



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION II  
245 PEACHTREE CENTER AVENUE NE, SUITE 1200  
ATLANTA, GEORGIA 30303-1257

May 13, 2011

Mr. R. M. Krich  
Vice President, Nuclear Licensing  
Tennessee Valley Authority  
3R Lookout Place  
1101 Market Street  
Chattanooga, TN 37402-2801

**SUBJECT: WATTS BAR NUCLEAR PLANT – NRC TEMPORARY INSTRUCTION 2515/183  
INSPECTION REPORT 05000390/2011009**

Dear Mr. Krich:

On April 29, 2011, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Watts Bar Nuclear Plant, Units 1 and 2, using Temporary Instruction 2515/183, "Follow-up to the Fukushima Daiichi Nuclear Station Fuel Damage Event." The enclosed inspection report documents the inspection results which were discussed on May 13, 2011, with Mr. Don Grissette and other members of your staff.

The objective of this inspection was to promptly assess the capabilities of the Watts Bar Nuclear Plant to respond to extraordinary consequences similar to those that have recently occurred at the Japanese Fukushima Daiichi Nuclear Station. The results from this inspection, along with the results from this inspection performed at other operating commercial nuclear plants in the United States will be used to evaluate the U.S. nuclear industry's readiness to safely respond to similar events. These results will also help the NRC to determine if additional regulatory actions are warranted.

All of the potential issues and observations identified by this inspection are contained in this report. The NRC's Reactor Oversight Process will further evaluate any issues to determine if they are regulatory findings or violations. Any resulting findings or violations will be documented by the NRC in a separate report. You are not required to respond to this letter.

TVA

2

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be made available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

***/RA/***

Eugene F. Guthrie, Chief  
Reactor Projects Branch 6  
Division of Reactor Projects

Docket Nos.: 50-390  
License Nos.: NPF-90

Enclosure: Inspection Report 05000390/2011009,  
w/Attachment: Supplemental Information

cc w/encl: (See page 3)

TVA

2

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be made available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

**/RA/**

Eugene F. Guthrie, Chief  
Reactor Projects Branch 6  
Division of Reactor Projects

Docket Nos.: 50-390  
License Nos.: NPF-90

Enclosure: Inspection Report 05000390/2011009,  
w/Attachment: Supplemental Information

cc w/encl: (See page 3)

X PUBLICLY AVAILABLE       NON-PUBLICLY AVAILABLE       SENSITIVE      X NON-SENSITIVE  
ADAMS:  Yes      ACCESSION NUMBER: ML111330435       SUNSI REVIEW COMPLETE  FORM 665 ATTACHED

OFFICE	RII:DRP	RII:DRP	RII:DRP	RII:DRP			
SIGNATURE	Via email	Via email	JDH /RA/	EFG /RA/			
NAME	BMonk	KMiller	JHamman	EGuthrie			
DATE	05/13/2011	05/13/2011	05/13/2011	05/13/2011			
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO

OFFICIAL RECORD COPY      DOCUMENT NAME: G:\DRPI\RPB6\WATTS BAR\REPORTS\2011\WBN TI-183 REPORT REV1.DOCX

TVA

3

cc w/encl:  
D. E. Grissette  
Site Vice President  
Watts Bar Nuclear Plant  
Tennessee Valley Authority  
Electronic Mail Distribution

G. A. Boerschig  
Plant Manager  
Watts Bar Nuclear Plant, MOB 2R-WBN  
Tennessee Valley Authority  
Electronic Mail Distribution

C. J. Riedl  
Acting Manager, Licensing  
Watts Bar Nuclear Plant, ADM 1L-WBN  
Tennessee Valley Authority  
P.O. Box 2000  
Spring City, TN 37381

J. W. Shea  
Manager, Corp. Nuclear Licensing - WBN  
Tennessee Valley Authority  
Electronic Mail Distribution

E. J. Vigluicci  
Assistant General Counsel  
Tennessee Valley Authority  
Electronic Mail Distribution

W. D. Crouch  
Licensing Manager, Unit 2  
Watts Bar Nuclear Plant, EQB 1B-WBN  
Tennessee Valley Authority  
P.O. Box 2000  
Spring City, TN 37381

County Mayor  
P.O. Box 156  
Decatur, TN 37322

County Executive  
375 Church Street  
Suite 215  
Dayton, TN 37321

Tennessee Department of Environment &  
Conservation  
Division of Radiological Health  
401 Church Street  
Nashville, TN 37243

Ann Harris  
341 Swing Loop  
Rockwood, TN 37854

TVA

4

Letter to R. M. Krich from Eugene Guthrie dated May 13, 2011

SUBJECT: WATTS BAR NUCLEAR PLANT – NRC TEMPORARY INSTRUCTION 2515/183  
INSPECTION REPORT 05000390/2011009

Distribution w/encl:

C. Evans, RII

L. Douglas, RII

OE Mail

RIDSNRRDIRS

PUBLIC

RidsNrrPMWattsBar1 Resource

RidsNrrPMWattsBar2 Resource

**U. S. NUCLEAR REGULATORY COMMISSION**

**REGION II**

Docket Nos.: 50-390

License Nos.: NPF-90

Report Nos.: 05000390/2011009

Licensee: Tennessee Valley Authority (TVA)

Facility: Watts Bar Nuclear Plant, Unit 1

Location: 1260 Nuclear Plant Road  
Spring City, TN 37381

Dates: March 23 – April, 27, 2011

Inspector: B. Monk, Senior Resident Inspector

Approved by: Eugene F. Guthrie, Chief  
Reactor Projects Branch 6  
Division of Reactor Projects

Enclosure

## **SUMMARY OF FINDINGS**

IR 05000390/2011009 03/23/2011 – 04/29/2011; Watts Bar Nuclear Plant, Unit 1; Temporary Instruction 2515/183 – Follow-up to the Fukushima Daiichi Nuclear Station Fuel Damage Event.

This report covers an announced Temporary Instruction inspection. The inspection was conducted by Resident and Region II inspectors. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006."

### **INSPECTION SCOPE**

The intent of the TI is to provide a broad overview of the industry's preparedness for events that may exceed the current design basis for a plant. The focus of the TI was on (1) assessing the licensee's capability to mitigate consequences from large fires or explosions on site, (2) assessing the licensee's capability to mitigate station blackout (SBO) conditions, (3) assessing the licensee's capability to mitigate internal and external flooding events accounted for by the station's design, and (4) assessing the thoroughness of the licensee's walk downs and inspections of important equipment needed to mitigate fire and flood events to identify the potential that the equipment's function could be lost during seismic events possible for the site. If necessary, a more specific follow-up inspection will be performed at a later date.

### **INSPECTION RESULTS**

All of the potential issues and observations identified by this inspection are contained in this report. The NRC's Reactor Oversight Process will further evaluate any issues to determine if they are regulatory findings or violations. Any resulting findings or violations will be documented by the NRC in a separate report.

Enclosure

03.01 Assess the licensee's capability to mitigate conditions that result from beyond design basis events, typically bounded by security threats, committed to as part of NRC Security Order Section B.5.b issued February 25, 2002, and severe accident management guidelines and as required by Title 10 of the Code of Federal Regulations (10 CFR) 50.54(hh). Use Inspection Procedure (IP) 71111.05T, "Fire Protection (Triennial)," Section 02.03 and 03.03 as a guideline. If IP 71111.05T was recently performed at the facility the inspector should review the inspection results and findings to identify any other potential areas of inspection. Particular emphasis should be placed on strategies related to the spent fuel pool. The inspection should include, but not be limited to, an assessment of any licensee actions to:

Licensee Action	Describe what the licensee did to test or inspect equipment.
<p>a. Verify through test or inspection that equipment is available and functional. Active equipment shall be tested and passive equipment shall be walked down and inspected. It is not expected that permanently installed equipment that is tested under an existing regulatory testing program be retested.</p> <p>This review should be done for a reasonable sample of mitigating strategies/equipment.</p>	<p>The licensee determined by walkdown the portable B.5.b equipment was available at the procedure specified location. For each piece of equipment, they determined that it was functional. Some of the equipment (e.g. portable diesels) have a PM program, so the licensee verified the PM was within periodicity. Any PM items, regardless of PM frequency, were performed if it had been greater than 90 days since last performance. Similar methods were used to verify supporting equipment for SAMG's.</p>
	<p>Describe inspector actions taken to confirm equipment readiness (e.g., observed a test, reviewed test results, discussed actions, reviewed records, etc.).</p>
	<p>The inspectors verified by sample walkdowns of the portable equipment and reviewed the most recent PM records. There were no findings of significance. See attached for list of reviewed documents.</p>
	<p>Discuss general results including corrective actions by licensee.</p>
	<p>The licensee grouped results into gaps, that is differences in what was required and what was found. Other items are identified as enhancements. All are captured in the Corrective Action Program (CAP).</p>
	<p>For this recommendation, the following two gaps were identified:</p> <ol style="list-style-type: none"> <li>1. SAG-5, "Reduce Fission Product Releases," requires the ABGTS Pre-filter and HEPA filter be replaced if a change in differential pressure indicated that they were fouled. These filters were not staged in a plant location or readily available (PER 343587).</li> <li>2. The H2 Recombiners were not currently being maintained functional to support their use under Severe Accident Management Guidelines SAG-7 and SCG-3 (PER 352687).</li> </ol>



Licensee Action	Describe the licensee's actions to verify that procedures are in place and can be executed (e.g. walkdowns, demonstrations, tests, etc.)
<p>b. Verify through walkdowns or demonstration that procedures to implement the strategies associated with B.5.b and 10 CFR 50.54(hh) are in place and are executable. Licensees may choose not to connect or operate permanently installed equipment during this verification.</p> <p>This review should be done for a reasonable sample of mitigating strategies/equipment.</p>	<p>The licensee reviewed all procedures that implement SAMG, Loss of Large Areas (LOLA) and B.5.b strategies, along with procedures that implement Mitigating Actions. Station personnel conducted walk downs and demonstrations to confirm each procedure's ability to execute the task.</p> <p>"Beyond Design Basis Event Procedures," lists the procedures that implement SAMG, B.5.b, and Mitigating Actions. See attached for a list of these procedures.</p>
	<p>Describe inspector actions and the sample strategies reviewed. Assess whether procedures were in place and could be used as intended.</p>
	<p>Inspectors performed a detailed review of MA-1, Recovery from Loss of Shutdown Power and Loss of ERCW. Two minor discrepancies were noted. One was an error in a diagram which showed the 1A Motor Driven AFW pump as a powered load, however in the procedure it was designated as the 1A Component Cooling System pump. The other error was related to the expected nominal amp readings on the portable diesel which were non-conservative (math error converting 2Kw at 480v to 2Kw at 6.9Kv).</p> <p>Inspectors observed the licensee execute Table A.4-2 Strategy, Manually Depressurize Steam Generators to Reduce RCS Inventory Loss. This strategy used nitrogen bottles, regulators and various valves per SOI-1.01, Main Steam System, to modulate Steam Generator PORV's from outside the control room.</p> <p>Inspectors walked through EPSIL1, Serious Event Mitigation, Appendix I - Restoration of Spent Fuel Pool Function Decision Flow Chart for SFP Makeup vs. Spray, Tabs 16 and 42. Inspectors reviewed Table a.4-1 Strategy, EPSIL1, Serious Event Mitigation, Appendix J, Restoration of Containment Function, SEVERE ACCIDENT MANAGEMENT GUIDELINE CA-6, RWST Gravity Drain and SAG-4, Inject into Containment for clarity and accomplish ability.</p>

	<p>The sampling of strategies reviewed revealed no findings. However, the 2 megawatt portable diesel, though load tested on a load bank, had never actually been connected to the installed electrical system and subjected to the starting of a second large motor with one large motor already running (these motors were a charging pump and a component cooling water pump).</p>
	<p>Discuss general results including corrective actions by licensee.</p>
	<p>For this recommendation, no gaps were identified, with the following enhancements identified. The proximity of the Main Control Room and Auxiliary Control Room from a radiation exposure perspective may need some calculational follow-up.</p> <ol style="list-style-type: none"> <li>1. Portable Shielding for Auxiliary Building Habitability; no PM to periodically verify (PER 349081).</li> <li>2. Develop a PM requirement to inventory replacement ABGTS Pre-filters and HEPA filters (PER 349083).</li> <li>3. Better establish ownership of MA-1 Diesel Generator (B.5.b); ownership of PMs, including periodic starts, is not clear; follow establishment of ownership with a Training Needs Analysis for the responsible positions (PER 340327).</li> <li>4. During the recent nuclear event in Japan, the main control room of at least one unit was evacuated. WBN was tasked to determine how the MCR at WBN would be evacuated due to high radiation and if Aux Control Room not was available due to high Radiation how would command and control be maintained (PER 340406).</li> <li>5. Seven enhancements regarding training (PERs 342940, 342219, 342222, 342322, 341535, 341542, and SR35421)</li> </ol>

Licensee Action	Describe the licensee's actions and conclusions regarding training and qualifications of operators and support staff.
<p>c. Verify the training and qualifications of operators and the support staff needed to implement the procedures and work instructions are current for activities related to Security Order Section B.5.b and severe accident management guidelines as required by 10 CFR 50.54 (hh).</p>	<p>1. <u>Operators</u>  <i>Licensed Operators</i> - B.5.b and station blackout related tasks were incorporated into the licensed operator training program and these tasks were retrained periodically. Completion of Licensed Operator Requalification training requirements was tracked in ATIS (electronic qualification matrix) and operators must be current to stand watch. Licensed Operators receive periodic SAMG training (implementer and/or decision maker, at least once per 4 years), and this was tracked by the qualification matrix. Licensed operators SAMG training status was tracked in the qualification matrix that was checked prior to standing watch. The results of the review indicate that licensed operators receive adequate training, and all licensed operators that stand watch were qualified in B.5.b, SAMG and station blackout.</p> <p><i>Non-Licensed Operators</i> - B.5.b and station blackout related tasks were incorporated into the non-licensed operator training program and these tasks were retrained periodically. Completion of Non-licensed Operator Requalification training requirements was tracked in ATIS (electronic qualification matrix) and operators must be current to stand watch. Non-licensed operators do not receive training on SAMGs and do not need training in this area as they perform previously identified auxiliary unit operator tasks during SAMG implementation. The assessment indicates that non-licensed operators receive adequate training on station blackout and B.5.b events and that all AUOs currently qualified to stand watch were qualified in these areas.</p> <p>2. <u>Maintenance</u>  Maintenance tasks and training were reviewed to determine readiness to perform activities related to B.5.b, SAMGs, and station blackout. The review determined maintenance training was adequate to address all of the electrical maintenance tasks contained in SAMGs, station blackout, and B.5.b related procedures and that no unique</p>

	<p>tasks exist in those procedures for electricians. It is therefore concluded that all maintenance workers are currently qualified to perform tasks supporting B.5.b actions, SAMGs, and station blackout.</p> <p>3. <u>Chemistry and Radiation Protection</u></p> <p>Chemistry - A review of procedures related to B.5.b, SAMGs, and station blackout determined that there were no unique tasks identified in these procedures for Chemistry. The conclusion was that normal training and qualification addresses qualification requirements for these procedures.</p> <p>Radiation Protection(RP) - A review of procedures related to B.5.b, SAMGs, and station blackout indicate there were no new or unique RP tasks contained in these procedures. Normal training and qualification address all identified tasks. The conclusion was that the training and qualification process was adequate to support implementation of B.5.b, SAMG, and blackout procedures.</p> <p>4. <u>Emergency Response Team Personnel</u></p> <p>A review of training qualifications for personnel assigned to the Emergency Response Teams identified no gaps/deficiencies, but did identify enhancements, which were entered into the Corrective Action Program</p> <p>Describe inspector actions and the sample strategies reviewed to assess training and qualifications of operators and support staff</p> <p>Inspectors reviewed the training attendance records of four Shift Operations Crews (SRO's and RO's) and five groups of Non-Licensed Operators for the most recent biennial training cycle, along with the lesson plans. See attached.</p>
--	--

	<p>Discuss general results including corrective actions by licensee.</p> <p>For this recommendation, no gaps were identified, with the following enhancements identified. The training was regular, but was obviously not the focus of requalification training. Additional training hours may need to be devoted to these types of events. However, the total network of procedures that umbrella B.5.b, SAMG and LOLA events rivals and may be larger than the emergency procedure network.</p> <p>Enhancement Recommendation: Appendix D of AOI-42.01, "Security Events," contains operator actions associated with emergency access to and emergency operation of the Turbine Driven Aux Feed Water Pumps. Even though the operator actions contained in this appendix were trained on in licensed operator and non-licensed operator continuing training sessions, the actions in the appendix have not been analyzed per NPG-SPP-17.2 "Analysis," and training designed and developed as appropriate per NPG-SPP-17.3 and NPG-SPP-17.4 (PER 342940).</p> <p>Enhancement Recommendation: During review of the SAMG Training program following the Japanese tsunami/earthquake, it was discovered that several of the WBN Site Emergency Directors were not qualified SAMG Decision Maker. This qualification was implied by TRN-34, Severe Accident Management Training, and NPG-SPP-18.3.1, Severe Accident Management (SAMG) Program Administration, but not specifically required. Sufficient Decision Makers were qualified to man the Technical Support Center (TSC), however all Site Emergency Directors (SED) do not maintain this qualification (PER 342219).</p> <p>Enhancement Recommendation: SAMG training was specified in TRN-34, Severe Accident Management, for certain responders to the Technical Support Center (TSC) and the Operations Support Center (OSC). However, this training requirement is not specified in TRN-30, Emergency Preparedness Training. This led to 8 of 33 ERO members specified in TRN-34 to be assigned to their ERO position without the training or has allowed their SAMG qualifications to lapse (PER 342222).</p> <p>Enhancement Recommendation: TRN-34, Severe Accident Management Training, does not require any SAMG training for the TSC Ops Manager. The procedure requires the BFN</p>
--	--

	<p>Technical Support Center Operations Manager to be trained as a Severe Accident Management Guideline Implementer. TRN-34 did not require any SAMG training for the WBN and SQN TSC Operations Manager. Consideration should be given to requiring that the TSC Operations Manager at all 3 sites be trained and qualified as a SAMG Decision Maker, since the only person in the TSC required to be trained and qualified as a decision maker was the SED. This arrangement leaves the SED in the TSC with no one trained and qualified to provide a peer check or independent verification for the SED when performing the SAMGs (PER 342322).</p> <p>Enhancement Recommendation: A training needs analysis should be conducted to determine training requirements for the task of connecting the MA-1 diesel IAW existing procedures (PER 341535).</p> <p>Enhancement Recommendation: Additional training was required for maintenance personnel involving decision making during accident response situations when normal supervision may not be available. Current training strategies did not deliver the overarching information that would allow the craft to have situational awareness of the intent and direction of the procedure and allow them to make on the spot decisions as to priority of sequence and ability of the work they are able to complete to support the procedure in progress (PER 341542).</p> <p>SR 352099 The H2 Recombiners were removed from Technical Specifications, and there was a DCN in place to remove them from service. Surveillance Instructions were no longer being performed on the H2 Recombiners, and the PMs were not being maintained current. The U1 B-Train Recombiner had a ground on the heater that made it non-functional. The recombiners were used as a strategy for controlling H2 in the context of the SAMGs. Specifically, procedures SAG-7 and SCG-1 addressed using the H2 recombiners during Severe Accident Scenarios.</p>
--	--

Licensee Action	Describe the licensee's actions and conclusions regarding applicable agreements and contracts are in place.
<p>d. Verify that any applicable agreements and contracts are in place and are capable of meeting the conditions needed to mitigate the consequences of these events.</p> <p>This review should be done for a reasonable sample of mitigating strategies/equipment.</p>	<p>All contracts verified current and sufficient.</p>
	<p>For a sample of mitigating strategies involving contracts or agreements with offsite entities, describe inspector actions to confirm agreements and contracts are in place and current (e.g., confirm that offsite fire assistance agreement is in place and current).</p>
	<p>Inspectors reviewed photo copies of current contracts with the following agencies:</p> <p>Rhea County Fire Department                      Dayton Fire Department                      Rockwood Fire Department                      State of Tennessee Act 2004</p> <p>See attached for contract numbers.</p> <p>The inspectors noted that unspecified equipment, materials and aid could be obtained from other TVA facilities in the area.</p>
	<p>Discuss general results including corrective actions by licensee.</p>
	<p>The concern for non-seismic buildings damaging emergency equipment was evaluated based on observations of those buildings.</p>
	<p>SR 345291 PER 346512 TVA availability of various pumps, hose, and adaptors. Storage and availability of equipment may be effected.</p>

<p>Licensee Action</p>	<p>Document the corrective action report number and briefly summarize problems noted by the licensee that have significant potential to prevent the success of any existing mitigating strategy.</p>
<p>e. Review any open corrective action documents to assess problems with mitigating strategy implementation identified by the licensee. Assess the impact of the problem on the mitigating capability and the remaining capability that is not impacted.</p>	<p>All items found fall in the area of enhancements (see above) with the exception of the following:</p> <p>Extra Auxiliary Building Gas Treatment System spare filters. This was entered into the corrective action program as PER 349083.</p> <p>All CAP documents listed were 'open'. The only actual gap determined was the lack of extra Auxiliary Building Gas Treatment System spare filters. The significance of this would be a function of the event. No problems were noted that would impede success of the strategy.</p>

<p>03.02 Assess the licensee's capability to mitigate station blackout (SBO) conditions, as required by 10 CFR 50.63, "Loss of All Alternating Current Power," and station design, is functional and valid. Refer to TI 2515/120, "Inspection of Implementation of Station Blackout Rule Multi-Plant Action Item A-22" as a guideline. It is not intended that TI 2515/120 be completely reinspected. The inspection should include, but not be limited to, an assessment of any licensee actions to:</p>	
<p>Licensee Action</p>	<p>Describe the licensee's actions to verify the adequacy of equipment needed to mitigate an SBO event.</p>
<p>a. Verify through walkdowns and inspection that all required materials are adequate and properly staged, tested, and maintained.</p>	<p>Watts Bar had no staged equipment/materials required by SBO analysis or procedures.</p>



	Describe inspector actions to verify equipment is available and useable.
	N/A
	Discuss general results including corrective actions by licensee.
	N/A
Licensee Action	Describe the licensee's actions to verify the capability to mitigate an SBO event.
b. Demonstrate through walkdowns that procedures for response to an SBO are executable.	<p>Licensee reviewed and walked down of the procedures and all associated procedures (see below) and determined they were executable.</p> <p>AOI-35, Loss of Offsite Power  AOI-40, Station Blackout  AOI-43.01, Loss of Unit 1 Train A Shutdown Boards  AOI-43.02, Loss of Unit 1 Train B Shutdown Boards  AOI-43.03, Loss of Unit 2 Train A Shutdown Boards  AOI-43.4, Loss of Unit 2 Train B Shutdown Boards  ECA-0.0, Loss of Shutdown Power</p> <p>Describe inspector actions to assess whether procedures were in place and could be used as intended.</p> <p>Inspectors reviewed the above listed procedures for intended use. Additionally, inspectors observed the use of AOI-35, AOI-43.01 and AOI-43.02 on the simulator. No findings were observed.</p>

Discuss general results including corrective actions by licensee.

In the below listed enhancements, PER 341528 concerning the Unit 2 backfeed capability could have as easily been identified as a gap as opposed to an enhancement. The alternatives do not have nearly the capability of the offsite backfeed from the non-safety related 500 kV switchyard. Without a design change this would most likely not be resolved beyond rewriting the procedure to use the portable 2MW diesel.

PER 340335 - Sound powered phones in Aux Inst. Control Room and the Unit 1 SDBD room, did not work.

PER 341528 - AOI-40, Station Blackout addressed using Appendix D, Establishing Backfeed to Unit 1 6.9 kV Shutdown Boards from the 500 kV System to feed the Unit 1 Shutdown Boards via the Unit 2 6.9 kV Unit Boards. This supply was currently not available due to design changes and modifications to the 500 kV switchyard and the links being removed from the Unit 2 Main Bank Transformer. Proceduralized direction existed for connection of a portable diesel generator to the Unit 2 6.9 kV Unit Boards for supplying the Unit 1 6.9 kV Shutdown Boards. A procedure should be developed to connect the portable DG to the affected unit versus using Unit 2, since Unit 2 will become operational in the near future. The portable DG can be connected within the four hour design consideration for station batteries, and the Unit 2 Main Bank Transformers or switchyard were not required.

PER 342800 - The portable diesel generators located on site should have the procedural guidance developed to have them used to mitigate the loss of shutdown power in all relevant procedures (ECA-0.0, AOI-35, AOI-40, AOI-43.01/02/03/04). As part of this change, additional points of connectivity for the portable DG should be considered (DG disconnects, 5th DG panel, etc.) The portable diesel generators are not currently identified for use during these events.

SR 342923 - Consider auxiliary charging pumps to supply RCP seal injection flow on loss of all AC. Suction from SFP to RCP seals and powered from temporary DG. (from McGuire OE).

	<p>SR 343992 - Mobile 2 MW DG utilized during loss of On/Off Site power scenarios, cannot be connected to required boards in an efficient manner. WBN needs to develop "quick connection" points for this DG to the required Board it will supply on a loss of power to the station.</p> <p>SR 344001 - U-2 needs to install their mobile 2 MW DG used for Station Blackout at the DG Bldg location. This would help facilitate regaining electrical power to the station during flooding events that would render U-1 mobile DG not usable due to its current location below Max Flood Elevation. U-2 mobile DG installation procedure needs to address an efficient means for installation to power SDBDs from DG Bldg.</p>
--	---

<p>03.03 Assess the licensee’s capability to mitigate internal and external flooding events required by station design. Refer to IP 71111.01, “Adverse Weather Protection,” Section 02.04, “Evaluate Readiness to Cope with External Flooding” as a guideline. The inspection should include, but not be limited to, an assessment of any licensee actions to verify through walkdowns and inspections that all required materials and equipment are adequate and properly staged. These walkdowns and inspections shall include verification that accessible doors, barriers, and penetration seals are functional.</p>	
<p>Licensee Action</p>	<p>Describe the licensee’s actions to verify the capability to mitigate existing design basis flooding events.</p>
<p>a. Verify through walkdowns and inspection that all required materials are adequate and properly staged, tested, and maintained.</p>	<p>All temporary equipment needed was verified available an in the appropriate locations. Installed equipment was verified within its PM or surveillance frequencies. Additionally, all flooding related procedures were reviewed for executability. Related equipment was verified as part of 3.0.1.a. See attached for procedures reviewed by the licensee.</p>

	<p>Describe inspector actions to verify equipment is available and useable. Assess whether procedures were in place and could be used as intended.</p> <p>Inspectors reviewed the UFSAR for maximum flooding description and flooding communications protocols between TVA River Services Operation and those AOI's which implement the associated Maintenance Instructions (MI's) that install temporary equipment. Additionally, inspectors performed some spot checks of the material condition of some of the spool pieces and tooling for installation.</p> <p>Discuss general results including corrective actions by licensee.</p> <p>Licensee identified some conflicts which they will need to resolve. PER 343611 on internal flooding procedure weakness (See 2<sup>nd</sup> NCV on IR 390/2011002) identified prior to Japanese event.</p> <p>PER 341523 - Performance Action 42 of TI-64 Attachment A contains a statement that recommends that the door A-78 and A-99 be closed in the event of an external flood warning. This statement was not in agreement with step 43 of AOI-7.01 Attachment 2 - Probable Maximum Flood – which required doors A-78 and A-99 be closed in the event of an external flood warning.</p> <p>AOI-7.01 revision 14 was issued on 11/13/03 to include the requirement of closing Doors A-78 and A-99. This revision was driven by a corrective action from PER 02-017703. The functional evaluation for PER 02-017703 provided the basis for closing doors A-78 and A-99 during a flood.</p> <p>An additional discrepancy in TI-64 regarding doors A-78 and A-99 was that Attachment A listed both doors as not being an external flood barrier.</p> <p>PER 340569 - WBN AOI-22, Break of Downstream Dam, assumes that Watts Bar Dam can produce a flow of 2000 cubic feet per second needed for WBN Ultimate Heat Sink requirements. AOI-22 discusses with concurrent break of upstream and downstream dams, natural flow of 2700 cfs would be available based on records prior to construction on the TN. River.</p>
--	--

	<p>WBN needed to re-validate this assumption since it had been several years since construction on the TN river had started.</p> <p>PER 343611 - The following issue was identified by the Japan event response team when responding to INPO IER L1 11-1 Recommendation 3:</p> <p>WBN procedures lacked robustness when coping with Internal Flooding events. The ARI for Alarm window 167-D (Turb/Aux/Rx Bldg Flooded), lacked specific guidance to properly respond to internal flooding concerns such as component cooling water or raw cooling water (RCW) pipe ruptures.</p> <p>SR 342941 - Can SQN and WBN auxiliary building be made available on all levels and remain water tight?</p> <p>SR 342947 - Review building large capacity lake with a dam at higher than maximum flood elevation with diesel power pumps to supply emergency makeup to the spent fuel pool and reactor coolant system under large scale events that result in loss of electrical power.</p>
--	---

03.04 Assess the thoroughness of the licensee’s walkdowns and inspections of important equipment needed to mitigate fire and flood events to identify the potential that the equipment’s function could be lost during seismic events possible for the site. Assess the licensee’s development of any new mitigating strategies for identified vulnerabilities (e.g., entered it in to the corrective action program and any immediate actions taken). As a minimum, the licensee should have performed walkdowns and inspections of important equipment (permanent and temporary) such as storage tanks, plant water intake structures, and fire and flood response equipment; and developed mitigating strategies to cope with the loss of that important function. Use IP 71111.21, “Component Design Basis Inspection,” Appendix 3, “Component Walkdown Considerations,” as a guideline to assess the thoroughness of the licensee’s walkdowns and inspections.

<p>Licensee Action</p>	<p>Describe the licensee’s actions to assess the potential impact of seismic events on the availability of equipment used in fire and flooding mitigation strategies.</p>
<p>a. Verify through walkdowns that all required materials are adequate and properly staged, tested, and maintained.</p>	<p>The inspectors walked down and inspected important plant equipment needed to mitigate fire and flood events to identify the potential for a loss of equipment function during a seismic event.</p> <p>The inspectors inspected the following:                  The material condition of the equipment.                  The material condition of surrounding seismic equipment and structures.                  The surrounding non-seismic equipment and structures, including temporary equipment.                  Assessed nearby non-seismic equipment and systems.                  Assessed transportability of credited portable equipment. Assessed ruggedness of credited portable equipment</p> <p>Describe inspector actions to verify equipment is available and useable. Assess whether procedures were in place and could be used as intended.</p> <p>No additional concurrent event equipment beyond that listed in the above paragraphs existed. No concurrent event procedures existed. The licensee review of this item consisted of a table top review of the concurrent events, determination of the impact of the fire event procedures with a concurrent, seismic event and assumption that non-seismic fire protection equipment was non-functional including assessment of the impact. Similar assessment was performed for a concurrent Seismic-Flooding event. This appeared to be a reasonable approach. The shortcomings of the equipment are captured in the below listed corrective action documents.</p>

	<p>Discuss general results including corrective actions by licensee. Briefly summarize any new mitigating strategies identified by the licensee as a result of their reviews.</p> <p>For SSE and Flood the following 13 vulnerabilities requiring mitigation strategies were identified:</p> <ol style="list-style-type: none"> <li>1. Evaluate if system 77 pumps and piping should be upgraded to Seismic Cat I (PER 349073).</li> <li>2. Evaluate if Auxiliary Boration Charging and Charging Booster Pumps need to be upgraded to Seismic CAT I (PER 349076).</li> <li>3. Evaluate if Control Rod Drive Mechanism (CRDM) Coolers need to be upgraded to Seismic CAT I (PER 349078).</li> <li>4. Evaluate if Fire Dampers in the Main Control Room need to be upgraded to Seismic CAT I (PER 349084).</li> <li>5. Evaluate if the PRT Makeup and Vent valves need to be upgraded to Seismic CAT I (PER 349089).</li> <li>6. Re-evaluate controls and indications in the Auxiliary Control Room for Main Steam, Feedwater, Reactor Coolant, and Chemical and Volume Control Systems need to be upgraded to Seismic CAT I (PER 349093).</li> <li>7. Manually close 1-FCV-62-61 in Accumulator Room # 4 in the event RCP Seal Return cannot be isolated from the Aux Control Room (PER 349093).</li> <li>8. Evaluate if the PRT Pressure and Level Indications need to be upgraded to Seismic CAT I (PER 349093).</li> <li>9. Evaluate if the Local indications for the Auxiliary Boration Charging Systems need to be upgraded to Seismic CAT I (PER 349093).</li> <li>10. Evaluate if the Local indications for the HPFP Strainers need to be upgraded to Seismic CAT I (PER 349093).</li> <li>11. Evaluate if the Local indications for ERCW need to be upgraded to Seismic CAT I (PER 349093).</li> <li>12. Evaluate the IPS Sump Pumps and Piping to be upgraded to Seismic CAT I (PER 349093).</li> <li>13. Evaluate if doors could withstand combined SSE and design basis flood stresses simultaneously (PER 352705).</li> </ol>
--	--

	<p>For SSE and Fire the following 11 vulnerabilities requiring mitigation strategies were identified:</p> <ol style="list-style-type: none"><li>1. Provide strategy to back feed the un-damaged non-seismic System 26 piping from the Class C portion (PER345302).</li><li>2. Develop a procedure to use the ERCW header in the Aux Bldg, el. 737 to supply HPFP Class C piping via the flood mode spool pieces (PER 345998).</li><li>3. Unit 2 flood mode spool pieces are not presently accessible due to scaffolding. If proposed strategy in 2 above is adapted, this strategy would be delayed due to the scaffolding. This is a concern for loss of large area (LOLA) requirements now. (PER 346306).</li><li>4. Cabinets used to store hoses, fittings, and other equipment used to cross-tie HPFP and ERCW (see 2 above) are not secured to prevent unauthorized access. If this equipment is missing, this proposed cross-tie strategy would be delayed. This is a concern for LOLA requirements now. (PER 345362)</li><li>5. The bulk of System 26 is non-seismically supported and may fail during an SSE. This would leave the bulk of the site with inadequate fire fighting capabilities (PER 346512).</li><li>6. Determine if minor modifications can be made to improve survivability of I(L) position retention supported piping (PER 346512).</li><li>7. Develop a procedure to use the ERCW header in the Additional DG Building to supply sectionalized HPFP non seismic piping at the DG Building to supply water to fight fires at the DG Building (346009).</li><li>8. Various portable fire-fighting equipment is normally stored in a non-seismic structure. Review building for modifications to allow for survivability of equipment. Can the building be made TVA seismic category I(L). U2 personnel working on LOLA have determined existing building is I(L) per the Tennessee building code (PER 346512).</li><li>9. Various TVA available portable water pumps, hoses, and adaptors are normally stored in a non-seismic structure, which could impact its being transported to the site (PER 346512).</li><li>10. Off-site mutual aid agencies store their portable fire-fighting equipment in non-seismic structures, which could impact its being transported to the site (PER 346512).</li><li>11. All large power transformers (Main Banks, USSTs, CSSTs) should be evaluated to ensure the NEI recommended seismic anchors are installed. Fires resulting from large transformers tipping over in seismic events would challenge personnel and equipment</li></ol>
--	---



	<p>resources and delay the restoration of offsite power sources (PER 352706). Enhancement Recommendation: Evaluate the need for Civil Engineering Design to be trained on the Condor software for evaluation of seismic events (PER 340405).</p> <p>Enhancement Recommendation: Review TI 52.001 for shortcomings and revise if necessary. Specifically, evaluate if Section 6.1 needs clarification for the role of Civil Engineering. Also, does a “floppy disc” represent the current method for transporting data or is a more modern technology prudent (PER 340409).</p>
--	--

## LIST OF DOCUMENTS REVIEWED

### **Section 03.01.a: Equipment Inspection/Testing**

WO 111552865, 1-TI-26.102, 5000 GPM TDFP Operating Procedure  
WO 10-816009-000, 1-TI-26.103, 5000 GPM TDFP Capability Procedure  
0-PI-OPS-33.0, EDMG Storage Cabinet Inventory  
WO 10-811308-000, 0-FPS-026-004, Annual Inspection of Hose and Fittings and Hydrostatic Test of fire Hose for IPS Coping Strategy  
WO 10-810934-000, Yearly Maintenance for the 2 MW Diesel Generator used for Security IPS Coping Plan  
WO 111933268, Periodic Maintenance for 2 MW Diesel Generator used for Security IPS Coping Plan, 0743W  
WO 09-815765-000, 0-FPS-026-004, Annual Inspection and Hydrostatic Test of Fire Hose, 4768V  
WO 09-821604-000, 0-FPS-026-004, Hose Station Inspection, 4647V  
WO110902125, 0-FPS-026-0012, Periodic Maintenance on the 5000 GALLION DIESEL PUMP USED FOR SECURITY IPS COPING PLAN, 0766W  
WO 10-812748-000, 0-FPS-510-0010, FIRE TRUCKS, TELESQUIRT & PMPR ANNUAL INSPECTION OF THE TELESQURT PMUG 0571W  
WO 10-814784-000, 0-GEN-510-0101, WO DESCRIPTION: TOWABLE GENERATOR, INSPECTION AND OPERATION, 0556F  
WO 10-812635-000, 1-PIPE-074-B, FLOOD MODE SPOOL PIECE INSPECTION MULTI-EQUIP, 1033V  
WO 111641208, 1-PMP-003-0001A-S, SEMI ANNUAL INSPECTION OF AOI-42.01 TAG-2 TOOLBOX, 0875W  
WO 111088627, 0-FPS-510-SCBA, CLEANING/SANTIZING, MAINTENACE, INSPECTION STORAGE AND INVENTORY OF POSITIVE PRESSURE MSA SCBA's, 0068W

### **Section 03.01.b: Procedures**

Depressurize the RCS, SAG-2, R2  
Inject into the RCS, SAG-3, R4  
Inject into Containment, SAG-4, R2  
Reduce Fission Product Releases, SAG-5, R4  
Control Containment Conditions, SAG-6, R4  
Reduce Containment Hydrogen, SAG-7, R1  
Mitigate Fission Produce Releases, SCG-1, R4  
Depressurize Containment, SCG-2, R3  
Control Hydrogen Flammability, SCG-3, R1  
Control Containment Vacuum, SCG-4, R1  
TSC Long Term Monitoring, SAEG-1, R3  
SAMG Termination, SAEG-2, R1  
RCS Injection to Recover Core, CA-1, R2  
Injection Rate for Long Term Decay Heat Removal, CA-2, R2  
Hydrogen Flammability in Containment, CA-3, R1  
Volumetric Release Rate from Vent, CA-4, R2  
Containment Water Level and Volume, CA-5, R4  
RWST Gravity Drain, CA-6, R1  
Hydrogen Impact When Depressurizing Containment, CA-7, R1

**Section 03.01.c: Training Records**

Crew attendance records for Licensed Operator Requal (LOR) for Cycle 8, 2009  
 Crew attendance records for Licensed Operator Requal (LOR) for Cycle 7, 2011  
 Crew attendance records for Licensed Operator Requal (LOR) for Cycle 12, 2009  
 Crew attendance records for Licensed Operator Requal (LOR) for Cycle 3, 2010  
 Non-Licensed Operator Requal for Cycle 9, Groups 1 through 5, 2009

Lesson plans for the following:

Security Events, 3-OT-AOI4200  
 Security Events, 3-OT-AOI4201 (NAUO)  
 Security Training, 3-OT-B5B  
 Earthquake, 3-OT-AOI0900  
 Maximum Flooding, 3-OT-AOI0700  
 Loss of 6.9kV Shutdown Board, 3-OT-AOI4300  
 SAMG EPT500.031  
 SAMG Retraining EPT500.031  
 MA-1, Recovery from Loss of All A/C Power & Loss of ERCW lesson plan

**Section 03.01.d: Contracts and MOU's**

Rhea County Fire Department – Contract # 99997795 as amended  
 Dayton Fire Department – Contract # 3211  
 Rockwood Fire Department – Contract # 53483  
 State of Tennessee - AN ACT to amend Tennessee Code Annotated, Title 7 and Title 58, relative to mutual aid, emergency and disaster assistance, and homeland security.

**Section 03.03.a: Procedures/Equipment**

MI-270.07, Visual Examination of Control, Auxiliary Building and Intake Pumping Station Doors and Hatchways  
 AOI-7.01, Maximum Probable Flood, MI-17.007, Flood Preparation – Temporary Lighting for Reactor and Auxiliary Building  
 MI-17.011, Flood Preparation – Filling CVCS Holdup Tanks  
 MI-17.015, Main Control Board Modifications for Flood Mode Operation  
 MI-17.018, Flood Preparation – High Pressure Fire Protection System Spool Pieces  
 MI-17.019, Flood Preparation – Auxiliary Charging System Spool Pieces  
 MI-17.021, Installation of Spool Pieces Between ERCW System and Component Cooling System  
 MI-17.022, Flood Preparation – Installation of Spool Pieces Between SFPC System and RHR System  
 MI-17.023, Flood Preparation – Reactor Coolant Drain Tank Spool Pieces  
 MI-17.024, Flood Preparation – Ice Condenser Cooling Spool Piece  
 MI-17.027, Flood Preparation – Blocking of Ice Condenser Glycol Valves  
 MI-17.028, Flood Preparation – Block Open Cold Leg Accumulator Drains to Reactor Coolant Drain Tank Valves  
 MI-17.030, Flood Preparation – Blocking Reactor Coolant Drain Tank Discharge Valve (1-FCV-77-9, Unit No. 1)  
 MI-17.033, Flood Preparation – Install Blind Flanges on HPFP Pump Discharge Relief Valves