	Resolved	(SER)	3.3.2	
(46)	Flood Level (Flood) Design			3.4	
(47)	Flood Protection	Resolved	(SER)	3.4.1	
(48)	Missile Protection			3.5	
(49)	Missile Selection and Description	Resolved	(SER) (SSER 9) (SSER 14) (SSER 22)	3.5.1	
(50)	Structures, Systems, and Components to be Protected from Externally Generated Missiles	Resolved	(SER) (SSER 2) (SSER 22)	3.5.2	
(51)	Barrier Design Procedures	Resolved	(SER)	3.5.3	
(52)	Protection Against the Dynamic Effects Associated with the Postulated Rupture of Piping	Resolved	(SER) (SSER 6) (SSER 11)	3.6	
(53)	Plant Design for Protection Against Postulated Piping Failures in Fluid System Outside Containment	Resolved	(SER) (SSER 14) (SSER 22)	3.6.1	
(54)	Determination of Break Locations and Dynamic Effects Associated with the Postulated Rupture of Piping	Resolved	(SER) (SSER 14) (SSER 22)	3.6.2	3
(55)	Leak-Before-Break Evaluation Procedures	Resolved	(SSER 5) (SSER 12) (SSER 22) (SSER 24)	3.6.3	
(56)	Seismic Design	Resolved	(SER) (SSER 6)	3.7	2
(57)	Seismic Input	Resolved	(SER) (SSER 6) (SSER 9) (SSER 16)	3.7.1	2

	<u>Issue</u>	<u>Status</u>		<u>Section</u>	<u>Note</u>
(58)	Seismic Analysis	Resolved	(SER) (SSER 6) (SSER 8) (SSER 11) (SSER 16)	3.7.2	2
(59)	Seismic Subsystem Analysis	Resolved	(SER) (SSER 6) (SSER 7) (SSER 8) (SSER 9) (SSER 12) (SSER 22)	3.7.3	
(60)	Seismic Instrumentation	Resolved	(SER)	3.7.4	1
(61)	Design of Seismic Category I Structures	Resolved	(SER) (SSER 9)	3.8	2
(62)	Steel Containment	Resolved	(SER) (SSER 3)	3.8.1	
(63)	Concrete and Structural Steel Internal Structures	Resolved	(SER) (SSER 7)	3.8.2	
(64)	Other Seismic Category I Structures	Open (NRR)	(SER) (SSER 14) (SSER 16)	3.8.3	
(65)	Foundations	Resolved	(SER)	3.8.4	
(66)	Mechanical Systems and Components	Resolved	(SER)	3.9	
(67)	Special Topics for Mechanical Components	Resolved	(SER) (SSER 6) (SSER 13) (SSER 22)	3.9.1	
(68)	Dynamic Testing and Analysis of Systems, Components, and Equipment	Resolved	(SER) (SSER 14) (SSER 22)	3.9.2	
(69)	ASME Code Class 1, 2, and 3 Components, Component Structures, and Core Support Structures	Resolved	(SER) (SSER 3) (SSER 4) (SSER 6) (SSER 7) (SSER 8) (SSER 15) (SSER 22)	3.9.3	
(70)	Control Rod Drive Systems	Resolved	(SER)	3.9.4	
(71)	Reactor Pressure Vessel Internals	Resolved	(SER) (SSER 23) (SSER 26)	3.9.5	

	<u>Issue</u>	<u>Status</u>		<u>Section</u>	<u>Note</u>
(72)	Inservice Testing of Pumps and Valves	Resolved	(SER) (SSER 5) (SSER 12) (SSER 14) (SSER 18) (SSER 20) (SSER 22) (SSER 27)	3.9.6	
(73)	Seismic and Dynamic Qualification of Seismic Category I Mechanical and Electrical Equipment	Resolved	(SER) (SSER 1) (SSER 3) (SSER 4) (SSER 5) (SSER 6) (SSER 8) (SSER 9) (SSER 23)	3.10	
(74)	Environmental Qualification of Mechanical and Electrical Equipment	Resolved	(SSER 15) (SSER 22) (SSER 27)	3.11	
(75)	Threaded Fasteners — ASME Code Class 1, 2, and 3	Resolved	(SSER 22)	3.13	
(76)	Reactor			4	
(77)	Introduction		(SER) (SSER 23)	4.1	
(78)	Fuel System Design	Resolved	(SSER 23) (SSER 27)	4.2	
(79)	Description	Resolved	(SER) (SSER 13) (SSER 23)	4.2.1	
(80)	Thermal Performance	Resolved	(SER) (SSER 2) (SSER 23) (SSER 27)	4.2.2	
(81)	Mechanical Performance	Resolved	(SER) (SSER 2) (SSER 10) (SSER 13) (SSER 23)	4.2.3	
(82)	Surveillance	Resolved	(SER) (SSER 2) (SSER 23)	4.2.4	
(83)	Fuel Design Considerations	Resolved	(SER) (SSER 23)	4.2.5	
(84)	Nuclear Design	Resolved	(SSER 23)	4.3	
(85)	Design Basis	Resolved	(SER) (SSER 13) (SSER 23)	4.3.1	

	<u>Issue</u>	<u>Status</u>		<u>Section</u>	<u>Note</u>
(86)	Design Description	Resolved	(SER) (SSER 13) (SSER 15) (SSER 23)	4.3.2	
(87)	Analytical Methods	Resolved	(SER) (SSER 23)	4.3.3	
(88)	Summary of Evaluation Findings	Resolved	(SER) (SSER 23)	4.3.4	
(89)	Thermal-Hydraulic Design	Resolved	(SSER 23)	4.4	
(90)	Performance in Safety Criteria	Resolved	(SER) (SSER 23)	4.4.1	
(91)	Design Bases	Resolved	(SER) (SSER 12) (SSER 23)	4.4.2	
(92)	Thermal-Hydraulic Design Methodology	Resolved	(SER) (SSER 6) (SSER 8) (SSER 12) (SSER 13) (SSER 16) SE dated 6/13/89 (SSER 23)	4.4.3	
(93)	Operating Abnormalities	Resolved	(SER) (SSER 13) (SSER 23)	4.4.4	
(94)	Loose Parts Monitoring System	Resolved	(SER) (SSER 3) (SSER 5) (SSER 16) (SSER 23)	4.4.5	
(95)	Thermal-Hydraulic Comparison	Resolved	(SER) (SSER 23)	4.4.6	
(96)	N-1 Loop Operation	Resolved	(SER) (SSER 23)	4.4.7	
(97)	Instrumentation for Inadequate Core Cooling Detection (TMI Action Item II.F.2)	Resolved	(SER) (SSER 10) (SSER 23) (SSER 27)	4.4.8	
(98)	Summary and Conclusion	Resolved	(SER) (SSER 23) (SSER 25)	4.4.9	
(99)	Reactor Materials			4.5	
(100)	Control Rod Drive Structural Materials	Resolved	(SER)	4.5.1	1
(101)	Reactor Internals and Core Support Materials	Resolved	(SER)	4.5.2	
(102)	Functional Design of Reactivity Control Systems	Resolved	(SER) (SSER 23)	4.6	

	<u>Issue</u>	<u>Status</u>		<u>Section</u>	<u>Note</u>
(103)	Reactor Coolant System and Connected Systems			5	
(104)	Summary Description	Resolved	(SER) (SSER 5) (SSER 6)	5.1	2
(105)	Integrity of Reactor Coolant Pressure Boundary			5.2	
(106)	Compliance with Codes and Code Cases	Resolved	(SER) (SSER 22)	5.2.1	
(107)	Overpressurization Protection	Resolved	(SER) (SSER 2) (SSER 15) (SSER 24)	5.2.2	
(108)	Reactor Coolant Pressure Boundary Materials	Resolved	(SER) (SSER 22)	5.2.3	
(109)	Reactor Coolant System Pressure Boundary Inservice Inspection and Testing	Resolved	(SER) (SSER 10) (SSER 12) (SSER 15) (SSER 16) (SSER 23)	5.2.4	
(110)	Reactor Coolant Pressure Boundary Leakage Detection	Resolved	(SER) (SSER 9) (SSER 11) (SSER 12) (SSER 22)	5.2.5	
(111)	Reactor Vessel			5.3	
(112)	Reactor Vessel Materials	Resolved	(SER) (SSER 11) (SSER 14) (SSER 22) (SSER 25)	5.3.1	
(113)	Pressure-Temperature Limits	Resolved	(SER) (SSER 16) (SSER 22) (SSER 25)	5.3.2	
(114)	Reactor Vessel Integrity	Resolved	(SER) (SSER 22)	5.3.3	
(115)	Component and Subsystem Design			5.4	
(116)	Reactor Coolant Pumps	Resolved	(SER) (SSER 22)	5.4.1	2
(117)	Steam Generators	Resolved	(SER) (SSER 1) (SSER 4) (SSER 22)	5.4.2	

	<u>Issue</u>	<u>Status</u>		<u>Section</u>	<u>Note</u>
(118)	Residual Heat Removal System	Resolved	(SER) (SSER 2) (SSER 5) (SSER 10) (SSER 11) (SSER 23)	5.4.3	
(119)	Pressurizer Relief Tank	Resolved	(SER) (SSER 22)	5.4.4	
(120)	Reactor Coolant System Vents (TMI Action Item II.B.1)	Open (Inspection)	(SER) (SSER 2) (SSER 5) (SSER 12) (SSER 23)	5.4.5	
(121)	Engineered Safety Features			6	
(122)	Engineered Safety Feature Materials			6.1	
(123)	Metallic Materials	Resolved	(SER) (SSER 23) (SSER 27)	6.1.1	
(124)	Organic Materials	Resolved	(SER) (SSER 22)	6.1.2	
(125)	Postaccident Emergency Cooling Water Chemistry	Resolved	(SER) (SSER 22)	6.1.3	
(126)	Containment Systems			6.2	
(127)	Containment Functional Design	Resolved	(SER) (SSER 3) (SSER 5) (SSER 7) (SSER 12) (SSER 14) (SSER 15) (SSER 22)	6.2.1	
(128)	Containment Heat Removal Systems	Resolved	(SER) (SSER 7) (SSER 22)	6.2.2	
(129)	Secondary Containment Functional Design	Resolved	(SER) (SSER 18) (SSER 22)	6.2.3	
(130)	Containment Isolation Systems	Resolved	(SER) (SSER 3) (SSER 5) (SSER 7) (SSER 12) (SSER 22)	6.2.4	
(131)	Combustible Gas Control Systems	Resolved	(SER) (SSER 4) (SSER 5) (SSER 8) (SSER 22)	6.2.5	



	<u>Issue</u>	<u>Status</u>		<u>Section</u>	<u>Note</u>
(132)	Containment Leakage Testing	Resolved	(SER) (SSER 4) (SSER 5) (SSER 19) (SSER 22) (SSER 26)	6.2.6	
(133)	Fracture Prevention of Containment Pressure Boundary	Resolved	(SER) (SSER 4) (SSER 23)	6.2.7	1
(134)	Emergency Core Cooling System	Resolved	(SER)	6.3	1
(135)	System Design	Open (NRR)	(SER) (SSER 6) (SSER 7) (SSER 11)	6.3.1	
(136)	Evaluation	Resolved	(SER) (SSER 5)	6.3.2	1
(137)	Testing	Open (NRR)	(SER) (SSER 2) (SSER 9)	6.3.3	
(138)	Performance Evaluation	Resolved	(SER)	6.3.4	
(139)	Conclusions	Open (NRR)	(SER)	6.3.5	
(140)	Control Room Habitability	Resolved	(SER) (SSER 5) (SSER 11) (SSER 16) (SSER 18) (SSER 22)	6.4	
(141)	Engineered Safety Feature (ESF) Filter Systems			6.5	
(142)	ESF Atmosphere Cleanup System	Resolved	(SER) (SSER 5) (SSER 22)	6.5.1	
(143)	Fission Product Cleanup System	Resolved	(SER)	6.5.2	1
(144)	Fission Product Control System	Resolved	(SER) (SSER 22) (SSER 26)	6.5.3	
(145)	Ice Condenser as a Fission Product Cleanup System	Resolved	(SER)	6.5.4	1
(146)	Inservice Inspection of Class 2 and 3 Components	Resolved	(SER) (SSER 10) (SSER 12) (SSER 15) (SSER 23)	6.6	
(147)	Instrumentation and Controls			7	
(148)	Introduction			7.1	
(149)	General	Resolved	(SER) (SSER 13) (SSER 16) (SSER 23)	7.1.1	

	<u>Issue</u>	<u>Status</u>		<u>Section</u>	<u>Note</u>
(150)	Comparison with Other Plants	Resolved	(SER) (SSER 23)	7.1.2	1
(151)	Design Criteria	Resolved	(SER) (SSER 4) (SSER 15) (SSER 23)	7.1.3	
(152)	Reactor Trip System	Resolved	(SER)	7.2	
(153)	System Description	Resolved	(SER) (SSER 13) (SSER 15) (SSER 23) (SSER 27)	7.2.1	
(154)	Manual Trip Switches	Resolved	(SER) (SSER 23)	7.2.2	1
(155)	Testing of Reactor Trip Breaker Shunt Coils	Resolved	(SER) (SSER 23)	7.2.3	1
(156)	Anticipatory Trips	Resolved	(SER) (SSER 23)	7.2.4	
(157)	Steam Generator Water Level Trip	Resolved	(SER) (SSER 2) (SSER 14) (SSER 23)	7.2.5	
(158)	Conclusions	Resolved	(SER) (SSER 13) (SSER 23)	7.2.6	
(159)	Engineered Safety Features System	Resolved	(SER) (SSER 13)	7.3	
(160)	System Description	Resolved	(SER) (SSER 13) (SSER 14) (SSER 23)	7.3.1	
(161)	Containment Sump Level Measurement	Resolved	(SER) (SSER 2) (SSER 23)	7.3.2	
(162)	Auxiliary Feedwater Initiation and Control	Resolved	(SER) (SSER 23)	7.3.3	1
(163)	Failure Modes and Effects Analysis	Resolved	(SER) (SSER 23)	7.3.4	
(164)	IE Bulletin 80-06	Resolved	(SER) (SSER 3) (SSER 23)	7.3.5	
(165)	Conclusions	Resolved	(SER) (SSER 13) (SSER 23)	7.3.6	
(166)	Systems Required for Safe Shutdown			7.4	
(167)	System Description	Resolved	(SER) (SSER 23)	7.4.1	

	<u>Issue</u>	<u>Status</u>		<u>Section</u>	<u>Note</u>
(168)	Safe Shutdown from Auxiliary Control Room	Resolved	(SER) (SSER 7) (SSER 23)	7.4.2	
(169)	Conclusions	Resolved	(SER) (SSER 23)	7.4.3	
(170)	Safety-Related Display Instrumentation			7.5	
(171)	Display Systems	Resolved	(SER) (SSER 23)	7.5.1	
(172)	Postaccident Monitoring System	Open (Inspection)	(SER) (SSER 7) (SSER 9) (SSER 14) (SSER 15) (SSER 23) (SSER 25) (SSER 27)	7.5.2	
(173)	IE Bulletin 79-27	Resolved	(SER) (SSER 23) (SSER 27)	7.5.3	
(174)	Conclusions	Open (Inspection)	(SER)	7.5.4	
(175)	All Other Systems Required for Safety			7.6	
(176)	Loose Part Monitoring System	Resolved	(SER) (SSER 23) (SSER 24)	7.6.1	
(177)	Residual Heat Removal System Bypass Valves	Resolved	(SER) (SSER 23)	7.6.2	
(178)	Upper Head Injection Manual Control	Resolved	(SER) (SSER 23)	7.6.3	
(179)	Protection Against Spurious Actuation of Motor-Operated Valves	Resolved	(SER) (SSER 23)	7.6.4	
(180)	Overpressure Protection during Low Temperature Operation	Resolved	(SER) (SSER 4) (SSER 23)	7.6.5	
(181)	Valve Power Lockout	Resolved	(SER) (SSER 23)	7.6.6	
(182)	Cold Leg Accumulator Valve Interlocks and Position Indication	Resolved	(SER) (SSER 23)	7.6.7	
(183)	Automatic Switchover From Injection to Recirculation Mode	Resolved	(SER) (SSER 23)	7.6.8	
(184)	Conclusions	Resolved	(SER) (SSER 4)	7.6.9	
(185)	Control Systems Not Required for Safety			7.7	

	<u>Issue</u>	<u>Status</u>		<u>Section</u>	<u>Note</u>
(186)	System Description	Open (NRR)	(SER) (SSER 23) (SSER 24) (SSER 25) (SSER 27)	7.7.1	
(187)	Safety System Status Monitoring System	Resolved	(SER) (SSER 7) (SSER 13) (SSER 23)	7.7.2	
(188)	Volume Control Tank Level Control System	Resolved	(SER) (SSER 23)	7.7.3	
(189)	Pressurizer and Steam Generator Overfill	Resolved	(SER) (SSER 23)	7.7.4	
(190)	IE Information Notice 79-22	Resolved	(SER) (SSER 23)	7.7.5	
(191)	Multiple Control System Failures	Resolved	(SER) (SSER 23)	7.7.6	
(192)	Conclusions	Resolved	(SER)	7.7.7	
(193)	Anticipated Transient Without Scram Mitigation System Actuation Circuitry (AMSAC)	Resolved	(SSER 9) (SSER 14) (SSER 23)	7.7.8	
(194)	NUREG-0737 Items	Resolved	(SER) (SSER 23)	7.8	
(195)	Relief and Safety Valve Position Indication (TMI Action Item II.D.3)	Open (Inspection)	(SER) (SSER 5) (SSER 14) (SSER 23)	7.8.1	
(196)	Auxiliary Feedwater System Initiation and Flow Indication (TMI Action Item II.E.1.2)	Open (Inspection)	(SER) (SSER 23)	7.8.2	
(197)	Proportional Integral Derivative Control Modification (TMI Action Item II.K.3.9)	Resolved	(SER) (SSER 23)	7.8.3	
(198)	Proposed Anticipatory Trip Modification (TMI Action Item II.K.3.10)	Resolved	(SER) (SSER 4) (SSER 23)	7.8.4	
(199)	Confirm Existence of Anticipatory Reactor Trip Upon Turbine Trip (TMI Action Item II.K.3.12)	Resolved	(SER) (SSER 23)	7.8.5	
(200)	Data Communication Systems		(SSER 23)	7.9	
(201)	Electric Power Systems			8	
(202)	General	Resolved	(SER) (SSER 22) (SSER 24) (SSER 27)	8.1	
(203)	Offsite Power System	Resolved	(SER) (SSER 22)	8.2	

	<u>Issue</u>	<u>Status</u>		<u>Section</u>	<u>Note</u>
(204)	Compliance with GDC 5	Resolved	(SER) (SSER 13) (SSER 22)	8.2.1	
(205)	Compliance with GDC 17	Resolved	(SER) (SSER 2) (SSER 3) (SSER 13) (SSER 14) (SSER 15) (SSER 22) (SSER 27)	8.2.2	
(206)	Compliance with GDC 18	Resolved	(SER) (SSER 22)	8.2.3	
(207)	Evaluation Findings	Resolved	(SER) (SSER 22)	8.2.4	
(208)	Onsite Power Systems	Resolved	(SER) (SSER 10) (SSER 19) (SSER 22)	8.3	
(209)	Onsite AC Power System Compliance with GDC 17	Open (NRR)	(SER) (SSER 2) (SSER 7) (SSER 9) (SSER 10) (SSER 13) (SSER 14) (SSER 18) (SSER 20) (SSER 22) (SSER 27)	8.3.1	
(210)	Onsite DC System Compliance with GDC 17	Open (NRR)	(SER) (SSER 2) (SSER 3) (SSER 13) (SSER 14) (SSER 22)	8.3.2	
(211)	Common Electrical Features and Requirements	Resolved	(SER) (SSER 2) (SSER 3) (SSER 7) (SSER 13) (SSER 14) (SSER 15) (SSER 16) (SSER 22)	8.3.3	

	<u>Issue</u>	<u>Status</u>		<u>Section</u>	<u>Note</u>
(212)	Evaluation Findings	Open (NRR)	(SER) (SSER 2) (SSER 3) (SSER 7) (SSER 13) (SSER 14) (SSER 15) (SSER 16) (SSER 22)	8.3.4	
(213)	Station Blackout	Open (NRR)	(SSER 22)	8.4	
(214)	Auxiliary Systems	Resolved	(SER) (SSER 10)	9	
(215)	Fuel Storage Facility			9.1	
(216)	New-Fuel Storage	Resolved	(SER)	9.1.1	1
(217)	Spent-Fuel Storage	Resolved	(SER) (SSER 5) (SSER 15) (SSER 16) (SSER 22)	9.1.2	
(218)	Spent Fuel Pool Cooling and Cleanup System	Resolved	(SER) (SSER 11) (SSER 15) (SSER 23) (SSER 26)	9.1.3	
(219)	Fuel-Handling System	Resolved	(SER) (SSER 3) (SSER 13) (SSER 22) (SSER 24)	9.1.4	
(220)	Water Systems			9.2	
(221)	Essential Raw Cooling Water and Raw Cooling Water System	Resolved	(SER) (SSER 9) (SSER 10) (SSER 18) (SSER 23) (SSER 27)	9.2.1	
(222)	Component Cooling System (Reactor Auxiliaries Cooling Water System)	Resolved	(SER) (SSER 5) (SSER 23) (SSER 27)	9.2.2	
(223)	Demineralized Water Makeup System	Resolved	(SER) (SSER 22)	9.2.3	
(224)	Potable and Sanitary Water Systems	Resolved	(SER) (SSER 9) (SSER 22)	9.2.4	
(225)	Ultimate Heat Sink	Resolved	(SER) (SSER 23) (SSER 27)	9.2.5	

	<u>Issue</u>	<u>Status</u>		<u>Section</u>	<u>Note</u>
(226)	Condensate Storage Facilities	Resolved	(SER) (SSER 12) (SSER 22)	9.2.6	
(227)	Process Auxiliaries			9.3	
(228)	Compressed Air System	Resolved	(SER) (SSER 22)	9.3.1	1
(229)	Process Sampling System	Resolved	(SER) (SSER 3) (SSER 5) (SSER 14) (SSER 16) (SSER 24)	9.3.2	
(230)	Equipment and Floor Drainage System	Resolved	(SER) (SSER 22)	9.3.3	3
(231)	Chemical and Volume Control System	Resolved	(SER) (SSER 22)	9.3.4	3
(232)	Heat Tracing		(SSER 22)	9.3.8	
(233)	Heating, Ventilation, and Air Conditioning Systems			9.4	
(234)	Control Room Area Ventilation System	Resolved	(SER) (SSER 9) (SSER 22)	9.4.1	
(235)	Fuel-Handling Area Ventilation System	Resolved	(SER) (SSER 22)	9.4.2	
(236)	Auxiliary Building and Radwaste Area Ventilation System	Resolved	(SER) (SSER 22)	9.4.3	
(237)	Turbine Building Area Ventilation System	Resolved	(SER) (SSER 22)	9.4.4	
(238)	Engineered Safety Features Ventilation System	Resolved	(SER) (SSER 9) (SSER 10) (SSER 11) (SSER 14) (SSER 16) (SSER 19) (SSER 22)	9.4.5	
(239)	Reactor Building Purge Ventilation System		(SSER 22)	9.4.6	
(240)	Containment Air Cooling System		(SSER 22)	9.4.7	
(241)	Condensate Demineralizer Waste Evaporator Building Environmental Control System		(SSER 22)	9.4.8	
(242)	Other Auxiliary Systems			9.5	
(243)	Fire Protection	Resolved	(SER) (SSER 10) (SSER 18) (SSER 19) (SSER 26)	9.5.1	3

	<u>Issue</u>	<u>Status</u>		<u>Section</u>	<u>Note</u>
(244)	Communications System	Resolved	(SER) (SSER 5)	9.5.2	1
(245)	Lighting System	Resolved	(SER) (SSER 22)	9.5.3	
(246)	Emergency Diesel Engine Fuel Oil Storage and Transfer System	Resolved	(SER) (SSER 5) (SSER 9) (SSER 10) (SSER 11) (SSER 12) (SSER 22)	9.5.4	2
(247)	Emergency Diesel Engine Cooling Water System	Resolved	(SER) (SSER 5) (SSER 11)	9.5.5	1
(248)	Emergency Diesel Engine Starting Systems	Resolved	(SER) (SSER 5) (SSER 10) (SSER 22)	9.5.6	2
(249)	Emergency Diesel Engine Lubricating Oil System	Resolved	(SER) (SSER 3) (SSER 5) (SSER 10) (SSER 22)	9.5.7	2
(250)	Emergency Diesel Engine Combustion Air Intake and Exhaust System	Resolved	(SER) (SSER 5) (SSER 10) (SSER 22)	9.5.8	2
(251)	Steam and Power Conversion System			10	
(252)	Summary Description	Resolved	(SER)	10.1	
(253)	Turbine Generator	Resolved	(SER) (SSER 5)	10.2	
(254)	Turbine Generator Design	Resolved	(SER) (SSER 12) (SSER 22)	10.2.1	
(255)	Turbine Disc Integrity	Resolved	(SER) (SSER 23)	10.2.2	
(256)	Main Steam Supply System	Resolved	(SER)	10.3	
(257)	Main Steam Supply System (Up to and Including the Main Steam Isolation Valves)	Resolved	(SER) (SSER 19) (SSER 22)	10.3.1	
(258)	Main Steam Supply System	Resolved	(SER) (SSER 22)	10.3.2	2
(259)	Steam and Feedwater System Materials	Resolved	(SER) (SSER 22)	10.3.3	
(260)	Secondary Water Chemistry	Resolved	(SER) (SSER 5) (SSER 22)	10.3.4	
(261)	Other Features			10.4	



	<u>Issue</u>	<u>Status</u>		<u>Section</u>	<u>Note</u>
(262)	Main Condenser	Resolved	(SER) (SSER 9) (SSER 22)	10.4.1	
(263)	Main Condenser Evacuation System	Resolved	(SER) (SSER 22)	10.4.2	
(264)	Turbine Gland Sealing System	Resolved	(SER) (SSER 22)	10.4.3	
(265)	Turbine Bypass System	Resolved	(SER) (SSER 5) (SSER 22)	10.4.4	
(266)	Condenser Circulating Water System	Resolved	(SER) (SSER 22)	10.4.5	
(267)	Condensate Cleanup System	Resolved	(SER) (SSER 22) (SSER 27)	10.4.6	
(268)	Condensate and Feedwater Systems	Resolved	(SER) (SSER 14) (SSER 22)	10.4.7	
(269)	Steam Generator Blowdown System	Resolved	(SER) (SSER 22) (SSER 24)	10.4.8	
(270)	Auxiliary Feedwater System	Resolved	(SER) (SSER 14) (SSER 23) (SSER 24)	10.4.9	
(271)	Heater Drains and Vents	Resolved	(SSER 22)	10.4.10	
(272)	Steam Generator Wet Layup System	Resolved	(SSER 22)	10.4.11	
(273)	Radioactive Waste Management			11	
(274)	Summary Description	Resolved	(SER) (SSER 16) (SSER 24)	11.1	2
(275)	Liquid Waste Management	Resolved	(SER) (SSER 4) (SSER 16) (SSER 24)	11.2	
(276)	Gaseous Waste Management	Resolved	(SER) (SSER 8) (SSER 16) (SSER 24) (SSER 25) (SSER 27)	11.3	
(277)	Solid Waste Management System	Resolved	(SER) (SSER 16) (SSER 24)	11.4	
(278)	Process and Effluent Radiological Monitoring and Sampling Systems	Resolved	(SER) (SSER 16) (SSER 20) (SSER 24)	11.5	

	<u>Issue</u>	<u>Status</u>		<u>Section</u>	<u>Note</u>
(279)	Evaluation Findings	Resolved	(SER) (SSER 8) (SSER 16)	11.6	
(280)	NUREG-0737 Items	Open (NRR)	(SER)	11.7	
(281)	Wide-Range Noble Gas, Iodine, and Particulate Effluent Monitors (TMI Action Items II.F.1(1) and II.F.1(2))	Open (Inspection)	(SER) (SSER 5) (SSER 6)	11.7.1	
(282)	Primary Coolant Outside Containment (TMI Action item III.D.1.1)	Open (NRR)	(SER) (SSER 5) (SSER 6) (SSER 10) (SSER 16)	11.7.2	
(283)	Radiation Protection			12	
(284)	General	Resolved	(SER) (SSER 10) (SSER 14) (SSER 24)	12.1	
(285)	Ensuring that Occupational Radiation Doses Are As Low As Reasonably Achievable (ALARA)	Resolved	(SER) (SSER 14) (SSER 24)	12.2	2
(286)	Radiation Sources	Resolved	(SER) (SSER 14) (SSER 24)	12.3	
(287)	Radiation Protection Design Features	Resolved	(SER) (SSER 10) (SSER 14) (SSER 18) (SSER 24) (SSER 26)	12.4	
(288)	Dose Assessment	Resolved	(SER) (SSER 14) (SSER 24) (SSER 27)	12.5	
(289)	Health Physics Program	Resolved	(SER) (SSER 10) (SSER 14) (SSER 24) (SSER 26)	12.6	
(290)	NUREG-0737 Items			12.7	
(291)	Plant Shielding (TMI Action Item II.B.2)	Resolved	(SER) (SSER 14) (SSER 16) (SSER 24) (SSER 27)	12.7.1	
(292)	High Range In-Containment Monitor (TMI Action Item II.F.1.(3))	Open (NRR)	(SER) (SSER 5)	12.7.2	
(293)	In-Plant Radioiodine Monitor (TMI Action Item II.D.3.3)	Open (NRR)	(SER) (SSER 16)	12.7.3	
(294)	Conduct of Operations			13	

	<u>Issue</u>	<u>Status</u>		<u>Section</u>	<u>Note</u>
(295)	Organization Structure of the Applicant	Resolved	(SER) (SSER 16) (SSER 22)	13.1	
(296)	Management and Technical Organization	Resolved	(SER)	13.1.1	
(297)	Corporate Organization and Technical Support	Resolved	(SER)	13.1.2	
(298)	Plant Staff Organization	Resolved	(SER) (SSER 8) (SSER 22) (SSER 25) (SSER 27)	13.1.3	
(299)	Training			13.2	
(300)	Licensed Operator Training Program	Resolved	(SER) (SSER 9) (SSER 10) (SSER 22)	13.2.1	
(301)	Training for Non-licensed Personnel	Resolved	(SER)	13.2.2	
(302)	Emergency Preparedness Evaluation			13.3	
(303)	Introduction	Open (NRR)	(SER) (SSER 13) (SSER 20)	13.3.1	
(304)	Evaluation of the Emergency Plan	Open (NRR)	(SER) (SSER 13) (SSER 20) (SSER 22)	13.3.2	
(305)	Conclusions	Open (NRR)	(SER) (SSER 13) (SSER 20) (SSER 22)	13.3.3	
(306)	Review and Audit	Resolved	(SER) (SSER 8) (SSER 22)	13.4	
(307)	Plant Procedures	Resolved	(SER) (SSER 22)	13.5	
(308)	Administrative Procedures	Resolved	(SER) (SSER 22)	13.5.1	
(309)	Operating and Maintenance Procedures	Resolved	(SER) (SSER 9) (SSER 10) (SSER 22)	13.5.2	
(310)	NUREG-0737 Items	Resolved	(SER) (SSER 3) (SSER 16) (SSER 22)	13.5.3	

	<u>Issue</u>	<u>Status</u>		<u>Section</u>	<u>Note</u>
(311)	Physical Security Plan	Resolved	(SER) (SSER 1) (SSER 10) (SSER 15) (SSER 20) (SSER 22)	13.6	
(312)	Introduction	Resolved	(SSER 22)	13.6.1	
(313)	Summary of Application	Resolved	(SSER 22)	13.6.2	
(314)	Regulatory Basis	Resolved	(SSER 22)	13.6.3	
(315)	Technical Evaluation	Resolved	(SSER 22)	13.6.4	
(316)	Conclusions	Resolved	(SSER 22)	13.6.5	
(317)	Cyber Security Plan	Resolved	(SSER 24)	13.6.6	
(318)	Initial Test Program	Resolved	(SER) (SSER 3) (SSER 5) (SSER 7) (SSER 9) (SSER 10) (SSER 12) (SSER 14) (SSER 16) (SSER 18) (SSER 19) (SSER 23)	14	
(319)	Accident Analyses			15	
(320)	General Discussion	Resolved	(SER)	15.1	
(321)	Normal Operation and Anticipated Transients	Open (NRR)	(SER)	15.2	
(322)	Loss-of-Cooling Transients	Resolved	(SER) (SSER 13) (SSER 14) (SSER 24)	15.2.1	
(323)	Increased Cooling Inventory Transients	Resolved	(SER) (SSER 24)	15.2.2	
(324)	Change in Inventory Transients	Resolved	(SER) (SSER 18) (SSER 24)	15.2.3	
(325)	Reactivity and Power Distribution Anomalies	Resolved	(SER) (SSER 4) (SSER 7) (SSER 13) (SSER 14) (SSER 24) (SSER 26)	15.2.4	
(326)	Conclusions	Resolved	(SER) (SSER 4)	15.2.5	
(327)	Limiting Accidents	Resolved	(SER)	15.3	

	<u>Issue</u>	<u>Status</u>		<u>Section</u>	<u>Note</u>
(328)	Loss-of-Coolant Accident (LOCA)	Resolved	(SER) (SSER 12) (SSER 15) (SSER 24)	15.3.1	
(329)	Steamline Break	Resolved	(SER) (SSER 3) (SSER 14) (SSER 24)	15.3.2	
(330)	Feedwater System Pipe Break	Resolved	(SER) (SSER 14) (SSER 24)	15.3.3	
(331)	Reactor Coolant Pump Rotor Seizure	Resolved	(SER) (SSER 14) (SSER 24)	15.3.4	
(332)	Reactor Coolant Pump Shaft Break	Resolved	(SER) (SSER 14) (SSER 24)	15.3.5	
(333)	Anticipated Transients Without Scram	Resolved	(SER) (SSER 3) (SSER 5) (SSER 6) (SSER 10) (SSER 11) (SSER 12) (SSER 24)	15.3.6	
(334)	Conclusions	Resolved	(SER)	15.3.7	
(335)	Radiological Consequences of Accidents	Resolved	(SER) (SSER 15) (SSER 25)	15.4	
(336)	Loss-of-Coolant Accident	Resolved	(SER) (SSER 5) (SSER 9) (SSER 18) (SSER 25)	15.4.1	
(337)	Main Steamline Break Outside of Containment	Resolved	(SER) (SSER 15) (SSER 25)	15.4.2	
(338)	Steam Generator Tube Rupture	Resolved	(SER) (SSER 2) (SSER 5) (SSER 12) (SSER 14) (SSER 15) (SSER 25)	15.4.3	
(339)	Control Rod Ejection Accident	Resolved	(SER) (SSER 15) (SSER 25)	15.4.4	

	<u>Issue</u>	<u>Status</u>		<u>Section</u>	<u>Note</u>
(340)	Fuel-Handling Accident	Resolved	(SER) (SSER 4) (SSER 15) (SSER 25)	15.4.5	
(341)	Failure of Small Line Carrying Coolant Outside Containment	Resolved	(SER) (SSER 25)	15.4.6	
(342)	Postulated Radioactive Releases as a Result of Liquid Tank Failures	Resolved	(SER) (SSER 25)	15.4.7	
(342a)	Postulated Waste Gas Decay Tank Rupture	Resolved	(SSER 25)	15.4.8	
(343)	NUREG-0737 Items			15.5	
(344)	Thermal Mechanical Report (TMI Action Item II.K.2.13)	Resolved	(SER) (SSER 4) (SSER 24)	15.5.1	
(345)	Voiding in the Reactor Coolant System during Transients (TMI Action Item II.K.2.17)	Resolved	(SER) (SSER 4) (SSER 24)	15.5.2	
(346)	Installation and Testing of Automatic Power-Operated Relief Valve Isolation System (TMI Action Item II.K.3.1) Report on Overall Safety Effect of Power-Operated Relief Valve Isolation System (TMI Action Item II.K.3.2)	Resolved	(SER) (SSER 5)	15.5.3	
(347)	Automatic Trip of Reactor Coolant Pumps (TMI Action Item II.K.3.5)	Resolved	(SER) (SSER 4) (SSER 16) (SSER 24)	15.5.4	
(348)	Small-Break LOCA Methods (II.K.3.30) and Plant-Specific Calculations (II.K.3.31)	Open (Inspection)	(SER) (SSER 4) (SSER 5) (SSER 16)	15.5.5	
(349)	Relative Risk of Low-Power Operation	Resolved	(SER)	15.6	
(350)	Technical Specification	Open (NRR)		16	
(351)	Quality Assurance			17	
(352)	General	Resolved	(SER)	17.1	
(353)	Organization	Resolved	(SER)	17.2	
(354)	Quality Assurance Program	Resolved	(SER) (SSER 2) (SSER 5) (SSER 10) (SSER 13) (SSER 15) (SSER 22)	17.3	
(355)	Conclusions	Resolved	(SER)	17.4	
(356)	Maintenance Rule			17.6	
(357)	Control Room Design Review			18	

	<u>Issue</u>	<u>Status</u>		<u>Section</u>	<u>Note</u>
(358)	General	Resolved	(SER) (SSER 5) (SSER 6) (SSER 15) (SSER 16) (SSER 22)	18.1	
(359)	Conclusions	Resolved	(SER) (SSER 16) (SSER 22)	18.2	
(360)	Report of the Advisory Committee on Reactor Safeguards	Open (NRR)	(SER)	19	
(361)	Common Defense and Security	Resolved	(SER)	20	
(362)	Financial Qualifications	Resolved	(SER)	21	
(363)	TVA Financial Qualifications for WBN Unit 2	Resolved	(SSER 22) (SSER 23)	21.1	
(364)	Foreign Ownership, Control, or Domination	Resolved	(SSER 22)	21.2	
(365)	Financial Protection and Indemnity Requirements			22	
(366)	General	Resolved	(SER)	22.1	
(367)	Preoperational Storage of Nuclear Fuel	Resolved	(SER)	22.2	
(368)	Operating Licenses	Open (NRR)	(SSER 22)	22.3	
(369)	Quality of Construction, Operational Readiness, and Quality Assurance Effectiveness			25	
(370)	Program for Maintenance and Preservation of the Licensing Basis for Units 1 and 2	Resolved	(SSER 22) (SSER 27)	25.9	

Notes:

1. In the process of further validating the information in the WBN Unit 2 FSAR, TVA identified minor administrative/typographical changes to sections previously considered Resolved. TVA addressed these changes to the applicable sections in their submittals and clearly indicated them to the NRC staff. The NRC staff has reviewed and confirmed that the changes made are administrative/typographical and do not impact the NRC staff's conclusions as stated in previous SSERs. Based on this review, no additional review is necessary and this section remains Resolved.
2. During the assessment of the regulatory framework for completion of the project, the NRC staff characterized certain topics as "Open" pending TVA's validation of the information contained in the section. TVA has determined that the information presented in the FSAR remained valid and only identified minor administrative or typographical changes to the section. TVA addressed the changes in their submittals and clearly indicated the changes. The NRC staff reviewed and confirmed that the changes made to the section are administrative/typographical and do not impact its conclusions as stated in

previous SSERs. Therefore, no additional review is necessary and the NRC staff considers this section Resolved.

3. In SSER 21, this issue was identified as “Resolved.” However, TVA made changes to the Unit 2 FSAR affecting the previous NRC staff conclusions. The NRC staff evaluated the changes and the results are documented in this SSER.

## 1.8 Confirmatory Issues

At this point in the review, there are some items that have essentially been resolved to the NRC staff's satisfaction, but for which certain confirmatory information has not yet been provided by the applicant. In these instances, the applicant has committed to provide the confirmatory information in the near future. If NRC staff review of this information does not confirm preliminary conclusions on an item, that item will be treated as open, and the NRC staff will report on its resolution in a supplement to this report.

The confirmatory items, with appropriate references to subsections of this report, are noted in Appendix HH.

## 1.9 License Conditions

### 1.9.1 Flooding License Condition

The NRC staff had proposed two license conditions in Section 2.4 of SSER 24. TVA has supplemented Section 2.4 since publication of SSER 24, the contents of which are still under NRC staff review. Upon completion of its review the NRC staff will determine whether the previously proposed license conditions are still valid, need to be modified, or are no longer necessary.

#### **Flooding Protection Proposed License Condition No. 1:**

TVA will submit to the NRC staff by August 31, 2012, for review and approval, a summary of the results of the finite element analysis, which demonstrates that the Cherokee and Douglas Dams are fully stable under design basis probable maximum flood loading conditions for the long-term stability analysis, including how the pre-established acceptance criteria were met.

#### **Flooding Protection Proposed License Condition No. 2:**

TVA will submit to the NRC staff, before completion of the first operating cycle, its long-term modification plan to raise the height of the embankments associated with the Cherokee, Fort Loudoun, Tellico, and Watts Bar Dams. The submittal shall include analyses to demonstrate that, when the modifications are complete, the embankments will meet the applicable structural loading conditions, stability requirements, and functionality considerations to ensure that the design basis probable maximum flood limits are not exceeded at the Watts Bar Nuclear Plant. All modifications to raise the height of the embankments shall be completed within 3 years from the date of issuance of the operating license.



### 1.9.2 Cyber Security License Condition

The NRC staff had proposed two license conditions discussed in Section 13.6.6.3.22 of SSER 24. The NRC staff is awaiting an updated implementation schedule from TVA. Upon receipt of this information, the NRC staff will determine whether the NRC's evaluation and the proposed license conditions published in SSER 24 are still valid, need to be modified, or are no longer necessary.

#### **Cyber Security Proposed License Condition 1:**

The licensee shall implement the requirements of 10 CFR 73.54(a)(1)(ii) as they relate to the security computer. Completion of these actions will occur consistent with the full implementation date of September 30, 2014, as established in the licensee's letter dated April 7, 2011, "Response to Request for Additional Information Regarding Watts Bar Nuclear Plant Cyber Security Plan License Amendment Request, Cyber Security Plan Implementation Schedule - Watts Bar Nuclear Plant Unit 1."

#### **Cyber Security Proposed License Condition 2:**

The licensee shall implement the requirements of 10 CFR 73.54(a)(1)(iii) as they relate to the corporate based systems that support emergency preparedness. Completion of these actions will occur consistent with the Watts Bar Nuclear Plant Unit 1 implementation schedule established in the licensee's letter dated April 7, 2011, "Response to Request for Additional Information Regarding Watts Bar Nuclear Plant Cyber Security Plan License Amendment Request, Cyber Security Plan Implementation Schedule - Watts Bar Nuclear Plant Unit 1."

### 1.9.3 Core Operating Limits License Condition

The NRC staff proposed a license condition discussed in Section 4.2.2 of SSER 27.

#### **PAD TCD Proposed License Condition:**

PAD4TCD may be used to establish core operating limits prior to the initial cycle, and prior to any remaining portion of the initial cycle. PAD4TCD may not be used to establish core operating limits prior to any reload cycle, and prior to any remaining portion of any reload cycle.

### 1.9.4 Electrical Design License Condition

The NRC staff proposed a license condition discussed in Section 8.2.2 of SSER 27.

#### **Bulletin 2012-01, "Design Vulnerability in Electrical Power System," Proposed License Condition:**

By December 31, 2017, TVA will report to the NRC that the actions to resolve the issues identified in Bulletin 2012-01, "Design Vulnerability in Electrical Power System" have been implemented.

### 1.13 Implementation of Corrective Action Programs and Special Programs

In 1985, TVA developed a corporate Nuclear Performance Plan (NPP) that identified and proposed corrections to problems concerning the overall management of its nuclear program and a site-specific plan for WBN entitled, "Watts Bar Nuclear Performance Plan." TVA established 18 corrective action programs (CAPs) and 11 special programs (SPs) to address these concerns.

SSER 21, Table 1.13.1 documented the status of NRC staff review of the CAPs and SPs. In this SSER and future supplements to the SER, the NRC staff will document its evaluation and closure of open NPP items.

#### 1.13.1 Corrective Action Programs

<u>No.</u>	<u>Title</u>	<u>Program Review Status</u>
(1)	Cable Issues	Resolved
	a. Silicon Rubber Insulated Cable	(See Appendix HH)
	b. Cable Jamming	
	c. Cable Support in Vertical Conduit	
	d. Cable Support in Vertical Trays	
	e. Cable Proximity to Hot Pipes	
	f. Cable Pull-Bys	
	g. Cable Bend Radius	
	h. Cable Splices	
	i. Cable Sidewall Bearing Pressure	
	j. Pulling Cables Through 90° Condulet and Flexible Conduit	
	k. Computer Cable Routing System Software and Database Verification and Validation	
(2)	Cable Tray and Tray Supports	Resolved
(3)	Design Baseline and Verification Program	Resolved
(4)	Electrical Conduit and Conduit Support	Resolved
(5)	Electrical Issues	Resolved
	a. Flexible Conduit Installations	(See Appendix HH)
	b. Physical Cable Separation and Electrical Isolation	
	c. Contact and Coil Rating of Electrical Devices	
	d. Torque Switch and Overload Relay Bypass Capability for Active Safety-Related Valves	
	e. Adhesive-Backed Cable Support Mount	
(6)	Equipment Seismic Qualification	Resolved
(7)	Fire protection	Resolved
(8)	Hanger and Analysis Update Program	Resolved

<u>No.</u>	<u>Title</u>	<u>Program Review Status</u>
(9)	Heat Code Traceability	Resolved
(10)	Heating, Ventilation, and Air-Conditioning Duct and Duct Supports	Resolved
(11)	Instrument Lines	Resolved
(12)	Prestart Test Program Plan	Resolved
(13)	Quality Assurance (QA) Records	Resolved
(14)	Quality-List (Q-List)	Resolved
(15)	Replacement Items Program (Piece Parts)	Resolved
(16)	Seismic Analysis	Resolved
(17)	Vendor Information Program	Resolved
(18)	Welding	Resolved

#### 1.13.2 Special Programs

<u>No.</u>	<u>Title</u>	<u>Program Review Status</u>
(1)	Concrete Quality Program	Resolved
(2)	Containment Cooling	Resolved
(3)	Detailed Control Room Design Review	Resolved
(4)	Environmental Qualifications Program	Resolved
(5)	Master Fuse List	Resolved
(6)	Mechanical Equipment Qualification	Resolved
(7)	Microbiologically Induced Corrosion	Resolved
(8)	Moderate Energy Line Break Flooding	Resolved
(9)	Radiation Monitoring System	Resolved
(11)	Use-As-Is Condition Adverse to Quality	Resolved

## 1.14 Implementation of Applicable Bulletin and Generic Letter Requirements

From time to time, the NRC staff issues generic requirements or recommendations in the form of orders, bulletins (BLs), generic letters (GLs), regulatory issue summaries, and other documents to address certain safety and regulatory issues. These are generally termed “generic communications.”

The table below outlines the status of the resolution of the generic communications. It should be noted that, although many of the generic communications have been documented or otherwise resolved, the NRC staff has determined that there may be circumstances that could result in the need to reopen a previously closed topic.

	<u>Correspondence No.</u>	<u>Title</u>
(1)	GL 1980-14	Light-Water Reactor Primary Coolant System Pressure Isolation Valves.
	TVA Action:	Submit Technical Specifications (TSs) for NRC Review.
	NRC Action:	To be reviewed during validation of TS 3.4.14 submitted February 2, 2010.
(2)	GL 1980-77	Refueling Water Level - Technical Specifications Changes.
	TVA Action:	Submit Technical Specifications for NRC Review.
	NRC Action:	To be reviewed during validation of TS 3.9.5 –TS 3.9.7 submitted February 2, 2010.
(3)	GL 1982-28	Inadequate Core Cooling Instrumentation System.
	TVA Action:	Closed.
	NRC Action:	Closed. Subsumed as part of NRC staff review of Instrumentation and Controls submitted April 8, 2010.
(4)	GL 1983-28	Required Actions Based on Generic Implications of Salem Anticipated Transient without Scram Events (Screened into the Items 4 through 7).
(4.a)	GL 1983-28 (item 3.1)	Post-Maintenance Testing (reactor trip system components).
		Submit Technical Specifications for NRC Review.
	TVA Action:	
	NRC Action:	To be reviewed during validation of TS Bases 3.0.1 submitted March 4, 2009.

	<u>Correspondence No.</u>	<u>Title</u>
(4.b)	GL 1983-28 (3.2)	Post-Maintenance Testing (All Surveillance Requirement Components).
	TVA Action	Submit Technical Specifications and NRC Review.
	NRC Action	To be reviewed during validation of TS Bases 3.0.1 submitted March 4, 2009.
(4.c)	GL 1983-28 (4.2)	Reactor Trip System Reliability (Preventive Maintenance and Surveillance Program for Reactor Trip Breakers).
	TVA Action	Submit Technical Specifications and NRC Review.
	NRC Action	To be reviewed during NRC staff evaluation of Item 17 of TS Table 3.3.1-1 submitted February 2, 2010.
(4.d)	GL 1983-28 (4.5)	Reactor Trip System Reliability (Automatic Actuation of Shunt Trip Attachment).
	TVA Action	Submit Technical Specifications and NRC Review.
	NRC Action	To be reviewed during NRC staff evaluation of Item 18 of TS Table 3.3.1-1 submitted February 2, 2010.
(8)	GL 1986-09	Technical Resolution of Generic Issue B-59, (N-1) Loop Operation in BWRs and PWRs.
	TVA Action	Submit Technical Specifications for NRC Review.
	NRC Action	To be reviewed during validation of TS 3.4.4 - TS 3.4.8 submitted February 2, 2010.
(9)	GL 1988-20	Individual Plant Examination for Severe Accident Vulnerability.
	TVA Action	Closed.
	NRC Action	Closed. NRC letter dated August 12, 2011 (ADAMS Accession No. ML111960228).
(10)	GL 1988-20s1	Initiation of the Individual Plant Examination for Severe Accident Vulnerabilities — 10 CFR 50.54.
	TVA Action	Closed.
	NRC Action	Closed. NRC letter dated August 12, 2011 (ADAMS Accession No. ML111960228).

	<u>Correspondence No.</u>	<u>Title</u>
(11)	GL 1988-20s2	Individual Plant Examination for Severe Accident Vulnerability. Accident Management Strategies for Consideration in the Individual Plant Examination Process.
	TVA Action	Closed.
	NRC Action	Closed. NRC letter dated August 12, 2011 (ADAMS Accession No. ML111960228).
(12)	GL 1988-20s3	Individual Plant Examination for Severe Accident Vulnerability. Completion of Containment Performance Improvement Program and Forwarding of Insights for Use in the IPE for Severe Accident Vulnerabilities.
	TVA Action	Closed.
	NRC Action	Closed. NRC letter dated August 12, 2011 (ADAMS Accession No. ML111960228).
(13)	GL 1988-20s4	Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities.
	TVA Action	Closed.
	NRC Action	Closed. NRC letter dated September 20, 2011 (ADAMS Accession No. ML111960300).
(14)	GL 1988-20s5	Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities - 10 CFR 50.54(f).
	TVA Action	Closed.
	NRC Action	Closed. NRC letter dated September 20, 2011 (ADAMS Accession No. ML111960300).
(15)	GL 1989-04	Guidelines on Developing Acceptable Inservice Testing Programs.
	TVA Action	The proposed approach has been approved for WBN Unit 1; the same approach was submitted for use on WBN Unit 2 without change.
	NRC Action	Closed. NRC letter dated October 21, 2014 (ADAMS Accession No. ML14289A222).

	<u>Correspondence No.</u>	<u>Title</u>
(16)	GL 1989-21	Request for Information Concerning Status of Implementation of Unresolved Safety Issue Requirements.
	TVA Action	TVA provided an updated status of unresolved safety issues on September 26, 2008, as supplemented on December 2, 2010, and January 25, 2011.
	NRC Action	Closed. See Appendix C of SSER 23.
(17)	GL 1990-06	Resolution of Generic Issues 70, "PORV [power-operated relief valve] and Block Valve Reliability," and 94, "Additional LTOP [low-temperature overpressure] Protection for PWRs."
	TVA Action	Submit Technical Specifications for NRC Review.
	NRC Action	To be reviewed during validation of TS 3.4.11 - TS 3.4.12 submitted February 2, 2010.
(18)	GL 1992-08	Thermo-Lag 330-1 Fire Barriers.
	TVA Action	The proposed approach has been approved for WBN Unit 1; the same approach will be proposed for use on WBN Unit 2 without change.
	NRC Action	Open. Pending NRC staff inspection verification.
(19)	GL 1995-03	Circumferential cracking of Steam Generator (SG) Tubes.
	TVA Action	The proposed approach has been approved for WBN Unit 1; the same approach was submitted for use on WBN Unit 2 without change.
	NRC Action	Closed. NRC Letter dated January 21, 2010 (ADAMS Accession No. ML093631061).
(20)	GL 1995-05	Voltage –Based Repair Criteria for Westinghouse Steam Generator Tubes affected by Outside Diameter Stress Corrosion Cracking.
	TVA Action	The proposed approach has been approved for WBN Unit 1; the same approach was submitted for use on WBN Unit 2 without change.
	NRC Action	Closed. NRC Letter dated January 21, 2010 (ADAMS Accession No. ML093631061).

	<u>Correspondence No.</u>	<u>Title</u>
(21)	GL 1996-06	Assurance of Equipment Operability and Containment Integrity During Design-Basis Accident Conditions.
	TVA Action	The proposed approach has been approved for WBN Unit 1; the same approach will be proposed for use on WBN Unit 2 without change.
	NRC Action	Closed. NRC Letter dated January 21, 2010 (ADAMS Accession No. ML100130227).
(22)	GL 1995-07	Pressure Locking and Thermal Binding of Safety-Related Power-Operated Gate Valves (Not identified in SSER 21 as "Open").
	TVA Action	The proposed approach has been approved for WBN Unit 1; the same approach will be proposed for use on WBN Unit 2 without change.
	NRC Action	Closed. NRC letter dated August 12, 2010 (ADAMS Accession No. ML100190443).
(23)	GL 1997-01	Degradation of Control Rod Drive Mechanism Nozzle and Other Vessel Closure Head Penetrations.
	TVA Action	The proposed approach has been approved for WBN Unit 1; the same approach will be proposed for use on WBN Unit 2 without change.
	NRC Action	Closed. NRC Letter dated June 30, 2010 (ADAMS Accession No. ML100539515).
(24)	GL 1997-04	Assurance of Sufficient Net Positive Suction Head for Emergency Core Cooling and Containment Heat Removal Pumps Integrity During Design-Basis Accident Conditions.
	TVA Action	The proposed approach has been approved for WBN Unit 1; the same approach was submitted for use on WBN Unit 2 without change.
	NRC Action	Closed. NRC Letter dated February 18, 2010 (ADAMS Accession No. ML100200375).



	<u>Correspondence No.</u>	<u>Title</u>
(25)	GL 1997-05	SG Tube Inspection Techniques.
	TVA Action	The proposed approach has been approved for WBN Unit 1; the same approach was submitted for use on WBN Unit 2 without change.
	NRC Action	Closed. NRC Letter dated January 21, 2010 (ADAMS Accession No. ML093631061).
(26)	GL 1997-06	Degradation of SG Internals.
	TVA Action	The proposed approach has been approved for WBN Unit 1; the same approach was submitted for use on WBN Unit 2 without change.
	NRC Action	Closed. NRC Letter dated January 21, 2010 (ADAMS Accession No. ML093631061).
(27)	GL 1998-02	Loss of Reactor Coolant Inventory and Associated Potential for Loss of Emergency Mitigation Functions While in a Shutdown Condition.
	TVA Action	The proposed approach has been approved for WBN Unit 1; the same approach will be proposed for use on WBN Unit 2 without change.
	NRC Action	Closed. NRC Letter dated May 11, 2010 (ADAMS Accession No. ML101200155).
(28)	GL 1998-04	Potential for Degradation of the ECCS [Emergency Core Cooling System] and the Containment Spray System after a LOCA because of Construction and Protective Coating Deficiencies and Foreign Material in Containment.
	TVA Action	The proposed approach has been approved for WBN Unit 1; the same approach was submitted for use on WBN Unit 2 without change.
	NRC Action	Closed. NRC Letter dated February 1, 2010 (ADAMS Accession No. ML100260594).

	<u>Correspondence No.</u>	<u>Title</u>
(29)	GL 2003-01	Control Room Habitability.
	TVA Action	No action or documentation is provided to show the NRC staff has reviewed the item for WBN Unit 2, and the resolution is through submittal of a technical specification.
	NRC Action	Closed. NRC Letter dated February 1, 2010 (ADAMS Accession No. ML100270076).
(30)	GL 2004-01	Requirements for SG Tube Inspection.
	TVA Action	The proposed approach has been approved for WBN Unit 1; the same approach was submitted for use on WBN Unit 2 without change.
	NRC Action	Closed. NRC Letter dated January 21, 2010 (ADAMS Accession No. ML093631061).
(31)	GL 2004-02	Potential Impact of Debris Blockage on Emergency Recirculation during Design-Basis Accidents at PWRs.
	TVA Action	The proposed approach has been approved for WBN Unit 1; the same approach was submitted for use on WBN Unit 2 without change.
	NRC Action	Closed. NRC Letter dated September 18, 2014 (ADAMS Accession No. ML14163A658).
(32)	GL 2006-01	SG Tube Integrity and Associated Technical Specifications.
	TVA Action	No action or documentation is provided to show the NRC staff has reviewed the item for WBN Unit 2, and the resolution is through submittal of a technical specification.
	NRC Action	Closed. NRC Letter dated January 21, 2010 (ADAMS Accession No. ML093631061) (See Appendix HH).

	<u>Correspondence No.</u>	<u>Title</u>
(33)	GL 2006-02	Grid Reliability and the Impact on Plant Risk and the Operability of Offsite Power.
	TVA Action	The proposed approach has been approved for WBN Unit 1; the same approach was submitted for use on WBN Unit 2 without change.
	NRC Action	Closed. NRC Letter dated January 21, 2010 (ADAMS Accession No. ML093631061) (See Appendix HH Open Item 6). Staff has reviewed Revision I to the proposed technical specifications and found that TSTF 449 has been incorporated.
(34)	GL 2006-03	Potentially Nonconforming Hemyc and MT Fire Barrier Configurations.
	TVA Action	The proposed approach has been approved for WBN Unit 1; the same approach was submitted for use on WBN Unit 2 without change.
	NRC Action	Closed. NRC Letter February 25, 2010 (ADAMS Accession No. ML100470398).
(35)	GL 2007-01	Inaccessible or Underground Power Cable Failures that Disable Accident Mitigation Systems or Cause Plant Transients.
	TVA Action	The proposed approach has been approved for WBN Unit 1; the same approach was submitted for use on WBN Unit 2 without change.
	NRC Action	Closed. NRC Letter dated January 26, 2010 (ADAMS Accession No. ML100120052).
(36)	GL 2008-01	Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems.
	TVA Action	TVA submitted the information requested by the GL.
	NRC Action	Closed. NRC letter dated August 23, 2011 (ADAMS Accession No. ML112232205).

	<u>Correspondence No.</u>	<u>Title</u>
(37)	BL 1992-01 and Supplement 1	Failure of Thermo-Lag 330 Fire Barrier System to Perform its Specified Fire Endurance Function.
	TVA Action	The proposed approach has been approved for WBN Unit 1; the same approach will be proposed for use on WBN Unit 2 without change.
	NRC Action	Open. Pending NRC staff inspection verification.
(38)	BL 1996-01	Control Rod Insertion Problems (PWR)
	TVA Action	The proposed approach has been approved for WBN Unit 1; the same approach was submitted for use on WBN Unit 2 without change.
	NRC Action	Closed. NRC letter dated May 3, 2010 (ADAMS Accession No. ML101200035) required Confirmatory Action (See Appendix HH Open Items 5 and 8). By letter dated July 30, 2012, TVA provided the information in the Confirmatory Action and the staff verified the information and has closed Appendix HH Open Items 5 and 8.
(39)	BL 1996-02	Movement of Heavy Loads Over Spent Fuel, Over Fuel In the Reactor Core, or Over Safety-Related Equipment.
		The proposed approach has been approved for WBN Unit 1; the same approach was submitted for use on WBN Unit 2 without change.
		Closed. NRC Letter dated March 4, 2010 (ADAMS Accession No. ML100480062).
(40)	BL 2001-01	Circumferential Cracking of Reactor Pressure Vessel (RPV) Head Penetration Nozzles.
	TVA Action	The proposed approach has been approved for WBN Unit 1; the same approach was submitted for use on WBN Unit 2 without change.
	NRC Action	Closed. See NRC Letter dated June 30, 2010 (ADAMS Accession No. ML100539515).

	<u>Correspondence No.</u>	<u>Title</u>
(41)	BL 2002-01	RPV Head Degradation and Reactor Coolant Pressure Boundary Integrity.
	TVA Action	The proposed approach has been approved for WBN Unit 1; the same approach was submitted for use on WBN Unit 2 without change.
	NRC Action	Closed. See NRC Letter dated June 30, 2010 (ADAMS Accession No. ML100539515).
(42)	BL 2002-02	RPV Head and Vessel Head Penetration Nozzle Inspection Program.
	TVA Action	The proposed approach has been approved for WBN Unit 1; the same approach was submitted for use on WBN Unit 2 without change.
	NRC Action	Closed. See NRC Letter dated June 30, 2010 (ADAMS Accession No. ML100539515).
(43)	BL 2003-02	Leakage from RPV Lower Head Penetrations and Reactor Coolant Pressure Boundary Integrity.
	TVA Action	The proposed approach has been approved for WBN Unit 1; the same approach was submitted for use on WBN Unit 2 without change.
	NRC Action	Closed. NRC Letter dated January 21, 2010 (ADAMS Accession No. ML093631061).
(44)	BL 2004-01	Inspection of Alloy 82/182/600 Materials Used in the Fabrication of Pressurizer Penetrations and Steam Space Piping Connections at PWRs.
	TVA Action	The proposed approach has been approved for WBN Unit 1; the same approach was submitted for use on WBN Unit 2 without change.
	NRC Action	Closed. NRC letter dated August 4, 2010 (ADAMS Accession No. ML102080017).

	<u>Correspondence No.</u>	<u>Title</u>
(45)	BL 2007-01	Security Officer Attentiveness.
	TVA Action	The proposed approach has been approved for WBN Unit 1; the same approach will be proposed for use on WBN Unit 2 without change.
	NRC Action	Closed. NRC letter dated March 25, 2010 (ADAMS Accession No. ML100770549).
(46)	BL 20011-01	Mitigating Strategies
	TVA Action	The proposed approach has been approved for WBN Unit 1; an updated approach will be proposed for use on WBN Unit 2 without change.
	NRC Action	Open.
(47)	BL 2012-01	Design Vulnerability In Electric Power System
	TVA Action	TVA submitted a letter on September 3, 2014 (ADAMS Accession No. ML14247A231) providing wording for the FSAR and proposed a license condition.
	NRC Action	Resolved.

NUREG-0737, TMI Action Items (TVA letter dated September 14, 1981, applies to all of the following NUREG-0737 issues):

(48)	NUREG-0737 Item I.B.1.2	Independent Safety Engineering Group.
	TVA Action	The proposed approach has been approved for WBN Unit 1; the same approach will be proposed for use on WBN Unit 2 without change.
	NRC Action	Open.
(49)	NUREG-0737 Item I.D.1	Control Room Design Review (CRDR).
	TVA Action	The proposed approach has been approved for WBN Unit 1; the same approach will be proposed for use on WBN Unit 2 without change.
	NRC Action	Closed in SSER 22, Section 18.2.

	<u>Correspondence No.</u>	<u>Title</u>
(50)	NUREG-0737 Item II.B.3	Post-accident Sampling.
	TVA Action	No action or documentation is provided to show the NRC staff has reviewed the item for WBN Unit 2, and the resolution is through submittal of a technical specification.
	NRC Action	Closed in SSER 24, Section 9.3.2.
(51)	NUREG-0737 Item II.E.4.2	Containment Isolation Dependability.
	TVA Action	No action or documentation is provided to show the NRC staff has reviewed the item for WBN Unit 2, and the resolution is through submittal of a technical specification.
	NRC Action	Open.
(52)	NUREG-0737 Item II.F.2	Instrumentation for Detection of Inadequate Core-Cooling.
	TVA Action	Closed.
	NRC Action	Closed. See SSER 25 and SSER 26, Section 7.5.2.2. Open Items 72, 95, 96, 97, 99, 100, 102, 103, 104, 106, 107, and 109 were closed in SSER 25, Section 7.5.2.2. Open items 94, 98, 101, 105, 108, 110, and 111 were closed in SSER 26, Section 7.5.2.2.
(53)	NUREG-0737 Item II.K.3.3	Reporting SV/RV Failures/Challenges.
	TVA Action	No action or documentation is provided to show the NRC staff has reviewed the item for WBN Unit 2, and the resolution is through submittal of a technical specification.
	NRC Action	Closed in SSER 22, Section 13.5.3.
(54)	NUREG-0737 Item II.K.3.10	Anticipatory Trip at High Power.
	TVA Action	No action or documentation is provided to show the NRC staff has reviewed the item for WBN Unit 2, and the resolution is through submittal of a technical specification.
	NRC Action	Closed (SSER 23, Section 7.8.4).

	<u>Correspondence No.</u>	<u>Title</u>
(55)	NUREG-0737 Item III.D.1.1	Primary Coolant Outside Containment.
	TVA Action	No action or documentation is provided to show the NRC staff has reviewed the item for WBN Unit 2, and the resolution is through submittal of a technical specification.
	NRC Action	Open.
(56)	NUREG-0737 Item III.D.3.4	Control-Room Habitability.
	TVA Action	The proposed approach has been approved for WBN Unit 1; the same approach will be proposed for use on WBN Unit 2 without change.
	NRC Action	Closed in SSER 22, Section 6.4.
(57)	IEB 75-08	PWR Pressure Instrumentation.
	TVA Action	The item has been approved either for both units at WBN or explicitly for WBN Unit 2; however, a change to the original approval requires submittal of the technical specifications and NRC staff review.
	NRC Action	Open.
(58)	IEB 77-04	Calculation Error Affecting Performance of a System for Controlling pH of Containment Sump Water Following a LOCA.
	TVA Action	The item has been approved either for both units at WBN or explicitly for WBN Unit 2; however, a change to the original approval requires submittal of the technical specifications and NRC staff review.
	NRC Action	Open.

Fukushima-Related Orders (NRC letters dated March 12, 2012):

(59)	EA-12-049	Mitigating Strategies for Beyond-Design-Basis External Events (ADAMS Accession No. ML12054A735)
	TVA Action	Provide final compliance letter by December 17, 2014.
	NRC Action	Open.



	<u>Correspondence No.</u>	<u>Title</u>
(60)	EA-12-051	Reliable Spent Fuel Pool Instrumentation (ADAMS Accession No. ML12054A679)
	TVA Action	Compliance letter sent October 29, 2014.
	NRC Action	Open



## 2 SITE CHARACTERISTICS

### 2.4 Hydrologic Engineering

#### 2.4.10 Flooding Protection Requirements

##### *Disposition of Open Item (Appendix HH)*

##### Open Item 133

Open Item 133 states, “In order to confirm the stability analysis of the sand baskets used by TVA in the WBN Unit 2 licensing basis, TVA will perform either a hydrology analysis without crediting the use of the sand baskets at the Fort Loudoun Dam for the seismic dam failure and flood combination, or TVA will perform a seismic test of the sand baskets, as stated in TVA’s letter dated April 20, 2011. TVA will report the results of this analysis or test to the NRC by October 31, 2011.”

By letter dated October 31, 2011 (ADAMS Accession No. ML11306A193), TVA informed NRC that TVA performed the hydrology analysis without use of the sand baskets under TVA Calculation CSQ000020080080, “Flood Levels at WBN and SQN [Sequoyah Nuclear Plant] from Seismic Dam Failures.” The hydrology analysis confirms the sand baskets are not required to be in place during and following the seismic events defined in Section 2.4.4 of the WBN Final Safety Analysis Report (FSAR).

By letter dated July 19, 2013 (ADAMS Accession No. ML13205A173), TVA notified the NRC staff that a permanent modification to replace the sand baskets located at the four dams had been chosen. The permanent modification consists of a combination of concrete floodwalls and raised earthen embankments or earthen berms. Heights of these modifications would range from 2.3 feet to 6.6 feet depending on the location. By letter dated April 25, 2014 (ADAMS Accession No. ML14122A219), TVA committed to removing the sand baskets (HESCO barriers) and completing the installation of the permanent modifications by October 31, 2015, except for 1900 feet at the Fort Loudoun Dam that will be completed by February 1, 2017.

Based on TVA’s description of the permanent modifications, and the commitment to remove the sand baskets (HESCO barriers) and complete the permanent modifications in a reasonable timeframe, the NRC staff considers **Open Item 133 to be closed**.



### 3 DESIGN CRITERIA

#### 3.9 Mechanical Systems and Components

##### 3.9.6 Inservice Testing of Pumps and Valves

*Disposition of Open Item (Appendix HH)*

##### Open Item 13

Open Item 13 states, "TVA is expected to submit an IST [inservice testing] program and specific relief requests for WBN Unit 2 nine months before the projected date of OL issuance."

TVA submitted the IST program on May 12, 2014 for WBN Unit 2. By letter dated October 21, 2014 (ADAMS Accession No. ML14289A222), NRC approved the program. Therefore, the staff considers **Open Item 13 to be closed**.

#### 3.11 Environmental Qualification of Mechanical and Electrical Equipment

##### 3.11.2 Evaluation

##### 3.11.2.2.1 Electrical Equipment in a Harsh Environment

In SSER 22, published in January 2011, the NRC staff documented its review of Section 3.11 of the FSAR. During its review, the NRC staff communicated to TVA a concern regarding the qualification of cables purchased under Contract 81K5-830078 for construction of WBN Unit 2. NRC staff sent TVA a Request for Additional Information on July 30, 2010, asking for additional information related to the cables in question. TVA responded to the NRC in a letter dated September 1, 2010, that these particular cables were properly qualified.

By letter dated August 3, 2011, as supplemented by letters dated June 13, 2012, and March 18, 2013, TVA identified additional cables similar to those discussed in the September 1, 2010, letter. Since 10 CFR 50.49(l) states "Replacement equipment must be qualified in accordance with the provisions of this section unless there are sound reasons to the contrary," the NRC staff questioned the origin of these additional cables.

TVA's letter dated March 18, 2013, clearly identifies the origin of the cables installed at WBN Unit 2, and states that they meet the qualification criteria of NUREG-0588, Category II, using the guidelines established in Institute of Electrical and Electronics Engineers (IEEE) Std. 323-1971, "IEEE Trial Use Standard; General Guide for Qualifying Class 1E Equipment for Nuclear Power Generating Stations." TVA stated that these cables were purchased prior to May 23, 1980, and were in the utility's stock prior to February 22, 1983. TVA also states that some of the cables were installed in WBN Unit 2, between 1980 and 1983, and another portion was installed between 1983 and 1985 (when construction was halted).

10 CFR 50.49(k) states "Applicants for and holders of operating licenses are not required to requalify electric equipment important to safety in accordance with the provisions of this section if the Commission has previously required qualification of that equipment in accordance with "Guidelines for Evaluating Environmental Qualification of Class 1E Electrical Equipment in Operating Reactors," November 1979 (DOR Guidelines), or NUREG-0588 (For Comment

version), “Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment.”

Since these cables were purchased and in the utility’s stock prior to February 22, 1983; installed as new equipment rather than replacement equipment; and that the cables meet the qualification criteria of NUREG-0588, Category II, the NRC staff finds that these additional cables meet the requirements of 10 CFR 50.49(k). Because the cables are not replacement equipment, 50.49(l) is inapplicable.

*Disposition of Open Item (Appendix HH)*

Open Item 23

Open Item 23 states, “Resolve whether or not TVA’s reasoning for not upgrading the MSIV [main steam isolation valve] solenoid valves to Category I is a sound reason to the contrary, as specified in 10 CFR 50.49(i).”

TVA stated that the original WBN Unit 2 MSIVs are qualified to NUREG-0588, Category II. TVA is refurbishing the MSIVs by replacing the missing subcomponents, including the solenoid valves, terminal blocks, and manufacturing wiring, with components of the same make, model, and type as supplied on the original purchase order. With the exception of the solenoid valves, the subcomponents will be qualified to NUREG-0588, Category I requirements. According to TVA, the solenoid valves cannot be upgraded because equivalent subcomponents qualified to NUREG-0588, Category I, requirements are not available. The NRC staff does not consider TVA’s justification for not upgrading the MSIV solenoid valves to Category I, as specified in 10 CFR 50.49(i), to be a sound reason.

By letter dated April 6, 2011 (ADAMS Accession No. ML110980637), TVA stated that the MSIV solenoid valves would be upgraded to Category I. In inspection report 05000391/2014608 (ADAMS Accession No. ML14322A182), the NRC staff documented where it reviewed TVA’s Environmental Qualification Documentation Package binder as well as the qualification test reports and found that TVA had successfully qualified the MSIV solenoid valves to the Category I criteria as committed.

Based on this response, the staff considers **Open Item 23 to be closed.**

## 4 REACTOR

### *Disposition of Open Item (Appendix HH)*

#### 4.2 Fuel System Design

##### 4.2.2 Thermal Performance

#### Open Item 61

Open Item 61 states “TVA should provide information to the NRC staff to demonstrate that PAD 4.0 can conservatively calculate the fuel temperature and other impacted variables, such as stored energy, given the lack of a fuel thermal conductivity degradation model.”

By letter dated August 6, 2013 (ADAMS Accession No. ML13225A024), TVA submitted new PAD fuel performance data generated for WBN Unit 2 with an updated PAD model (PAD4TCD) that includes explicit modeling of thermal conductivity degradation.

By letter dated May 22, 2014 (ADAMS Accession No. ML14143A250), TVA submitted computer code input data requested by the NRC staff in order to perform a confirmatory analysis.

Based upon (1) comparison of the PAD4TCD model predictions against Halden high burnup fuel temperature measurements and (2) good agreement of the temperature dependent and exposure dependent coefficients between PAD4TCD and FRAPCON-3.4 thermal conductivity models, the NRC staff has previously found the PAD4TCD thermal conductivity model acceptable during the review of the Turkey Point Units 3 and 4 Extended Power Uprate (EPU) (ADAMS Accession No. ML11293A365). Using the information supplied in the May 22, 2014, letter, the NRC staff performed a confirmatory analysis similar to that performed in the Turkey Point Units 3 and 4 EPU, which demonstrated that there is good agreement between PAD4TCD and FRAPCON-3.5 for the fuel design planned for WBN Unit 2. Based upon the previous review of PAD4TCD done for the Turkey Point 3 and 4 EPU and the confirmatory analysis performed by the NRC staff on the Watts Bar fuel, the NRC staff finds that this open item has been satisfied and considers **Open Item 61 to be closed**.

Similar to other interim uses of PAD4TCD, the NRC staff is proposing a license condition on PAD4TCD. The proposed license condition is as follows:

#### **PAD TCD Proposed License Condition:**

PAD4TCD may be used to establish core operating limits prior to the initial cycle, and prior to any remaining portion of the initial cycle. PAD4TCD may not be used to establish core operating limits prior to any reload cycle, and prior to any remaining portion of any reload cycle.





## 6 ENGINEERED SAFETY FEATURES

### *Disposition of Open Items (Appendix HH)*

#### 6.1 Engineered Safety Features Material

##### 6.1.1 Metallic Materials

##### 6.1.1.1 Materials Selection and Fabrication

#### Open Item 59

Open Item 59 states, "The staff's evaluation of the compatibility of the ESF [engineered safety features] system materials with containment sprays and core cooling water in the event of a LOCA is incomplete pending resolution of GSI-191 for WBN Unit 2."

NRC Letter dated September 18, 2014 (ADAMS Accession No. ML14163A658), concluded that TVA's response to Generic Letter (GL) 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors" (ADAMS Accession No. ML042360586) dated September 13, 2004, requesting that licensees address the issues raised by Generic Safety Issue 191, "Assessment of Debris Accumulation on Pressurized-Water Reactor Sump Performance," for WBN Unit 2 was acceptable. Therefore, **Open Item 59 is closed.**



## 7 INSTRUMENTATION AND CONTROLS

### 7.2 Reactor Trip System

#### 7.2.1 Description

##### 7.2.1.1 System Description

###### *Disposition of Open Item (Appendix HH)*

Open Item 63 states, "TVA should confirm to the NRC staff that testing prior to Unit 2 fuel load has demonstrated that two-way communications is impossible with the Eagle 21 communications interface."

Open Item 93 (Section 7.9.3.2 "Separation of Protection and Control Systems") states, "TVA should confirm to the staff that testing of the Eagle 21 system has sufficiently demonstrated that two-way communication to the ICS is precluded with the described configurations."

By letter dated October 22, 2014 (ADAMS Accession No. ML14295A520), TVA provided Enclosures 1, 2, and 3 to its letter describing its response to these action items. In this response, TVA provided a description of the test it performed on one of the Eagle 21 chassis to demonstrate that two-way communication was precluded by the specific configuration employed at WBN Unit 2. Their description included a copy of its test plan, a summary of the test steps performed, including sketches of the test setup employed, and a high level summary of the test and its results. The purpose of this test was to verify that the External Communications Interface for WBN Unit 2 Eagle 21 Reactor Protection System only allows data flow in one direction (i.e., data out to the plant computer and no data into the Eagle 21 system).

Under normal operating conditions, the Loop Calculation Processor (LCP) (which performs safety related functions) of each of the Eagle 21 chassis generates status information at a rate of ten times per second. This information travels on the internal Eagle 21 high-level data link control (HDLC) serial bus where it is received in parallel by the Eagle 21 Test Sequence Processor (TSP) and by a Serial-to-Ethernet converter (SEC). The SEC then passes this status information on to the plant Integrated Computer System (ICS) through a fiber optic device to the Ethernet network connection. (As described above, each of the 14 Eagle 21 chassis sends such status information via a fiber optic Ethernet connection to a personal computer (PC) located in the process computer room. This PC then aggregates the data from the 14 Eagle 21 chassis and sends the aggregated data to the ICS over a separate network connection.) To ensure that no data traffic on the internal HDLC serial link of each Eagle 21 chassis can adversely impact the LCPs of each chassis, internal unidirectional communication between these sections is enforced to be from the LCP to the TSP and SEC by removing the "receive communications" integrated circuit chips from the sockets in the LCP data link handler board section and removing the "transmit communications" integrated circuit chips from their respective sockets in the TSP data link handler board and the SEC board. In addition, the installation of jumpers as described in Section 7.9.3.2 of the staff's SER (SSER 23) prevents the SEC from transmitting data onto the HDLC serial port. Therefore, the LCP has no ability to receive data from any source nor does the TSP or SEC have the ability to transmit data to the LCP.

To demonstrate the unidirectional communications, the Ethernet port external to one of the Eagle 21 chassis (which has a Serial-to-Ethernet communications configuration typical of each

of the 14 Eagle 21 chassis) coming from the ICS PC was temporarily disconnected and an Ethernet hub was connected in its place. A laptop with an Ethernet communications port was connected to one side of the Ethernet port. The laptop computer was configured to generate a data storm pattern to the Eagle 21 by targeting the Eagle 21 chassis' Internet Protocol (IP) address. A second laptop was connected to the Ethernet hub to analyze and record the network data traffic to verify that the Eagle 21 rack did not respond to any of the data storm traffic and that it continued to send out the appropriate LCP status information. Oscilloscope probes were also connected to the LCP Data Link Handler serial "receive" lines and the SEC serial "transmit" lines to verify that no serial data traffic was present, which was as expected since the SEC has no transmit capability.

The test demonstrated that when the data storm pattern information was generated by the first laptop, no change in response of the LCP was evident on the second laptop. Further, the oscilloscope traces showed no serial information present at the LCP "receive" portion of the HDLC. This testing was witnessed by NRC staff inspection team members. The inspectors reviewed the test procedure, Eagle 21 vendor manual, and associated drawings to verify that the described test configuration and acceptance criteria was valid for the Open Items in question. The inspection team member noted that the test procedure involved injecting data packets through the cable normally attached to the fiber optic converter and reading any return data packets. Additionally, the inspection team witnessed the performance of the test and observed the oscilloscope traces monitoring the SEC controller's (i.e., the communications interface) transmit and receive lines, as well as the loop controller processor's (the safety-related processor board) receive lines. The inspectors also reviewed the drawings to verify that they were in the same configuration described in Open Item 93. The inspectors observed the testing and reviewed the test results to verify the test setup and to determine whether the acceptance criteria were met.

Based on the staff evaluation that there appears to have been an appropriate test setup and successful performance of the licensee's Eagle 21 digital communications test, and on the staff's evaluation of the licensee's responses in the enclosures to their October 22, 2014, letter, and the observations noted in the inspection report prepared by the NRC Region II staff, the NRC staff finds that **Open Items 63 and 93 have been adequately addressed and are closed.**

#### Open Item 64

Open Item 64 states, "TVA stated that, 'Post modification testing will be performed to verify that the design change corrects the Eagle 21, Rack 2 RTD accuracy issue prior to WBN Unit 2 fuel load.' This issue is open pending NRC staff review of the testing results."

The inspectors reviewed the test in work order (WO) 11347100 and the change package to verify that a 0.2 degree Fahrenheit (°F) bias, which had been discovered during factory acceptance testing, was corrected. The inspectors also reviewed the WO to verify that the test equipment was properly calibrated. Based on a review of the final closure package as documented in the Inspection Report 2014-602 dated March 27, 2014 (ADAMS Accession No. ML14086A063), **Open Item 64 is closed.**

## 7.5 Safety-Related Display Instrumentation

### 7.5.2 Post-Accident Monitoring System

#### 7.5.2.3 High-Range Containment Area Radiation Monitors

##### 7.5.2.3.4 Technical Evaluation

### *Disposition of Open Item (Appendix HH)*

#### Open Item 80

Open Item 80 states, "TVA should provide clarification to the staff on how TVA Standard Specification SS-E18-14.1 meets the guidance of Regulatory Guide (RG) 1.180, and should address any deviations from the guidance of the RG."

By letter dated May 6, 2011 (ADAMS Accession No. ML11129A205), TVA responded to SSER, Appendix HH Open Item 80. In Attachment 1 to this letter, TVA provided a white paper entitled, "Comparison of Regulatory Guide (RG) 1.180, "Guidelines For Evaluating Electromagnetic and Radio-Frequency Interference In Safety-Related Instrumentation and Control Systems," Revision 1, and TVA Standard Specification SS-E18-14.1, "Electromagnetic Interference (EMI) Testing Requirements for Electronic Devices," Revision 3." Attachment 1 to the TVA letter provided the history and program description of the subject standard, along with any differences between the subject standard and the guidance contained in RG 1.180. It further provided specific comparison for each test along with the conclusion statement. TVA also stated, in "30 years of evaluating equipment TVA has not seen a failure from susceptibility testing."

The NRC staff reviewed the TVA white paper and evaluated the differences and the specific comparisons. One of the cited differences is that TVA applies the Standard Specification to all electronic equipment, not just digital safety systems. The NRC staff has no concern with regards to this requirement because it covers a broader scope of equipment or testing than required by RG 1.180. The other difference is in the area of magnetic field testing. TVA has stated this requirement is typically not tested because their electronic equipment is not located in areas with strong magnetic fields. This exemption is permitted by RG 1.180.

The NRC staff further reviewed TVA's response for each test item and found the tests met or exceeded the test requirements. TVA used alternate tests and followed the guidance in Electric Power Research Institute TR-102323, the use of which was approved by NRC on April 17, 1996. TVA also provided justifications or an explanation for any differences. The NRC staff noted a difference in the area of low frequency susceptibility testing. In a letter dated September 21, 2011 (ADAMS Accession No. ML112590046), NRC requested TVA to justify why the low frequency conducted susceptibility test covered the frequency range from 30 Hz to 50 kHz when RG 1.180 required testing from 30 Hz to 150 kHz. TVA responded in a letter dated September 30, 2011 (ADAMS Accession No. ML11287A254), that the Nemko test report included test frequencies from 30 Hz to 50 kHz, however, 30 Hz to 150 kHz tests were performed as part of TUV test report S7439-03. By letter dated November 18, 2011 (ADAMS Accession No. ML113130218), the NRC staff stated that it had reviewed the TUV test report and indicated that it was conducted on the older model RM-1000 radiation monitors. By letter dated November 30, 2011 (ADAMS Accession No. ML11341A156), TVA provided the similarity analysis between the old and the new model and justified any changes. Some of the changes

included electromagnetic shielding to improve the electro-magnetic compatibility performance; a few new and improved components replaced the old obsolete components resulting in an improved accuracy.

By letter dated August 30, 2012 (ADAMS Accession No. ML12249A195), TVA further clarified that the low frequency conducted susceptibility testing was conducted in accordance with Military Standard MIL-STD-461E, which requires testing from 30 Hz to 150 kHz for DC powered equipment and from 120 Hz to 150 kHz for 60 Hz AC powered equipment (i.e. from the second harmonic of supply frequency). The test was carried out using MIL-STD-461D whereas RG 1.180 requires testing to MIL-STD-461E but TVA reviewed and confirmed the testing met the guidance of MIL-STD-461E and RG 1.180, Revision 1.

The NRC staff reviewed the information TVA provided as well as the test data. The NRC staff confirmed the testing was done for the required range and the differences between the old and new model of I/F converter were documented and justified. TVA letter dated December 10, 2012 (ADAMS Accession No. ML12349A379) provided the formal test data as Enclosures 1 and 2.

The last open issue regarding low frequency conducted susceptibility testing was resolved based on the NRC staff's evaluation of TVA's comparison and analysis of the applicability of old test data to the new I/F converters, provided in TVA's letters dated May 6, 2011, August 30, 2012, and December 10, 2012.

TVA has provided sufficient information in its responses to confirm that TVA Standard Specification SS-E18-14.1 meets the guidance of RG 1.180. The staff's requests for clarification of various items including the frequency range for the low frequency conducted susceptibility were satisfactorily resolved by the referenced TVA letters and documents as detailed above. Therefore based on the above, **Open Item 80 is closed.**

### 7.5.3 IE Bulletin 79-27

#### Open Item 73

Open Item 73 (Appendix HH) states, "The NRC staff will inspect to confirm that TVA has completed the WBN Unit 2 EOPs [emergency operating procedures] prior to fuel load."

Per NRC Inspection Report 05000391/2014604, dated June 25, 2014 (ADAMS Accession No. ML14177A214), the list of WBN Unit 2 emergency procedures is complete. Those procedures reviewed were written in accordance with TI-12.06, "Writer's Guide for Abnormal and Emergency Operating Instructions," and are complete and ready for approval and use. The NRC inspectors determined that the Watts Bar emergency, abnormal and annunciator response procedures are prepared to adequately control and correct safety-related functions in the event of a system or component malfunction indication. Therefore, **Open Item 73 is closed.**

## 7.7 Control Systems

### 7.7.1 Description

#### 7.7.1.9 Incore Instrumentation System

##### *Disposition of Open Item (Appendix HH)*

##### Open Item 131

Open Item 131 states, "TVA should review the EOP action level setpoint to account for the difference between core exit temperature readings for Unit 1 and Unit 2 and confirm the EOP action level setpoint to the NRC staff."

By letter dated October 14, 2011 (ADAMS Accession No. ML11291A095), TVA explained that change in the EOP action level setpoint due to the difference between core exit temperature readings caused by the location change of the core exit thermocouples (CETs) was evaluated in TVA calculation WBNOSG4188, "EOP Setpoints Verification Document, Appendix 1: Standard Setpoints Table," Revision 21. TVA states that this calculation shows that the Unit 1 EOP CET setpoint is higher than the Unit 2 EOP CET setpoint. TVA submitted copies of the relevant pages from this calculation in Attachment 12 to TVA's October 14, 2011, letter. This attachment shows that there is a difference in EOP action level setpoints between Unit 1 and Unit 2.

The NRC staff has reviewed the calculations in Attachment 12 which contains the environmental allowances that are added to the core exit thermocouple readings. They're different between WBN Units 1 and 2. For indication of an uncovered core that is more conservative, the staff has considered a lower G03 (core uncovered) value than a higher value.

Setpoint G03:

Core Exit Temperature (CET) =  $670^{\circ}\text{F} + \text{normal channel inaccuracy and post-accident transmitter errors}$

Unit 1:  $\text{CET} = 670^{\circ}\text{F} + 57^{\circ}\text{F} = 727^{\circ}\text{F}$

Unit 2:  $\text{CET} = 670^{\circ}\text{F} + 30.7^{\circ}\text{F} \approx 700^{\circ}\text{F}$

The nominal G03 setpoint (core uncovered) value of  $670^{\circ}\text{F}$  is the same for both WBN Units 1 and 2. The difference between the G03 setpoints, in Units 1 and 2, is due to different values for the normal channel inaccuracy and post-accident transmitter errors. Based upon this information, the staff infers the following basis:

1. If there is no LOCA, and the CET is reading  $670^{\circ}\text{F}$ , then it would be expected that the pressurizer safety valves would be open (the saturation pressure, at  $670^{\circ}\text{F}$ , is about 2531 pounds per square inch absolute, which is a little higher than the safety valve opening setpressure).
2. If the core is not already uncovered, then it will eventually become uncovered if the RCS inventory loss through the safety valves is not replaced by charging flow.
3. Since the open safety valves will prevent RCS pressure from rising, CET readings of  $670^{\circ}\text{F}$  or higher would be indicative of superheated steam; attributed to an uncovered core.

4. If there is a LOCA, and RCS pressure is lower, then a CET reading of 670 °F or greater would indicate that the CET is measuring superheated steam, coming from an uncovered core.
5. Adding uncertainties to the 670 °F value rules out other situations that could produce lower CET readings, in which the core is not uncovered.

It is not uncommon to have different EOP parameter values for different units at a site, particularly those whose construction completion wasn't concurrent. Some parameters can be standardized, while others cannot.

By letter dated February 18, 2014, TVA submitted Revision 103XX of Appendix C to its Radiological Emergency Plan. Revision 103XX has been updated to include the different EOP CET setpoints for WBN Units 1 and 2. Based on the NRC staff's review of the differences between the EOP CET setpoints for the two units, and TVA's inclusion of the different setpoints in Appendix C to the Radiological Emergency Plan, the NRC staff considers **Open Item 131 closed**.



## 8 ELECTRICAL POWER SYSTEMS

### *Disposition of Open Items (Appendix HH)*

#### 8.1 Introduction

##### Open Item 26

Open Item 26 states, "For the scenario with an accident in one unit and concurrent shutdown of the second unit without offsite power, TVA stated that Unit 2 pre-operational testing will validate the diesel response to sequencing of loads on the Unit 2 emergency diesel generators (EDGs). The NRC staff will evaluate the status of this issue and will update the status of the EDG load response in a future SSER."

By letter dated November 18, 2011 (ADAMS Accession No. ML113120438), the NRC staff requested additional details on Open Item 26. TVA updated its response by letter dated June 7, 2012 (ADAMS Accession No. ML12160A351). The questions were related to EDG rating and loading criteria. Specifically the staff requested TVA to:

- a) Explain the variations in the worst case loading provided in different responses and provide a summary of current calculations depicting DG loading, including procedurally required loads that may be manually connected, and
- b) Provide verification or test documents from the manufacturer or Appendix B qualified supplier of the DG engine and DG generator certifying the "hot", "cold" and "step load" capabilities.

In response to staff questions, TVA stated that the ongoing plant modifications and validation of calculation accuracies through the inspection process had resulted in adjustments to the EDG loading calculations. TVA attached excerpts from Calculation EDQ 00099920080014, "Diesel Generator Loading Analysis," Revision 16, summarizing the results from the last update.

The licensee has evaluated the load carrying capability (steady-state running load) and margin available for the worst case EDG loading for two separate events. As stated in the FSAR, load carrying capability is based on a 2-hour rating of 4840 kilowatt (kW) from 0 to 2 hours and on a continuous rating of 4400 kW from 2 hours to the end of the event. Attachment 1 to Calculation EDQ 00099920080014, Revision 16, depicts worst case EDG loading with available margin when serving loads during a loss-of-offsite power (LOOP) concurrent with a loss-of-coolant accident (LOCA). This table indicates that EDG 2B-B has the highest loading of 4237.20 kilowatt (kW), which is less than the 2 hour rating of 4840 kW. The maximum steady state running load (2 hours to the end of event) is calculated to be 4093.66 kW for EDG 1A-A compared to nominal rating of 4400 kW. The other EDGs have lower loading for this event.

Attachment 2 to Calculation EDQ 00099920080014, Revision 16, provides details on each EDG loading with one unit in LOOP plus LOCA and the second unit in LOOP only. For the case of Unit 1 in a LOOP/LOCA event and Unit 2 in a LOOP only condition, TVA has concluded that EDG 1A-A has the maximum loading of 4220.51 kW for the first 2 hours and 4093.66 kW for the remaining duration. These loadings are below the corresponding nominal and 2 hour ratings of the EDGs, as stated above. The other EDGs have lower loading for this event.

For the case of Unit 2 in a LOOP/LOCA event and Unit 1 in a LOOP only condition, the licensee has concluded that EDG 2B-B has the maximum loading of 4237.2 kW for the first 2 hours and EDG 2A-A has 3975.57 kW for steady state operation beyond 2 hours. These loadings are below the corresponding nominal and 2 hour ratings of the EDGs, as stated above. The other EDGs have lower loading for this event.

The licensee has also performed a sensitivity analyses for transient loading of the EDGs during motor starts. Based on the details provided in the referenced calculation, the staff finds that the EDGs at WBN Units 1 and 2 are adequately rated to support safe shutdown of both units following an accident in one unit coupled with a LOOP at both units.

The licensee has indicated that the “hot,” “cold,” and “step load” capabilities of the EDGs were reviewed and concurred by MKW Power Systems, Inc., the Appendix B qualified supplier of the EDG engine and generator for WBN. The licensee has used the higher rating(s) for motor starting analyses. The staff did not consider the additional spare margin available with these ratings as the nameplate ratings envelope the postulated steady state loadings.

Based on the responses provided by the applicant, the NRC staff finds the responses acceptable and therefore considers **Open Item 26 to be closed**.

## 8.2 Offsite (Preferred) Electric Power System

### 8.2.2 Analysis

#### NRC Bulletin 2012-01

The NRC issued Bulletin 2012-01, “Design Vulnerability in Electric Power System,” dated July 27, 2012, to notify licensees that the NRC staff is requesting information about the facilities’ electric power system designs to determine if further regulatory action is warranted. Bulletin 2012-01 requires addressees to comprehensively verify compliance with the regulatory requirements of General Design Criterion (GDC) 17, “Electric Power Systems,” and the design criteria for protection systems under 10 CFR 50.55a(h)(2).

TVA provided its response for WBN Unit 2 in Enclosure 3 of letter dated October 25, 2012 (ADAMS Accession No. ML12312A167). Based on review of the response, NRC staff determined that the design vulnerability exists at WBN Unit 2 electric power system and no design features have been provided to enable functioning of electric power system with an open phase condition (OPC) with offsite power circuits. In response to NRC staff’s RAI (ADAMS Accession No. ML13351A314) concerning status and schedule for completion of plant design changes and modifications to resolve the open phase design vulnerability, TVA provided its response in letter dated February 3, 2014 (ADAMS Accession No. ML14038A075). TVA stated that it is fully engaged in the development of accurate detection and protection equipment without compromising nuclear safety or increasing plant risk, this new OPC technology is being thoroughly evaluated, will be tested, and will be fully analyzed before installation. In addition, based on the operating experience to-date, the OPC of concern is a loss of one or two of the three phases of a nuclear power plant’s offsite electrical power circuit due to any component failure on the high voltage side of a transformer connecting a qualified offsite electrical power circuit to the transmission system with and without a high impedance ground under all operating electrical system configurations and loading conditions. In supplemental letter dated September 3, 2014 (ADAMS Accession No. ML14247A231), TVA submitted additional text to be

added to the FSAR and proposed a license condition associated with actions for resolving NRC Bulletin 2012-01.

The proposed text that would be added to the WBN Unit 2 FSAR Section 8.2.2 “Analysis,” as part of WBN Unit 2 FSAR Amendment 113 states:

*The NRC issued Bulletin 2012-01, “Design Vulnerability in Electrical Power Systems,” describing a condition resulting from the loss of a single phase between the transmission network and the onsite power distribution system at an operating nuclear plant in the United States. TVA has taken the short term actions described in the bulletin and the nuclear industry is developing a long term resolution. TVA has added the following license condition for the long term actions:*

*Actions to resolve the issues identified in the Bulletin will be implemented on or before December 31, 2017.*

**The NRC staff is proposing the following License Condition:**

By December 31, 2017, TVA will report to the NRC that the actions to resolve the issues identified in Bulletin 2012-01, “Design Vulnerability in Electrical Power System” have been implemented.

Based on the above, the staff concludes that there is reasonable assurance that OPC design vulnerability with the WBN Unit 2 electric power system will be addressed by TVA when license conditions and regulatory commitments are met. The staff will close Bulletin 2012-01 for WBN Unit 2 when TVA notifies the NRC with a close-out letter when full compliance is achieved.

**8.3 Onsite (Standby) Power System**

**8.3.1 AC Power System**

**8.3.1.1 Description**

**Open Item 32**

Open Item 32 states, “TVA should provide to the NRC staff the details of the administrative limits of EDG voltage and speed range, and the basis for its conclusion that the impact is negligible, and describe how it accounts for the administrative limits in the Technical Specification [TS] surveillance requirements for EDG voltage and frequency.”

By letter dated February 13, 2014 (ADAMS Accession Number ML14038A079), TVA proposed modifying the WBN Unit 2 TS Surveillance Requirements (SRs) related to surveillance, operation and testing of the EDGs when not connected in parallel with the offsite sources. Specifically, TVA proposed to modify the frequency range from greater than or equal to ( $\geq$ ) 58.8 Hz and less than or equal to ( $\leq$ ) 61.2 Hz to  $\geq$  59.8 Hz and  $\leq$  60.1 Hz for SRs 3.8.1.7, 3.8.1.11, 3.8.1.12, 3.8.1.15, 3.8.1.19, and 3.8.1.21. With respect to the monthly surveillance performed on the EDG, TVA proposes to revise this surveillance (i.e., SR 3.8.1.2) to confirm that the nominal frequency value of 60 Hz is achieved. The letter states that the EDG voltage limits of 6800 V to 7260 V, as described in the TS, are correct as validated by the analyses.

The WBN Unit 2 FSAR Section 3.1 details conformance with the Commission's regulatory requirements related to the content of TSs as set forth in 10 CFR Section 50.36. GDC 17, "Electric Power Systems," of Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50, requires, in part, that an onsite electric power system shall be provided to permit functioning of structures, systems, and components important to safety. The onsite electric power supplies and the onsite electric distribution system shall have sufficient independence, redundancy, and testability to perform their safety functions assuming a single failure. In addition, this criterion requires provisions to minimize the probability of losing electric power from any of the remaining supplies as a result of the loss of power from the unit, the transmission network, or the onsite electric power supplies.

GDC 18, "Inspection and Testing of Electric Power Systems," requires that electric power systems important to safety be designed to permit appropriate periodic inspection and testing to demonstrate operability and functional performance.

It states in 10 CFR Section 50.36 that each license authorizing operation of a production or utilization facility of a type described in 10 CFR 50.21 or 50.22 will include TSs. As described in 10 CFR 50.36(c)(1) - (8), TSs will include items in the following categories: (1) safety limits, limiting safety system settings, and limiting control settings; (2) limiting conditions for operation; (3) surveillance requirements; (4) design features; (5) administrative controls; (6) decommissioning; (7) initial notification; (8) written reports.

NRC RG 1.9, Revision 3, dated July 1993, "Selection, Design, Qualification and Testing of Emergency Diesel Generators used as Class 1E Onsite Electric Power Systems at Nuclear Power Plants," describes a method acceptable to the NRC staff for complying with the Commission's regulations with regard to design and testing of onsite EDGs.

The staff has reviewed TVA's regulatory and technical analyses in support of its proposed changes, which is described in Enclosure 1 of the TVA's letter dated February 13, 2014.

The offsite and onsite power systems at the WBN Unit 2 are designed to comply with the requirements of GDC 17 and 18 respectively. The WBN Unit 2 FSAR states that the offsite sources are two independent 161-kV transmission lines terminating at the 161-kV switchyard, providing power to the plant, on demand, via the common station service transformers to the onsite Class 1E distribution system

The standby Alternating Current (AC) power system (onsite electrical power system) serves the two nuclear power units (WBN Unit 1 and WBN Unit 2) and certain common plant equipment. It consists of two independent EDG systems, each system containing two EDG units, two redundant Class 1E electric power distribution trains, and four redundant vital instrument and control power channels, each provided with an uninterruptible ac power supply and distribution panel. Each EDG consists of two 16-cylinder engines directly connected to a 6.9 kV generator. The continuous rating of each EDG is 4400 kilowatt (kW) at 0.8 power factor, 6.9 kV, 3-phase, and 60 Hz. Each EDG also has an additional rating of 4840 kW for 2 hours out of 24 hours. Ratings for the EDGs satisfy the requirements of RG 1.9 Rev. 3. The continuous service rating of each EDG is 4400 kW with 10 percent overload permissible for up to 2 hours in any 24 hour period.

Any variation in steady state voltage and/or frequency affects the operating characteristics of motor driven loads such as pumps, fans and valves. If variation in both voltage and frequency occurs simultaneously, the effect will be superimposed and compounded such that the available

margin in EDG capacity may be eroded. TVA has proposed to narrow the existing allowable range of frequency for the acceptance criteria during EDG surveillance testing to assure that safe shutdown equipment will perform as required by accident analyses.

TVA has stated that the changes in frequency from the nominal rating of 60 Hz to the proposed range were evaluated for the following equipment with consideration to a LOOP or a LOCA coupled with a LOOP:

1. Pump flow, Net Positive Suction Head (NPSH) availability and horsepower requirements,
2. Fan flow and horsepower requirements,
3. Motor operated valves (MOV) opening/closing speed and horsepower requirements,
4. Air compressor flow and horsepower requirements, and
5. Chiller horsepower requirements

TVA stated that only major pumps in safety significant systems were evaluated in detail, because, the speed, load, flow, and NPSH are only slightly impacted (i.e., 0.3%). The results of the evaluations are tabulated in Tables 3 and 4 of Enclosure 1 of the TVA's letter dated February 13, 2014. TVA has concluded that the brake horsepower of motors due to a speed variation of  $\pm 0.3\%$  will vary by 1.0%. Table 5 of Enclosure 1 provides a summary of the major pump brake horsepower (BHP) as a result of frequency variation. TVA has concluded that the change in BHP of large motors is acceptable due to the rating of the equipment, the margin in nameplate rating or specific analyses performed by the vendor indicating that any temperature increase will not adversely impact the motor windings.

For the long term mitigation of a LOCA/LOOP, TVA evaluated major fans and air handling units (Section 1.2.7 of Enclosure 1) supplied by the EDGs. The evaluation concluded that all of the fans affected by diesel generator frequency variation will provide adequate flow to maintain safe shutdown equipment environment.

TVA stated that MOV stroke time will be approximately 0.8% longer as a result of the change in the frequency and voltage. The evaluation concluded that the longer stroke time does not exceed the time for MOV operation assumed in the safety analyses for accident mitigation requirements. Hence the longer stroke time is acceptable. The shorter stroke time due to higher frequency does not impact assumptions in safety analyses. TVA has concluded that there are no concerns with MOV operation due to the variation in EDG frequency and voltage.

Enclosure 1 also provided a summary of evaluations performed for voltage and frequency variations on air compressor and chiller flows, power transformers, battery chargers, hydrogen igniters and pertinent small motors. TVA has concluded that the impact on these components is minor and acceptable.

TVA also evaluated the impact of the proposed change on EDG1-1A, the heaviest loaded EDG, under postulated accident conditions and concluded that:

1. The calculated total load of 4116 kW is below the nominal rating of 4400 kW and therefore acceptable for the EDGs.
2. There is no impact on TS-required fuel oil volume. The current calculation assumes that the EDGs operate at the 2-hour overload rating of 4840 kW for the first 2 hours of the seven-day period and at 4400 kW for the remaining 166 hours of the seven-day period.

TVA has evaluated the impact of frequency and voltage variation in the ranges of 59.8 to 60.1 Hz and 6800 V to 7260 V, respectively for WBN Unit 2 equipment fed by the EDGs during a LOOP or LOCA/LOOP and proposed TSs. The NRC staff has reviewed TVA's proposed TSs and supporting documentation. Based on the evaluation discussed above, the staff determined that the proposed TSs related to the allowable steady state operating voltage and frequency band of the EDGs is consistent with the recommendations of the NRC guidance in RG 1.9 Rev. 3. The NRC staff also concludes that the proposed TSs will meet the intent of GDC 17 and 18 governing the design and operation of the onsite electrical power systems and provides adequate assurance of system operability. Therefore, the NRC staff finds the proposed changes acceptable and consistent with the NRC regulations and the regulatory guidance, and considers **Open Item 32 to be closed.**

## 9 AUXILIARY SYSTEMS

### 9.2 Water Systems

#### 9.2.1 Essential Raw Cooling Water System

*Disposition of Open Items (Appendix HH)*

##### Open Item 91

Open Item 91 states, "TVA should update the FSAR with information describing how WBN Unit 2 meets GDC 5, assuming the worst case single failure and a LOOP, as provided in TVA's letter dated April 13, 2011."

In FSAR Amendment 112 (ADAMS Accession No. ML14160A901), TVA updated the FSAR describing how WBN Unit 2 meets GDC 5. The NRC staff has reviewed these changes and found them to be acceptable. Therefore, **Open Item 91 is closed.**

#### 9.2.2 Component Cooling System (Reactor Auxiliaries Cooling Water System)

##### Open Item 67

Open Item 67 states, "TVA should confirm, and the NRC staff should verify, that the component cooling booster pumps for Unit 2 are above PMF [probable maximum flood] level."

By letter dated March 20, 2014 (ADAMS Accession No. ML14085A009), TVA stated that rather than relocating the component cooling system thermal barrier booster pumps above the PMF level, it is implementing a flood barrier modification to prevent water damage to both Unit 1 and Unit 2 pumps in the event of a PMF. The flooding barriers around the Unit 1 pumps have been installed and inspected by the NRC staff (Inspection Report 05000390/2014003), verifying that the height of the barriers are greater than the proposed PMF level for WBN. The Unit 2 barriers are the same design as the Unit 1 barriers and have been verified to be partially installed. For Unit 2, a section of the barrier has been left open allowing access to the pump for pre-operational testing. The Unit 2 barrier will be fully installed prior to fuel load. The NRC staff considers **Open Item 67 closed.**

#### 9.2.5 Ultimate Heat Sink

##### Open Item 66

Open Item 66 states, "TVA should clarify FSAR Section 9.2.5 to add the capability of the UHS [ultimate heat sink] to bring the nonaccident unit to cold shutdown within 72 hours."

The NRC staff confirmed that TVA updated the FSAR, in Amendment 105, to add clarification that the UHS is capable of bringing the nonaccident unit to cold shut down within 72 hours. Therefore, **Open Item 66 is closed.**





## 10 STEAM AND POWER CONVERSION SYSTEM

### 10.4 Other Features

#### *Disposition of Open Items (Appendix HH)*

#### 10.4.6 Condensate Cleanup System

##### Open Item 35

Open Item 35 states, "TVA should provide information to the NRC staff that the CCS [condensate cleanup system] will produce feedwater purity in accordance with BTP MTEB 5-3 or, alternatively, provide justification for producing feedwater purity to another acceptable standard."

TVA updated the FSAR, in Amendment 112, to include the statement "The plant chemistry program establishes the steam generator steam side and feedwater chemistry specifications for normal power operations. This program is based on EPRI [Electric Power Research Institute] PWR secondary water chemistry guidelines as detailed in the plant chemistry program." The NRC staff finds this to be consistent with staff expectations for secondary water chemistry, as described in BTP MTEB 5-3. Therefore, **Open Item 35 is closed.**



## 11 RADIOACTIVE WASTE SYSTEM

### 11.3 Gaseous Waste Management

#### *Disposition of Open Items (Appendix HH)*

##### Open Item 139

Open Item 139 states, “The results of the cost-benefit analysis required by 10 CFR Part 50, Appendix I, subsection II.D, should be provided in the WBN Unit 2 FSAR. Upon receipt of the updated FSAR, the NRC staff will confirm that the update has been made by TVA.”

The NRC staff confirmed that TVA updated the FSAR, in Amendment 109, to include the results of the cost-benefit analysis. Therefore, **Open Item 139 is closed.**



## 12 RADIATION PROTECTION

### *Disposition of Open Items (Appendix HH)*

#### 12.5 Dose Assessment

##### Open Item 115

Open Item 115 states, "TVA should update the FSAR to reflect the information regarding design changes to be implemented to lower radiation levels as provided in its letter [to] the NRC dated June 3, 2010."

The NRC staff confirmed that TVA updated the FSAR, in Amendments 105 and 109, to include the information previously provided in its letter dated June 3, 2010. Therefore, **Open Item 115 is closed.**

#### 12.7 NUREG-0737 Items

##### 12.7.1 Plant Shielding (TMI Action Item II.B.2)

##### Open Item 117

Open Item 117 states, "TVA should update the FSAR to reflect the calculational basis for access to vital areas as provided in its letter dated February 25, 2011."

The NRC staff confirmed that TVA updated the FSAR, in Amendment 109, to include the information previously provided in its letter dated February 25, 2011. Therefore, **Open Item 117 is closed.**



## 13 CONDUCT OF OPERATIONS

### 13.1 Organizational Structure of Applicant

#### 13.1.3 Plant Staff Organization

##### *Disposition of Open Items (Appendix HH)*

##### Open Item 9

Open Item 9 states, "Confirm that education and experience of management and principal supervisory positions down through the shift supervisory level conform to Regulatory Guide 1.8."

Per NRC Inspection Report 0500391/2014603, dated May 9, 2014 (ADAMS Accession No. ML14129A381), the education and experience of management at Watts Bar were confirmed to conform to the requirements of RG 1.8, regarding the management of Unit 2 post-construction. Therefore, **Open Item 9 is closed.**

##### Open Item 10

Open Item 10 states, "Confirm that TVA has an adequate number of licensed and non-licensed operators in the training pipeline to support the preoperational test program, fuel loading, and dual unit operation."

Per NRC Inspection Report 0500391/2014603, dated May 9, 2014 (ADAMS Accession No. ML14129A381), the applicant had enough qualified personnel to staff for dual unit operation. The applicant had enough reactor operators in the training pipeline to be able to staff the reactor operator position with reactor operators (rather than with senior reactor operators) after the June 2016 License Class. Therefore, **Open Item 10 is closed.**





**25 QUALITY OF CONSTRUCTION, OPERATIONAL READINESS, AND QUALITY ASSURANCE EFFECTIVENESS**

25.9 Program for Maintenance and Preservation of the Licensing Basis for Units 1 and 2

*Disposition of Open Items (Appendix HH)*

Open Item 12

Open Item 12 (Appendix HH) states, "TVA's implementation of NGDC PP-20 and EDCR [Engineering Document Construction Release] Appendix J is subject to future NRC audit and inspection."

The NRC staff performed the audit at TVA from August 12 to August 14, 2014 (ADAMS Accession No. ML14323A562), to review the implementation of the licensing basis preservation program (NGDC PP-20) and EDCR Appendix J. Overall the NRC staff found that the licensing basis preservation program was being adequately implemented such that the program was providing its intended function. Therefore, **Open Item 12 is closed.**



## **APPENDIX A      CHRONOLOGY OF RADIOLOGICAL REVIEW OF WATTS BAR NUCLEAR PLANT, UNIT 2, OPERATING LICENSE REVIEW**

Public correspondence exchanged between the NRC and TVA during the review of the operating license application for Watts Bar Nuclear Plant (WBN), Units 1 and 2, is available through the NRC's Agencywide Documents Access and Management System (ADAMS) or the Public Document Room (PDR). This correspondence includes that occurring subsequent to TVA's letter notifying the NRC of its decision to reactivate construction of WBN Unit 2, which had been in a deferred status under the Commission's Policy Statement on Deferred Plants.

Web-based ADAMS (WBA) is the latest interface to ADAMS. This search engine enables searching the ADAMS repository of official agency records (Publicly Available Records System (PARS) and Public Legacy libraries) for publicly available regulatory guides, NUREG-series reports, inspection reports, Commission documents, correspondence, and other regulatory and technical documents written by NRC staff, contractors, and licensees. WBA permits full-text searching and enables users to view document images, download files, and print locally. New documents become accessible on the day they are published, and are released periodically throughout the day. ADAMS documents are provided in Adobe Portable Document Format (PDF).

The NRC PDR reference staff is available to assist with ADAMS. Contact information for the PDR staff is on the NRC Web site at <http://www.nrc.gov/reading-rm/contact-pdr.html>.



## APPENDIX E

## PRINCIPAL CONTRIBUTORS TO SSER 27

D. Hoang, NRR/DE/EMCB  
K. Hoffman, NRR/DE/EPNB  
J. Kaizer, NRR/DSS/SNPB  
S. Lingam, NRR/DORL/LPWB  
G. S. Matharu, NRR/DE/EEEE  
R. Mathew, NRR/DE/EEEE  
S. Miranda, NRR/DSS/SRXB  
M. Panicker, NRR/DSS/SNPB  
J. Parillo, NRR/DRA/ARCB  
R. Pedersen, NRR/DRA/ARCB  
J. Poole, NRR/DORL/LPWB  
G. Purciarello, NRR/DSS/SBPB  
D. Rahn, NRR/DE/EICB  
S. Ray, NRR/DE/EEEE  
G. Singh, NRR/DE/EICB  
M. Yoder, NRR/DE/ESGB



**APPENDIX Z            SAFETY EVALUATION BY THE OFFICE OF NUCLEAR  
REACTOR REGULATION REGARDING THE PRESERVICE  
INSPECTION PROGRAM**

*Disposition of Open Item (Appendix HH)*

3.0    EVALUATION OF PRESERVICE INSPECTION PROGRAM PLAN

3.2    Review of ASME [American Society of Mechanical Engineers] Code and OM [Operation and Maintenance] Code Requirements.

3.2.3    Acceptability of the Examination Sample

Open Item 70

Open Item 70 states, "TVA should provide the revised WBN Unit 2 PSI [preservice inspection] program ASME Class 1, 2, and 3 Supports "Summary Tables," to include numbers of components so that the NRC staff can verify that the numbers meet the reference ASME Code."

By letter dated November 1, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12311A296), TVA submitted Revision 7 to the Preservice Inspection Program Plan. Revision 7 included new tables for Class 1, 2 and 3 non-exempt piping support distribution by system and type. In these new tables the licensee identified the number of supports in the population and the number of examinations required to complete the preservice examinations. The staff has reviewed these tables, and the supports identified for examination, and find that they meet the requirements of the 2001 Edition through the 2003 Addenda of ASME Code, Section XI. Therefore, the NRC staff finds that **Open Item 70 has satisfactorily been completed and is closed.**





**APPENDIX HH WATTS BAR UNIT 2 ACTION ITEMS TABLE**

This table provides a status of required action items associated of all open items, confirmatory issues, and proposed license conditions that the NRC staff has identified. Unless otherwise noted, the item references are to sections of this SSER. Items that are still open are listed first, and items that have been closed are listed second. Some numbers were not used in the sequential list. There are **22 items** still open and **106 items** that have been closed as of November 15, 2014.

<b>Open Items</b>				
<b><u>Item</u></b>	<b><u>Type</u></b>	<b><u>Action Required</u></b>	<b><u>Lead</u></b>	<b><u>Status</u></b>
(1)	CI	Review evaluations and corrective actions associated with a power assisted cable pull. (NRC safety evaluation dated August 31, 2009, ADAMS Accession No. ML092151155)	NRR	Open
(16)		Based on the uniqueness of EQ, the NRC staff must perform a detailed inspection and evaluation prior to fuel load to determine how the WBN Unit 2 EQ program complies with the requirements of 10 CFR 50.49. (SSER 22, Section 3.11.2)	RII/NRR	Open
(17)		The NRC staff should verify the accuracy of the WBN Unit 2 EQ list prior to fuel load. (SSER 22, Section 3.11.2.1)	RII/NRR	Open
(25)		Prior to the issuance of an operating license, TVA is required to provide satisfactory documentation that it has obtained the maximum secondary liability insurance coverage pursuant to 10 CFR 140.11(a)(4), and not less than the amount required by 10 CFR 50.54(w) with respect to property insurance, and the NRC staff has reviewed and approved the documentation. (SSER 22, Section 22.3)	NRR	Open
(30)		TVA should confirm that all other safety-related equipment (in addition to the Class 1E motors) will have adequate starting and running voltage at the most limiting safety related components (such as motor operated valves, contactors, solenoid valves or relays) at the degraded voltage relay setpoint dropout setting. TVA should also confirm that the final Technical Specifications are properly derived from these analytical values for the degraded voltage settings. (SSER 22, Section 8.3.1.2)	RII/NRR	Open

(33)	CI	TVA stated in Attachment 9 of its letter dated July 31, 2010, that certain design change notices (DCNs) are required or anticipated for completion of WBN Unit 2, and that these DCNs were unverified assumptions used in its analysis of the 125 VDC vital battery system. Verification of completion of these DCNs to the NRC staff is necessary prior to issuance of the operating license. (SSER 22, Section 8.3.2.3; SSER 24, Section 8.1)	RII/NRR	Open
(37)	CI	The NRC staff will review the combined WBN Unit 1 and 2 Appendix C prior to issuance of the Unit 2 OL to confirm (1) that the proposed Unit 2 changes were incorporated into Appendix C, and (2) that changes made to Appendix C for Unit 1 since Revision 92 and the changes made to the NP-REP since Revision 92 do not affect the bases of the staff's findings in this SER supplement. (SSER 22, Section 13.3.2)	NSIR	Open
(38)	CI	The NRC staff will confirm the availability and operability of the ERDS for Unit 2 prior to issuance of the Unit 2 OL. (SSER 22, Section 13.3.2.6)	RII/NSIR	Open
(40)	CI	The NRC staff will confirm the adequacy of the emergency facilities and equipment to support dual unit operations prior to issuance of the Unit 2 OL. (SSER 22, Section 13.3.2.8)	RII/NSIR	Open
(41)	CI	TVA committed to (1) update plant data displays as necessary to include Unit 2, and (2) to update dose assessment models to provide capabilities for assessing releases from both WBN units. The NRC staff will confirm the adequacy of these items prior to issuance of the Unit 2 OL. (SSER 22, Section 13.3.2.9)	RII/NSIR	Open
(43)	CI	Section V of Appendix E to 10 CFR Part 50 requires TVA to submit its detailed implementing procedures for its emergency plan no less than 180 days before the scheduled issuance of an operating license. Completion of this requirement will be confirmed by the NRC staff prior to the issuance of an operating license. (SSER 22, Section 13.3.2.18)	NSIR	Open
(69)	CI	The WBN Unit 2 RCS vent system is acceptable, pending verification that the RCS vent system is installed. (SSER 23, Section 5.4.5)	RII	Open
(74)	CI	The NRC staff will verify installation of the acoustic-monitoring system for the power-operated relief valve (PORV) position indication in WBN Unit 2 before fuel load. (SSER 23, Section 7.8.1)	RII	Open
(75)	CI	The NRC staff will verify that the test procedures and qualification testing for auxiliary feedwater initiation and control and flow indication are completed in WBN Unit 2 before fuel load. (SSER	RII	Open

		23, Section 7.8.2)		
(79)		TVA should perform a radiated susceptibility survey, after the installation of the hardware but prior to the RM-1000 being placed in service, to establish the need for exclusion distance for the HRCAR monitors while using handheld portable devices (e.g., walkie-talkie) in the control room, as documented in Attachment 23 to TVA's letter dated February 25, 2011, and item number 355 of TVA's letter dated April 15, 2011. (SSER 23, Section 7.5.2.3)	NRR	Open
(83)	CI	TVA should confirm to the NRC staff the completion of the data storm test on the DCS. (SSER 23, Section 7.7.1.4)	NRR	Open
(90)	CI	The NRC staff should verify that the ERCW dual unit flow balance confirms that the ERCW pumps meet all specified performance requirements and have sufficient capability to supply all required ERCW normal and accident flows for dual unit operation and accident response, in order to verify that the ERCW pumps meet GDC 5 for two-unit operation. (SSER 23, Section 9.2.1)	RII/NRR	Open
(134)		TVA should provide to the NRC staff supporting technical justification for the statements in Amendment 104 of FSAR Section 2.4.4.1, "Dam Failure Permutations," page 2.4-32 (in the section "Multiple Failures") that, "Fort Loudoun, Tellico, and Watts Bar have previously been judged not to fail for the OBE (0.09 g). Postulation of Tellico failure in this combination has not been evaluated but is bounded by the SSE failure of Norris, Cherokee, Douglas and Tellico." (SSER 24, Section 2.4.10)	NRR	Open
(140)	CI	TVA to confirm to the staff the completion of the Unit 2 OMA feasibility walkdowns. (SSER 26, Appendix FF, Section 8.0)	NRR	Open
(141)	CI	TVA to confirm to the staff the completion of the multiple spurious operation scenario resolution actions for scenarios which only affect Unit 2. (SSER 26, Appendix FF, Section 8.0)	NRR	Open
(142)	CI	TVA to confirm to the staff the completion of the electrical coordination modifications. (SSER 26, Appendix FF, Section 8.0)	NRR	Open
(143)	CI	TVA to confirm the as-built FPR aligns with as-designed FPR. Gaps to be submitted to the NRC for approval. (SSER 26, Appendix FF, Section 8.0)	NRR	Open

<b>Closed Items</b>				
(2)	CI	Conduct appropriate inspection activities to verify cable lengths used in calculations and analysis match as-installed configuration. (NRC safety evaluation dated August 31, 2009, ADAMS Accession No. ML092151155). Closed in Inspection Report 05000391/2013604, dated June 27, 2013, ADAMS Accession No. ML13179A079.	RII	Closed
(3)	CI	Confirm TVA submitted update to FSAR section 8.3.1.4.1. (NRC safety evaluation dated August 31, 2009, ADAMS Accession No. ML092151155) Closed in SSER 24, Section 8.1.	NRR	Closed
(4)	CI	Conduct appropriate inspection activities to verify that TVA's maximum SWBP criteria for signal level and coaxial cables do not exceed the cable manufacturer's maximum SWBP criteria. (NRC safety evaluation dated August 31, 2009, ADAMS Accession No. ML092151155) Closed in Inspection Report 0500391/2012602, dated March 27, 2012, ADAMS Accession No. ML12087A324.	RII	Closed
(5)	CI	Verify timely submittal of pre-startup core map and perform technical review. (TVA letter dated September 7, 2007, ADAMS Accession No. ML072570676). By letter dated July 30, 2012, TVA provided the pre-startup core map. The staff has verified the information and has closed Appendix HH Open Items 5 and 8, which came from the review of BL 1996-01.	NRR	Closed
(6)	CI	Verify implementation of TSTF-449. (TVA letter dated September 7, 2007, ADAMS Accession No. ML072570676). Staff has reviewed Revision I to the proposed technical specifications and found that TSTF 449 has been incorporated.	NRR	Closed
(7)	CI	Verify commitment completion and review electrical design calculations. (TVA letter dated October 9, 1990, ADAMS Accession No. ML073551056). Closed in Inspection Report 05000391/2013610, dated February 14, 2014, ADAMS Accession No. ML14049A158.	RII	Closed
(8)	CI	TVA should provide a pre-startup map to the NRC staff indicating the rodded fuel assemblies and a projected end of cycle burnup of each rodded assembly for the initial fuel cycle 6-months prior to fuel load. (NRC safety evaluation dated May 3, 2010, ADAMS Accession No. ML101200035). By letter dated July 30, 2012, TVA provided the pre-startup core map. The staff has verified the information and has closed Appendix HH Open	NRR	Closed

		Items 5 and 8, which came from the review of BL 1996-01.		
(9)	CI	Confirm that education and experience of management and principal supervisory positions down through the shift supervisory level conform to Regulatory Guide 1.8. (SSER 22, Section 13.1.3). Closed in Inspection Report 0500391/2014603, dated May 9, 2014, ADAMS Accession No. ML14129A381.	RII	Closed
(10)	CI	Confirm that TVA has an adequate number of licensed and non-licensed operators in the training pipeline to support the preoperational test program, fuel loading, and dual unit operation. (SSER 22, Section 13.1.3). Closed in Inspection Report 0500391/2014603, dated May 9, 2014, ADAMS Accession No. ML14129A381.	RII	Closed
(11)	CI	The plant administrative procedures should clearly state that, when the Assistant Shift Engineer assumes his duties as Fire Brigade Leader, his control room duties are temporarily assumed by the Shift Supervisor (Shift Engineer), or by another SRO, if one is available. The plant administrative procedures should clearly describe this transfer of control room duties. (SSER 22, Section 13.1.3) Closed in SSER 25, Section 13.1.3.	NRR	Closed
(12)		TVA's implementation of NGDC PP-20 and EDCR Appendix J is subject to future NRC audit and inspection. (SSER 22, Section 25.9). Closed in SSER 27, Section 25.9	NRR	Closed
(13)		TVA is expected to submit an IST program and specific relief requests for WBN Unit 2 nine months before the projected date of OL issuance. (SSER 22, Section 3.9.6). Closed in SSER 27, Section 3.9.6.	NRR	Closed
(14)		TVA stated that the Unit 2 PTLR is included in the Unit 2 System Description for the Reactor Coolant System (WBN2-68-4001), which will be revised to reflect required revisions to the PTLR by September 17, 2010. (SSER 22, Section 5.3.1) Closed in SSER 25, Section 5.3.1.	NRR	Closed
(15)		TVA should confirm to the NRC staff the completion of Primary Stress Corrosion Cracking (PWSCC) mitigation activities on the Alloy 600 dissimilar metal butt welds (DMBW) in the primary loop piping. (SSER 22, Section 3.6.3) Closed in SSER 24, Section 3.6.3.	NRR	Closed
(18)		Based on the extensive layup period of equipment within WBN Unit 2, the NRC staff must review, prior to fuel load, the assumptions used by TVA to re-establish a baseline for the qualified life of	RII/NRR	Closed

		equipment. The purpose of the staff's review is to ensure that TVA has addressed the effects of environmental conditions on equipment during the layup period. (SSER 22, Section 3.11.2.2) Closed in Inspection Report 0500391/2011604, dated June 29, 2011, ADAMS Accession No. ML111810890.		
(19)		The NRC staff should complete its review of TVA's EQ Program procedures for WBN Unit 2 prior to fuel load. (SSER 22, Section 3.11.2.2.1) Closed in Inspection Report 0500391/2011604, dated June 29, 2011, ADAMS Accession No. ML111810890.	RII/NRR	Closed
(20)	CI	Resolve whether or not routine maintenance activities should result in increasing the EQ of the 6.9 kV motors to Category I status in accordance with 10 CFR 50.49. (SSER 22, Section 3.11.2.2.1; SSER 24, Section 8.1) Closed in Inspection Report 0500391/2011605, dated August 5, 2011, ADAMS Accession No. ML112201418.	RII/NRR	Closed
(21)		The NRC staff should confirm that the Electrical Penetration Assemblies (EPAs) are installed in the tested configuration, and that the feedthrough module is manufactured by the same company and is consistent with the EQ test report for the EPA. (SSER 22, Section 3.11.2.2.1) Closed in Inspection Report 05000391/2011607, dated September 30, 2011, ADAMS Accession No. ML112730197.	RII/NRR	Closed
(22)		TVA must clarify its use of the term "equivalent" (e.g., identical, similar) regarding the replacement terminal blocks to the NRC staff. If the blocks are similar, then a similarity analysis should be completed and presented to the NRC for review. (SSER 22, Section 3.11.2.2.1) Closed in SSER 24, Section 8.1.	NRR	Closed
(23)		Resolve whether or not TVA's reasoning for not upgrading the MSIV solenoid valves to Category I is a sound reason to the contrary, as specified in 10 CFR 50.49(l). (SSER 22, Section 3.11.2.2.1; SSER 24, Section 8.1). Closed in SSER 27, Section 3.11.2.2.1.	NRR	Closed
(24)		The NRC staff requires supporting documentation from TVA to justify its establishment of a mild environment threshold for total integrated dose of less than $1 \times 10^3$ rads for electronic components such as semiconductors or electronic components containing organic material. (SSER 22, Section 3.11.2.2.1) Closed in SSER 24, Section 8.1.	NRR	Closed

(26)		For the scenario with an accident in one unit and concurrent shutdown of the second unit without offsite power, TVA stated that Unit 2 pre-operational testing will validate the diesel response to sequencing of loads on the Unit 2 emergency diesel generators (EDGs). The NRC staff will evaluate the status of this issue and will update the status of the EDG load response in a future SSER. (SSER 22, Section 8.1). Closed in SSER 27, Section 8.1.	NRR	Closed
(27)		TVA should provide a summary of margin studies based on scenarios described in Section 8.1 for CSSTs A, B, C, and D. (SSER 22, Section 8.2.2) Closed in SSER 24, Section 8.1.	NRR	Closed
(28)		TVA should provide to the NRC staff a detailed discussion showing that the load tap changer is able to maintain the 6.9 kV bus voltage control band given the normal and post-contingency transmission operating voltage band, bounding voltage drop on the grid, and plant conditions. (SSER 22, Section 8.2.2) Closed in SSER 24, Section 8.1.	NRR	Closed
(29)		TVA should provide information about the operating characteristics of the offsite power supply at the Watts Bar Hydro Plant (for dual-unit operation), including the operating voltage range, postcontingency voltage drops (including bounding values and post-unit trip values), and operating frequency range. (SSER 22, Section 8.2.2) (corrected version of Open Item 29 from SSER 22 Appendix HH) Closed in SSER 24, Section 8.1.	NRR	Closed
(31)		TVA should clarify the loading sequence as explained in its letter dated December 6, 2010, to the staff. TVA should clarify whether the existing statements in FSAR regarding automatic sequencing logic are correct. If the FSAR description is correct, TVA should explain how the EDG and logic sequencing circuitry will respond to a LOCA followed by a LOOP scenario. (SSER 22, Section 8.3.1.11) (corrected version of Open Item 31 from SSER 22 Appendix HH) Closed in SSER 24, Section 8.1	NRR	Closed
(32)		TVA should provide to the NRC staff the details of the administrative limits of EDG voltage and speed range, and the basis for its conclusion that the impact is negligible, and describe how it accounts for the administrative limits in the Technical Specification surveillance requirements for EDG voltage and frequency. (SSER 22, Section 8.3.1.14). Closed in SSER 27, Section 8.3.	NRR	Closed

(34)	CI	TVA stated that the method of compliance with Phase I guidelines would be substantially similar to the current Unit 1 program and that a new Section 3.12 will be added to the Unit 2 FSAR that will be materially equivalent to Section 3.12 of the current Unit 1 FSAR. (SSER 22, Section 9.1.4) Closed in SSER 24, Section 9.1.4.	NRR	Closed
(35)		TVA should provide information to the NRC staff that the CCS will produce feedwater purity in accordance with BTP MTEB 5-3 or, alternatively, provide justification for producing feedwater purity to another acceptable standard. (SSER 22, Section 10.4.6). Closed in SSER 27, Section 10.4.6.	NRR	Closed
(36)		TVA should provide information to the NRC staff to enable verification that the SGBS meets the requirements and guidance specified in the SER or provide justification that the SGBS meets other standards that demonstrate conformance to GDC 1 and GDC 14. (SSER 22, Section 10.4.8) Closed in SSER 24, Section 10.4.8.	NRR	Closed
(39)	CI	The NRC staff will confirm the adequacy of the communications capability to support dual unit operations prior to issuance of the Unit 2 OL. (SSER 22, Section 13.3.2.6) Closed in Inspection Report 0500391/2011609, dated December 16, 2011, ADAMS Accession No. ML11350A229.	RII/NSIR	Closed
(42)	CI	The NRC staff will confirm the adequacy of the accident assessment capabilities to support dual unit operations prior to issuance of the Unit 2 OL. (SSER 22, Section 13.3.2.9) Closed in Inspection Report 0500391/2011609, dated December 16, 2011, ADAMS Accession No. ML11350A229.	RII/NSIR	Closed
(44)		TVA should provide additional information to clarify how the initial and irradiated $RT_{NDT}$ was determined. (SSER 22, Section 5.3.1) Closed in SSER 25, Section 5.3.1.	NRR	Closed
(45)	CI	TVA stated in its response to RAI 5.3.2-2, dated July 31, 2010, that the PTLR would be revised to incorporate the COMS arming temperature. (SSER 22, Section 5.3.2) Closed in SSER 25, Section 5.3.2.	NRR	Closed
(46)	CI	The LTOP lift settings were not included in the PTLR, but were provided in TVA's response to RAI 5.3.2-2 in its letter dated July 31, 2010. TVA stated in its RAI response that the PTLR would be revised to incorporate the LTOP lift settings into the PTLR. (SSER 22, Section 5.3.2) Closed in SSER 25, Section 5.3.2.	NRR	Closed



(47)	CI	The NRC staff noted that TVA's changes to Section 6.2.6 in FSAR Amendment 97, regarding the implementation of Option B of Appendix J, were incomplete, because several statements remained regarding performing water-sealed valve leakage tests "as specified in 10 CFR [Part] 50, Appendix J." With the adoption of Option B, the specified testing requirements are no longer applicable; Option A to Appendix J retains these requirements. The NRC discussed this discrepancy with TVA in a telephone conference on September 28, 2010. TVA stated that it would remove the inaccurate reference to Appendix J for specific water testing requirements in a future FSAR amendment. (SSER 22, Section 6.2.6) Closed in SSER 26, Section 6.2.6.	NRR	Closed
(48)	CI	The NRC staff should verify that its conclusions in the review of FSAR Section 15.4.1 do not affect the conclusions of the staff regarding the acceptability of Section 6.5.3. (SSER 22, Section 6.5.3) Closed in SSER 26, Section 6.5.3.	NRR	Closed
(49)	CI	The NRC staff was unable to determine how TVA linked the training qualification requirements of ANSI N45.2-1971 to TVA Procedure TI-119. Therefore, the implementation of training and qualification for inspectors will be the subject of future NRC staff inspections. (NRC letter dated July 2, 2010, ADAMS Accession No. ML101720050). Closed in Inspection Report 0500391/2014602, dated March 27, 2014, ADAMS Accession No. ML14086A063.	RII	Closed
(50)	CI	TVA stated that about 5 percent of the anchor bolts for safety-related pipe supports do not have quality control documentation, because the pull tests have not yet been performed. Since the documentation is still under development, the NRC staff will conduct inspections to follow-up on the adequate implementation of this construction refurbishment program requirement. (NRC letter dated July 2, 2010, ADAMS Accession No. ML101720050) Closed in Inspection Report 0500391/2013612, dated March 28, 2013, ADAMS Accession No. ML13088A066.	RII	Closed
(51)	CI	The implementation of TVA Procedure TI-119 will be the subject of NRC follow-up inspection to determine if the construction refurbishment program requirements are being adequately implemented. (NRC letter dated July 2, 2010, ADAMS Accession No. ML101720050). Closed in Inspection Report 0500391/2014602, dated March 27, 2014, ADAMS Accession No. ML14086A063.	RII	Closed

(52) through (58)		Not used.		
(59)		The staff's evaluation of the compatibility of the ESF system materials with containment sprays and core cooling water in the event of a LOCA is incomplete pending resolution of GSI-191 for WBN Unit 2. (SSER 23, Section 6.1.1.4). Closed in SSER 27, Section 6.1.	NRR	Closed
(60)	CI	TVA should amend the FSAR description of the design and operation of the spent fuel pool cooling and cleanup system in FSAR Section 9.1.3 as proposed in its December 21, 2010, letter to the NRC. (SSER 23, Section 9.1.3) Closed in SSER 26, Section 9.1.3.	NRR	Closed
(61)		TVA should provide information to the NRC staff to demonstrate that PAD 4.0 can conservatively calculate the fuel temperature and other impacted variables, such as stored energy, given the lack of a fuel thermal conductivity degradation model. (SSER 23, Section 4.2.2). Closed in SSER 27, Section 4.2.	NRR	Closed
(62)	CI	Confirm TVA's change to FSAR Section 10.4.9 to reflect its intention to operate with each CST isolated from the other. (SSER 23, Section 10.4.9) Closed in SSER 24, Section 10.4.9.	NRR	Closed
(63)	CI	TVA should confirm to the NRC staff that testing prior to Unit 2 fuel load has demonstrated that two-way communications is impossible with the Eagle 21 communications interface. (SSER 23, Section 7.2.1.1). Closed in SSER 27, Section 7.2.	RII	Closed
(64)	CI	TVA stated that, "Post modification testing will be performed to verify that the design change corrects the Eagle 21, Rack 2 RTD accuracy issue prior to WBN Unit 2 fuel load." This issue is open pending NRC staff review of the testing results. (SSER 23, Section 7.2.1.1). Closed in Inspection Report 05000391/2014602, dated March 27, 2014, ADAMS Accession No. ML14086A063.	RII	Closed
(65)		TVA should provide justification to the staff regarding why different revisions of WCAP-13869 are referenced in WBN Unit 1 and Unit 2. (SSER 23, Section 7.2.1.1) Closed in SSER 26, Section 7.2.1.1.	NRR	Closed
(66)	CI	TVA should clarify FSAR Section 9.2.5 to add the capability of the UHS to bring the nonaccident unit to cold shutdown within 72 hours. (SSER 23, Section 9.2.5). Closed in SSER 27, Section 9.2.5.	NRR	Closed
(67)	CI	TVA should confirm, and the NRC staff should verify, that the component cooling booster pumps for Unit 2 are above PMF level. (SSER 23, Section	NRR	Closed

		9.2.2). Closed in SSER 27, Section 9.2.2.		
(68)		Not used.		
(70)		TVA should provide the revised WBN Unit 2 PSI program ASME Class 1, 2, and 3 Supports "Summary Tables," to include numbers of components so that the NRC staff can verify that the numbers meet the reference ASME Code. (Section 3.2.3 of Appendix Z of SSER 23). Closed in SSER 27, Section 3.2.3 of Appendix Z.	NRR	Closed
(71)		By letter dated April 21, 2011 (ADAMS Accession No. ML111110513), TVA withdrew its commitment to replace the Unit 2 clevis insert bolts. TVA should provide further justification for the decision to not replace the bolts to the NRC staff. (SSER 23, Section 3.9.5) Closed in SSER 26, Section 3.9.5.	NRR	Closed
(72)		The NRC staff should complete its review and evaluation of the additional information provided by TVA regarding the ICC instrumentation. (SSER 23, Section 4.4.8) Closed in SSER 25, Section 7.5.2.2.	NRR	Closed
(73)	CI	The NRC staff will inspect to confirm that TVA has completed the WBN Unit 2 EOPs prior to fuel load. (SSER 23, Section 7.5.3). Closed in Inspection Report 05000391/2014604, dated June 25, 2014, ADAMS Accession No. ML14177A214.	RII	Closed
(76)	CI	The NRC staff will verify that the derivative time constant is set to zero in WBN Unit 2 before fuel load. (SSER 23, Section 7.8.3) Closed in Inspection Report 05000391/2011607, dated September 30, 2011, ADAMS Accession No. ML112730197.	RII	Closed
(77)		It is unclear to the NRC staff which software V&V documents are applicable to the HRCAR monitors. TVA should clarify which software V&V documents are applicable, in order for the staff to complete its evaluation. (SSER 23, Section 7.5.2.3) Closed in SSER 26, Section 7.5.2.3.4	NRR	Closed
(78)		TVA intends to issue a revised calculation reflecting that the TID in the control room is less than $1 \times 10^3$ rads, which will be evaluated by the NRC staff. (SSER 23, Section 7.5.2.3) Closed in SSER 25, Section 7.5.2.3.	NRR	Closed
(80)		TVA should provide clarification to the staff on how TVA Standard Specification SS-E18-14.1 meets the guidance of RG 1.180, and should address any deviations from the guidance of the RG. (SSER 23, Section 7.5.2.3). Closed in SSER 27, Section 7.5.2.3.	NRR	Closed

(81)		The extent to which TVA's supplier, General Atomics (GA), complies with EPRI TR-106439 and the methods that GA used for its commercial dedication process should be provided by TVA to the NRC staff for review. (SSER 23, Section 7.5.2.3) Closed in SSER 26, Section 7.5.2.3.4.	NRR	Closed
(82)		The staff concluded that the information provided by TVA pertaining to the in-containment LPMS equipment qualification for vibration was incomplete. TVA should provide (item number 362 of ADAMS Accession No. ML111050009), documentation that demonstrates the LPMS in-containment equipment has been qualified to remain functional in its normal operating vibration environment, per RG 1.133, Revision 1. (SSER 23, Section 7.6.1) Closed in SSER 24, Section 7.6.1.4.5.	NRR	Closed
(84) through (89)		Not used.		
(91)		TVA should update the FSAR with information describing how WBN Unit 2 meets GDC 5, assuming the worst case single failure and a LOOP, as provided in TVA's letter dated April 13, 2011. (SSER 23, Section 9.2.1). Closed in SSER 27, Section 9.2.1.	NRR	Closed
(92)		Not used.		
(93)		TVA should confirm to the staff that testing of the Eagle 21 system has sufficiently demonstrated that two-way communication to the ICS is precluded with the described configurations. (SSER 23, Section 7.9.3.2). Closed in SSER 27, Section 7.9.	RII	Closed
(94)		TVA should provide to the staff either information that demonstrates that the WBN Unit 2 Common Q PAMS meets the applicable requirements in IEEE Std. 603-1991, or justification for why the Common Q PAMS should not meet those requirements. (SSER 23, Section 7.5.2.2.3) Closed in SSER 26, Section 7.5.2.2.	NRR	Closed
(95)		TVA should update FSAR Table 7.1-1, "Watts Bar Nuclear Plant NRC Regulatory Guide Conformance," to reference IEEE Std. 603-1991 for the WBN Unit 2 Common Q PAMS. (SSER 23, Section 7.5.2.2.3) Closed in SSER 25, Section 7.5.2.2.	NRR	Closed
(96)		TVA should (1) update FSAR Table 7.1-1 to include RG 1.100, Revision 3, for the Common Q PAMS, or (2) demonstrate that the Common Q PAMS is in conformance with RG 1.100, Revision 1, or provide justification for not conforming. (SSER 23, Section 7.5.2.2.3) Closed in SSER 25, Section 7.5.2.2.	NRR	Closed

(97)		TVA should demonstrate that the WBN Unit 2 Common Q PAMS is in conformance with RG 1.153, Revision 1, or provide justification for not conforming. (SSER 23, Section 7.5.2.2.3) Closed in SSER 25, Section 7.5.2.2.	NRR	Closed
(98)		TVA should demonstrate that the WBN Unit 2 Common Q PAMS is in conformance with RG 1.152, Revision 2, or provide justification for not conforming. (SSER 23, Section 7.5.2.2.3) Closed in SSER 26, Section 7.5.2.2.3.	NRR	Closed
(99)		TVA should update FSAR Table 7.1-1 to reference IEEE 7-4.3.2-2003 as being applicable to the WBN Unit 2 Common Q PAMS. (SSER 23, Section 7.5.2.2.3; SSER 25, Section 7.5.2.2) Closed in SSER 25, Section 7.5.2.2.	NRR	Closed
(100)		TVA should update FSAR Table 7.1-1 to reference RG 1.168, Revision 1; IEEE 1012-1998; and IEEE 1028-1997 as being applicable to the WBN Unit 2 Common Q PAMS. (SSER 23, Section 7.5.2.2.3) Closed in SSER 25, Section 7.5.2.2.	NRR	Closed
(101)		TVA should demonstrate that the WBN Unit 2 Common Q PAMS application software is in conformance with RG 1.168, Revision 1, or provide justification for not conforming. (SSER 23, Section 7.5.2.2.3) Closed in SSER 26, Section 7.5.2.2.	NRR	Closed
(102)		TVA should update FSAR Table 7.1-1 to reference RG 1.209 and IEEE Std. 323-2003 as being applicable to the WBN Unit 2 Common Q PAMS. (SSER 23, Section 7.5.2.2.3) Closed in SSER 25, Section 7.5.2.2.	NRR	Closed
(103)		TVA should demonstrate that the WBN Unit 2 Common Q PAMS conforms to RG 1.209 and IEEE Std. 323-2003, or provide justification for not conforming. (SSER 23, Section 7.5.2.2.3) Closed in SSER 25, Section 7.5.2.2.	NRR	Closed
(104)	CI	The NRC staff will review the WEC self assessment to verify that it the WBN Unit 2 PAMS is compliant to the V&V requirements in the SPM or that deviations from the requirements are adequately justified. (SSER 23, Section 7.5.2.2.3.4.2) Closed in SSER 25, Section 7.5.2.2.	NRR	Closed
(105)		TVA should produce an acceptable description of how the WBN Unit 2 Common Q PAMS SysRS and SRS implement the design basis requirements of IEEE Std. 603-1991 Clause 4. (SSER 23, Section 7.5.2.2.3.4.3.1) Closed in SSER 26, Section 7.5.2.2.	NRR	Closed
(106)		TVA should produce a final WBN Unit 2 Common Q PAMS SRS that is independently reviewed. (SSER 23, Section 7.5.2.2.3.4.3.1) Closed in	NRR	Closed

		SSER 25, Section 7.5.2.2.		
(107)	CI	TVA should provide to the NRC staff documentation to confirm that the final WBN Unit 2 Common Q PAMS SDDs that are independently reviewed. (SSER 23, Section 7.5.2.2.3.4.3.2) Closed in SSER 25, Section 7.5.2.2.	NRR	Closed
(108)		TVA should demonstrate to the NRC staff that there are no synergistic effects between temperature and humidity for the Common Q PAMS equipment. (SSER 23, Section 7.5.2.2.3.5.2) Closed in SSER 26, Section 7.5.2.2.	NRR	Closed
(109)		TVA should demonstrate to the NRC staff acceptable data storm testing of the Common Q PAMS. (SSER 23, Section 7.5.2.2.3.7.1.8) Closed in SSER 25, Section 7.5.2.2.	NRR	Closed
(110)		TVA should provide information to the NRC staff describing how the WBN Unit 2 Common Q PAMS design supports periodic testing of the RVLIS function. (SSER 23, Section 7.5.2.2.3.9.2.6) Closed in SSER 26, Section 7.5.2.2.	NRR	Closed
(111)		TVA should confirm to the staff that there are no changes required to the technical specifications as a result of the modification installing the Common Q PAMS. If any changes to the technical specifications are required, TVA should provide the changes to the NRC staff for review. (SSER 23, Section 7.5.2.2.3.11) Closed in SSER 26, Section 7.5.2.2.	NRR	Closed
(112)	CI	TVA should provide an update to the FSAR reflecting the radiation protection design features descriptive information provided in its letter dated October 4, 2010. (SSER 24, Section 12.4) Closed in SSER 26, Section 12.4.	NRR	Closed
(113)	CI	TVA should provide an update to the FSAR reflecting the justification for the periodicity of the COT frequency for WBN non-safety related area radiation monitors. (SSER 24, Section 12.4) Closed in SSER 26, Section 12.4.	NRR	Closed
(114)	CI	TVA should update the FSAR to reflect that WBN meets the radiation monitoring requirements of 10 CFR 50.68. (SSER 24, Section 12.4) Closed in SSER 26, Section 12.4.	NRR	Closed
(115)	CI	TVA should update the FSAR to reflect the information regarding design changes to be implemented to lower radiation levels as provided in its letter the NRC dated June 3, 2010. (SSER 24, Section 12.5). Closed in SSER 27, Section 12.5	NRR	Closed

(116)	CI	TVA should update the FSAR to reflect the qualification standards of the RPM as provided in its letter to the NRC dated October 4, 2010. (SSER 24, Section 12.6) Closed in SSER 26, Section 12.6.	NRR	Closed
(117)	CI	TVA should update the FSAR to reflect the calculational basis for access to vital areas as provided in its letter dated February 25, 2011. (SSER 24, Section 12.7.1). Closed in SSER 27, Section 12.7.1	NRR	Closed
(118)		TVA should provide to the NRC staff a description of how the other vanadium detectors within the IITA would be operable following the failure of an SPND. (SSER 24, Section 7.7.1.9.2) Closed in SSER 26, Section 7.7.1.9.	NRR	Closed
(119)		TVA should submit WNA-CN-00157-WBT, Revision 0, to the NRC by letter. The NRC staff should confirm by review of WNA-CN-00157-WBT, Revision 0, that no credible source of faulting can negatively impact the CETs or PAMS train. (SSER 24, Section 7.7.1.9.5) Closed in SSER 25, Section 7.7.1.9.	NRR	Closed
(120)		TVA must confirm to the NRC staff that the maximum over-voltage or surge voltage that could affect the system is 264 VAC, assuming that the power supply cable to the SPS cabinet is not routed with other cables greater than 264 VAC. (SSER 24, Section 7.7.1.9.5; SSER 25, Section 7.7.1.9) Closed in SSER 26, Section 7.7.1.9.	NRR	Closed
(121)		TVA should submit the results to the NRC staff of a 600 VDC dielectric strength test performed on the IITA assembly. (SSER 24, Section 7.7.1.9.5) Closed in SSER 26, Section 7.7.1.9.	NRR	Closed
(122)		TVA should confirm to the NRC staff that different divisions of safety power are supplied to the IIS SPS cabinets, with the power cables routed in separate shielded conduits. (SSER 24, Section 7.7.1.9.5) Closed in SSER 25, Section 7.7.1.9.	NRR	Closed
(123)		TVA should provide an explanation to the NRC staff of how the system will assign a data quality value to notify the power distribution calculation software to disregard data from a failed SPND. (SSER 24, Section 7.7.1.9.5) Closed in SSER 26, Section 7.7.1.9.	NRR	Closed
(124)		While the BEACON datalink on the Application server can connect to either BEACON machine, only BEACON A is used for communication. TVA should clarify to the NRC staff whether automatic switchover to the other server is not permitted. (SSER 24, Section 7.7.1.9.5) Closed in SSER 25,	NRR	Closed

		Section 7.7.1.9.		
(125)		TVA should provide clarification to the NRC staff of the type of connector used with the MI cable in Unit 2, and which EQ test is applicable. (SSER 24, Section 7.7.1.9.5) Closed in SSER 26, Section 7.7.1.9.	NRR	Closed
(126)		To enable the NRC staff to evaluate and review the IITA environmental qualification, TVA should provide the summary report of the environmental qualification for the IITA. (SSER 24, Section 7.7.1.9.5) Closed in SSER 26, Section 7.7.1.9.	NRR	Closed
(127)		TVA should provide a summary to the NRC staff of the electro-magnetic interference/radio-frequency interference (EMI/RFI) testing for the MI cable electro-magnetic compatibility (EMC) qualification test results. (SSER 24, Section 7.7.1.9.5) Closed in SSER 26, Section 7.7.1.9.	NRR	Closed
(128)		TVA should submit the seismic qualification test report procedures and results for the SPS cabinets to the NRC staff for review. (SSER 24, Section 7.7.1.9.5) Closed in SSER 25, Section 7.7.1.9.	NRR	Closed
(129)		TVA should verify to the NRC staff resolution of the open item in WNA-CN-00157-WBT for the Quint power supply (to be installed in the SPS cabinet) to undergo EMC testing of 4 kV to validate the assumptions made in the Westinghouse analysis. (SSER 24, Section 7.7.1.9.5) Closed in SSER 26, Section 7.7.1.9.	NRR	Closed
(130)		TVA should provide a summary to the NRC staff of the EMC qualification test results of the SPS cabinets. (SSER 24, Section 7.7.1.9.5) Closed in SSER 25, Section 7.7.1.9.	NRR	Closed
(131)		TVA should review the EOP action level setpoint to account for the difference between core exit temperature readings for Unit 1 and Unit 2 and confirm the EOP action level setpoint to the NRC staff. (SSER 24, Section 7.7.1.9.5). Closed in SSER 27, Section 7.7.	NRR	Closed
(132)		TVA must provide the NRC staff with analyses of the boron dilution event that meet the criteria of SRP Section 15.4.6, including a description of the methods and procedures used by the operators to identify the dilution path(s) and terminate the dilution, in order for the staff to determine that the analyses comply with GDC 10. (SSER 24, Section 15.2.4.4) Closed in SSER 26, Section 15.2.4.4.	NRR	Closed



(133)		In order to confirm the stability analysis of the sand baskets used by TVA in the WBN Unit 2 licensing basis, TVA will perform either a hydrology analysis without crediting the use of the sand baskets at the Fort Loudoun Dam for the seismic dam failure and flood combination, or TVA will perform a seismic test of the sand baskets, as stated in TVA's letter dated April 20, 2011. TVA will report the results of this analysis or test to the NRC by October 31, 2011. (SSER 24, Section 2.4.10). Closed in SSER 27, Section 2.4.10.	NRR	Closed
(135)		TVA has not provided the analysis required by 10 CFR Part 50, Appendix I, subsection II.D. TVA must demonstrate with a cost-benefit analysis that a sufficient reduction in the collective dose to the public within a 50-mile radius would not be achieved by reasonable changes to the design of the WBN gaseous effluent processing systems. (SSER 24, Section 11.3) Closed in SSER 25, Section 11.3.	NRR	Closed
(136)	CI	The JFD summary for the data from 1991 through 2010 provided by letter dated November 7, 2011, and a discussion of the long-term representativeness of these data should be provided in the WBN Unit 2 FSAR. Upon receipt of the updated FSAR, the NRC staff will confirm that these updates have been made by TVA. (SSER 25, Section 2.3.3) Closed in SSER 26, Section 2.3.3.	NRR	Closed
(137)	CI	The NRC staff will confirm, upon receipt, that TVA integrated the updated CR $\chi/Q$ values from its letter dated September 15, 2011, into a future amendment of the FSAR. (SSER 25, Section 2.3.4) Closed in SSER 26, Section 2.3.4.	NRR	Closed
(138)	CI	Upon receipt of the updated ODCM, the NRC staff will confirm that corresponding revisions related to the updated annual average $\chi/Q$ and D/Q values have been made to the ODCM. (SSER 25, Section 2.3.5) Closed in SSER 26, Section 2.3.5.	NRR	Closed
(139)	CI	The results of the cost-benefit analysis required by 10 CFR Part 50, Appendix I, subsection II.D, should be provided in the WBN Unit 2 FSAR. Upon receipt of the updated FSAR, the NRC staff will confirm that the update has been made by TVA. (SSER 25, Section 11.3). Closed in SSER 27, Section 11.3	NRR	Closed

CI – Confirmatory Issue







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(See instructions on the reverse)

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10. SUPPLEMENTARY NOTES

Docket No. 50-391

11. ABSTRACT (200 words or less)

This report supplements the safety evaluation report (SER), NUREG-0847 (June 1982), with respect to the application filed by the Tennessee Valley Authority (TVA), as applicant and owner, for a license to operate Watts Bar Nuclear Plant (WBN) Unit 2 (Docket No 50-391).

In its SER and Supplemental SER (SSER) Nos. 1 through 20 issued by the U.S. Nuclear Regulatory Commission (NRC), the NRC staff documented its safety evaluation and determination that WBN Unit 1 met all applicable regulations and regulatory guidance. Based on satisfactory findings from all applicable inspections, on February 7, 1996, the NRC issued a full-power operating license (OL) to WBN Unit 1, authorizing operation up to 100-percent power.

In SSER 21, the NRC staff addressed TVA's application for a license to operate WBN Unit 2, and provided information regarding the status of the items remaining to be resolved, which were outstanding at the time that TVA deferred construction of WBN Unit 2, and were not evaluated and resolved as part of the licensing of WBN Unit 1. SSERs 22 to 26 documented the NRC staff's ongoing evaluation and closure of open items in support of TVA's application for a license to operate WBN Unit 2. In this and future SSERs, the NRC staff continues its documentation of its review of open items in support of TVA's application for an operating license for WBN Unit 2.

12. KEY WORDS/DESCRIPTORS (List words or phrases that will assist researchers in locating the report.)

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**NUREG-0847  
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**Safety Evaluation Report Related to the Operation of  
Watts Bar Nuclear Plant, Unit 2**

**January 2015**