



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

June 22, 2015

Mr. Joseph Shea  
Vice President, Nuclear Licensing  
Tennessee Valley Authority  
1101 Market Street, LP 3D-C  
Chattanooga, TN 37402-2801

**SUBJECT: WATTS BAR NUCLEAR PLANT UNITS 1 AND 2 – NRC TEAM INSPECTION  
REPORT 05000390/2015009 AND 05000391/2015616**

Dear Mr. Shea:

On April 3, 2015, the U. S. Nuclear Regulatory Commission (NRC) completed an inspection at your Watts Bar Nuclear Plant, Units 1 and 2. The enclosed report documents the inspection results, which were discussed on April 3, 2015, with Mr. Walsh and other members of your staff. A re-exit was conducted with Mr. O'Dell via telephone on May 15, 2015, to discuss the final results of the inspection.

The inspection examined activities conducted under your licenses as they relate to the implementation of mitigation strategies and spent fuel pool instrumentation orders (EA-12-049 and EA-12-051) and Emergency Preparedness Communication/Staffing/Multi-Unit Dose Assessment Plans, your compliance with the Commission's rules and regulations, and with the conditions of your operating license. Within these areas, the inspection involved examination of selected procedures and records, observation of activities, and interviews with plant personnel. The NRC inspectors did not identify any findings or violations of more than minor significance.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of the NRC's document

J. Shea

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system (ADAMS). Adams is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

***/RA/***

Anthony D. Masters, Chief  
Reactor Projects Branch 7  
Division of Reactor Projects

Docket No.: 50-390, 50-391  
License No.: NPF-90, CPPR-92

Enclosure: 05000390/2015009 AND 05000391/2015616  
w/Attachment: Supplementary Information

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ADAMS:  Yes      ACCESSION NUMBER: \_\_\_\_\_       SUNSI REVIEW COMPLETE       FORM 665 ATTACHED

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**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION II**

Docket No.: 50-390, 50-391

License No.: NPF-90, CPPR-92

Report No.: 05000390/2015009, 05000391/2015616

Licensee: Tennessee Valley Authority (TVA)

Facility: Watts Bar Nuclear Plant Units 1 and 2

Location: Spring City, TN

Dates: March 30 – April 3, 2015

Inspectors: R. Rodriguez, Senior Project Engineer (Team Leader)  
S. Sanchez, Senior Emergency Preparedness Inspector  
J. Hamman, Resident Inspector (Watts Bar Unit 1)  
J. Seat, Construction Project Inspector  
W. Cook, Senior Reactor Analyst, Region I (Observer)  
J. Boettcher, Reactor Inspector, Region III (Observer)  
R. Hagar, Senior Project Engineer, Region IV (Observer)  
T. Brown, Project Manager, JLD (Observer)  
J. Paige, Project Manager, JLD (Observer)

Approved by: Anthony D. Masters, Chief  
Reactor Projects Branch 7  
Division of Reactor Projects

ENCLOSURE

## SUMMARY OF FINDINGS

IR 05000390/2015009 and 05000391/2015616; 3/30/2015 – 4/03/2015; Watts Bar Nuclear Plant Units 1 and 2; Temporary Instruction 2515/191, Inspection of the Implementation of Mitigation Strategies and Spent Fuel Pool Instrumentation Orders and Emergency Preparedness Communication/Staffing/Multi-Unit Dose Assessment Plans issued October 06, 2014.

The inspection covered a one week inspection by one senior project inspector, a senior emergency preparedness inspector, a construction project inspector, and the resident inspector. No findings of significance were identified. The significance of most findings is identified by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, Significance Determination Process (SDP); cross-cutting aspects were determined using IMC 0310; Aspects Within Cross-Cutting Areas; and findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 5.

### A. NRC-Identified and Self-Revealing Findings

None

### B. Licensee-Identified Violations

None

## REPORT DETAILS

### 4. Other Activities

#### 4OA5 Other Activities (TI 2515/191)

The objective of Temporary Instruction (TI) 2515/191 “Inspection of the Implementation of Mitigation Strategies and Spent Fuel Pool Instrumentation Orders and Emergency Preparedness Communication/Staffing/Multi-Unit Dose Assessment Plans” is to verify that licensees have adequately implemented the mitigation strategies as described in the licensee’s Final Integrated Plan (ADAMS Accession No. ML15072A116) and the NRC’s plant safety evaluation (ADAMS Accession No. ML15078A193) and to verify that the licensees installed reliable water-level measurement instrumentation in their spent fuel pools. The purpose of this TI is also to verify that licensees have implemented emergency preparedness (EP) enhancements as described in their site-specific submittals and NRC safety assessments, including multi-unit dose assessment capability, enhancements to ensure that staffing is sufficient, and that communications can be maintained during beyond-design-basis external events.

The team verified that plans for complying with NRC Orders EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (ADAMS Accession No. ML12229A174) and EA-12-051, Order Modifying Licenses With Regard to Reliable Spent Fuel Pool Instrumentation (ADAMS Accession No. ML12056A044) are in place and are being implemented by the licensee. The team also verified that the licensee had implemented staffing and communications plans provided in response to the March 12, 2012, request for information letter and multi-unit dose assessment information provided per COMSECY-13-0010, Schedule and Plans for Tier 2 Order on Emergency Preparedness for Japan Lessons Learned, dated March 27, 2013 (ADAMS Accession No. ML12339A262).

The team discussed the plans and strategies with plant staff, reviewed documentation, and where appropriate, performed plant walk downs to verify that the strategies could be implemented as stated in the licensee’s submittals and the NRC staff prepared safety evaluation. For most strategies, this included verification that the strategy was feasible, procedures and/or guidance had been developed, training had been provided to plant staff, and required equipment had been identified and staged. Specific details of the team’s inspection activities are described in the following sections.

## 1. Mitigation Strategies for Beyond-Design Basis External Events

### a. Inspection Scope

The team examined the licensee's established guidelines and implementing procedures for the beyond-design-basis mitigation strategies. The team assessed how the licensee coordinated and documented the interface/transition between existing off-normal and Emergency Operating Procedures with the newly developed mitigation strategies. The team selected a number of mitigation strategies and conducted plant walk downs with licensed operators and responsible plant staff to assess: the adequacy and completeness of the procedures; familiarity of operators with the procedure objectives and specific guidance; staging and compatibility of equipment; and the practicality of the operator actions prescribed by the procedures, consistent with the postulated scenarios.

The team verified that a preventive maintenance program had been established for the Diverse and Flexible Coping Strategies (FLEX) portable equipment and that periodic equipment inventories were in place and being conducted. Additionally, the team examined the introductory and planned periodic/refresher training provided to the Operations and Maintenance staff most likely to be tasked with implementation of the FLEX mitigation strategies. The team also reviewed the introductory and planned periodic training provided to the Emergency Response Organization personnel. Documents reviewed are listed in the Attachment.

### b. Assessment

Based on samples selected for review, the team verified that the licensee satisfactorily implemented appropriate elements of the FLEX strategy as described in the plant specific submittal(s) and the associated safety evaluation. The team did not identify any issues of a more than minor significance concerning the licensee's compliance with NRC Order EA-12-049. The team verified that the licensee satisfactorily:

- developed and issued FLEX Support Guidelines (FSGs) to implement the FLEX strategies for postulated external events
- integrated their FSGs into their existing plant procedures such that entry into and departure from the FSGs are clear when using existing plant procedures
- protected FLEX equipment from site-specific hazards
- developed and implemented adequate testing and maintenance of FLEX equipment to ensure their availability and capability
- trained their staff to assure personnel proficiency in the mitigation of beyond-design-basis events
- developed means to ensure that the necessary off-site FLEX equipment will be available from off-site locations.

The team verified that issues identified during the inspection were entered into the licensee's corrective action program.

## 2. Spent Fuel Pool Instrumentation

### a. Inspection Scope

The team examined the licensee's newly installed spent fuel pool (SFP) instrumentation. Specifically, the team verified the sensors were installed as described in the plant specific submittals and the associated safety evaluation, and that the cabling for the power supplies and the indications for each channel are physically and electrically separated. Additionally, environmental conditions and accessibility of the instruments were evaluated.

The team verified that the licensee has approved procedures for maintenance, testing, calibration, and use of the primary and backup SFP instrumentation channels. And that the procedures follow the guidance contained in Nuclear Energy Institute (NEI) 12-02 and that these procedures are part of an existing licensee process to be maintained. Documents reviewed are listed in the attachment.

### b. Assessment

Based on samples selected for review, the team determined that the licensee satisfactorily installed and established control of the SFP instrumentation as described in the plant specific submittal(s) and the associated safety evaluation. The team did not identify any issues of a more than minor significance concerning the licensee's compliance with NRC Order EA-12-051. The team verified that the licensee satisfactorily:

- installed the SFP instrumentation sensors, cabling, and power supplies to provide physical and electrical separation as described in the plant specific submittal(s) and safety evaluation
- installed the SFP instrumentation display in the accessible location, and environmental conditions as described in the plant specific submittal(s)
- trained their staff to assure personnel proficiency with the maintenance, testing, and use of the SFP instrumentation
- developed and issued procedures for maintenance, testing, and use of the reliable SFP instrumentation.

The team verified that issues identified during the inspection were entered into the licensee's corrective action program.



### 3. Staffing and Communication Request for Information

#### a. Inspection Scope

Through discussions with plant staff, review of documentation and plant walk downs, the team verified that the licensee has implemented required changes to staffing, communications equipment, and facilities to support a multi-unit extended loss of all AC power (ELAP) scenario as described in the licensee's staffing assessment and the NRC safety evaluation. The team also verified that the licensee has implemented multi-unit dose assessment (including releases from spent fuel pools) capability using the licensee's site-specific dose assessment software and approach as described in the licensee's multi-unit dose assessment submittal. Documents reviewed are listed in the Attachment.

#### b. Assessment

The team reviewed information provided in the licensee's multi-unit dose submittal and in response to the NRC's March 12, 2012, request for information letter, and verified that the licensee satisfactorily implemented enhancements pertaining to Near-Term Task Force Recommendation 9.3 response to a large scale natural emergency event that results in an extended loss of all AC power to all site units and impedes access to the site. The team verified the following:

- Licensee satisfactorily implemented required staffing change(s) to support a multi-unit ELAP scenario
- EP communications equipment and facilities are sufficient for dealing with a multi-unit ELAP scenario
- Implemented multi-unit dose assessment capabilities (including releases from spent fuel pools) using the licensee's site-specific dose assessment software and approach.

The team verified that issues identified during the inspection were entered into the licensee's corrective action program.

### 4OA6 Exit

#### Exit Meeting Summary

On April 3, 2015, the team presented the inspection results to Mr. Walsh and other members of the site staff. The team confirmed that proprietary information was not provided or examined during the inspection. A re-exit was conducted with Mr. O'Dell via telephone on May 15, 2015, to discuss the final results of the inspection.

ATTACHMENT: SUPPLEMENTARY INFORMATION

**SUPPLEMENTARY INFORMATION**

**KEY POINTS OF CONTACT**

Licensee personnel:

S. Duncan, Performance Improvement Manager  
K. Walsh, Site VP  
S. Conners, Plant Manager  
J. O'Dell, Regulatory Compliance  
D. Charlton, Regulatory Compliance  
J. Harvey, FLEX Engineer  
T. Dutchemendy, Emergency Preparedness Manager  
W. Smith, Operations Training Manager  
J. Reidy, Operations  
R. Proffitt, Regulatory Compliance

NRC personnel:

C. Kontz, Senior Project Engineer  
S. Rose, Chief, Projects Branch 5  
T. Nazario, Senior Resident Inspector Watts bar Unit 2  
E. Patterson, Resident Inspector Watts Bar Unit 2  
V. McCree, Regional Administrator

**LIST OF REPORT ITEMS**

Opened and Closed

None

Discussed

None

## LIST OF DOCUMENTS REVIEWED

### Procedures

0-AOI-7.12, Extended Loss of AC Power (ELAP) During Flood Conditions, Rev 0  
0-FSI-2, Alternate Auxiliary Feedwater Suction Source, Rev. 0  
0-FSI-3, Alternate Low Pressure Feedwater, Rev. 0  
0-FSI-4, DC Bus Management/Load Shed and 480V FLEX DG Alignment/Loading, Rev. 0  
0-FSI-5.01, Initial Assessment and FLEX Equipment Staging, Rev. 0  
0-FSI-5.02, 6900V FLEX Diesel Generator Start-up and Alignment, Rev. 0  
0-FSI-5.04, 6900V FLEX DG Plant Equipment Loading, Rev. 0  
0-FSI-5.05, ERCW Alignment for 5000 GPM Portable Diesel Pump (5PDP), Rev. 0  
0-FSI-6, Alternate AFWST Makeup, Rev. 0  
0-FSI-7, Loss of Vital Instrumentation or Control Power, Rev. 0  
0-FSI-8, Alternate Reactor Coolant System Boration, Rev. 0  
0-MI-360.021, FLEX – Staging of Small Diesel Equipment, Rev. 1  
0-MI-360.022, FLEX – Staging of Large Diesel Pumps, Rev. 2  
0-MI-360.023, FLEX – Portable Diesel Equipment Refueling, Rev. 1  
0-MI-360.024, 480V FLEX DG Fuel Oil Pump Connection, Rev. 0  
0-MI-360.025, FLEX - Align Intermediate Pressure Pump (Diesel Driven) from AFWST to SG Makeup  
0-MI-360.025, FLEX – Align Intermediate Pressure Pump (Diesel-Driven) from AFWST  
0-MI-360.026, FLEX – Align EL 737 Intermediate Pressure Pumps from ERCW to SG  
0-MI-360.029, FLEX – Hose Deployment for Essential Raw Cooling Water System, Rev. 1  
0-PI-OPS-1-FP, Freeze Protection, Rev. 3  
0-SOI-100.01, Communications Systems, Rev. 1  
0-TI-447, Diverse and Flexible Coping Strategies (FLEX) Program, Rev. 1  
1-AOI-14, Loss of RHR Shutdown Cooling, Rev. 2  
1-ECA-0.0, Loss of Shutdown Power, Rev. 3  
ARG-4, Loss of all AC Power While on Shutdown Cooling, Rev. 3  
Loading, Rev. 0  
MAI-3.3, Cable Terminating, Splicing, and Testing for Cables Rated up to 15,000 Volts, Rev. 35  
Makeup, Rev. 0  
NPG-SPP-07.2.11, Shutdown Risk Management, Rev 6  
OPDP8, Operability Determination Process and Limiting Conditions for Operation Tracking, Rev. 18  
SOI-235.07, 120V AC Vital Power System 2-III, Rev. 19  
SOI-235.08, 120V AC Vital Power System 2-IV, Rev. 19  
to SG Makeup, Rev. 1

### Drawing

0-47W600-363, Spent Fuel Pool Electrical Instruments and Controls

Calculations

CDQ0003602014000487, Elevation 692' Submersible FLEX Pump Supports  
 CDQ0010032013000348, Auxiliary Feedwater FLEX Hose Isolation Valve Support  
 N30312A, Auxiliary Feedwater Flex Hose Isolation Valve Pipe Stress Analysis  
 SL-012404, FLEX Implementation HVAC ELAP Analysis, Rev. 0  
 MDQ0003602013000272, WBN ELAP Transient Temperature Analysis, Rev. 0  
 T69141218430, Seismic Tie-Down of FLEX Staged Equipment at Watts Bar Nuclear  
 W50140715008, Liquefaction Induced Settlement of Haul Roads  
 24900-100-K0R-CY00-00001, Subsurface Investigation and Foundation Report for the Watts  
 Bar Nuclear Plant Unit 1 Steam Generator Replacement Project

Design Change Notice

59683, Install a Spent Fuel Pool Wide Range Monitoring System for Compliance with NRC  
 Order EA-12-051.

Work Orders

115143708, 115616464, 115886420

PERs/SRs Generated

1008369, FLEX Mitigating Strategies – Consider Integrating Additional Human Factors  
 1007705, FLEX Procedure Enhancement to 1-ECA-1.0 and 2-ECA-0.0  
 1008229, FLEX NRC Inspection – Procedure Enhancements to 0-FSI-5.01  
 1008237, FLEX NRC Inspection – Procedure Enhancements to 0-FSI-8  
 1008255, FLEX NRC Inspection – Vital Batt Charger Xfer Switches Labeling  
 1008259, FLEX NRC Inspection – Procedure Enhancements to 0-FSI-4  
 1008266, Changes Needed to FLEX 0-MI-360.026  
 1008268, Procedure Enhancement to 0-MI-360.022  
 1008272, Procedure Enhancement to 0-MI-360.029  
 1008275, Procedure Enhancement to 0-MI-360.025  
 1008279, Procedure Enhancement to 0-MI-360.025  
 1008282, Spent Fuel Level Indicating Circuit Power Supplies still labeled as Spares  
 1008290, Add Toolbags for FLEX 0-MI-360.026  
 1007675, Conduit Cover Missing from Spent Fuel Pool Level Indicator Circuit  
 1008275, FLEX Mitigating Strategies for Modes 5 and 6  
 1008280, Name on the Breaker Compartment for the Diesel Transfer Switches Still Reflect the  
 5<sup>th</sup> Diesel Rather than the 6.9kV FLEX Diesel

Other

CECC-EPIP-6, CECC Plant Assessment Staff Procedure for Alert, SAE, & GE, Rev. 38  
 CECC-EPIP-8, Dose Assessment Staff Activities During Nuclear Plant Radiological  
 Emergencies, Rev. 41  
 OIP-6, FLEX (Beyond Design Basis) Validation Process  
 Watts Bar Safety Evaluation Report Regarding Implementation of Mitigating Strategies and  
 Reliable Spent Fuel pool Instrumentation Related to Orders EA-12-049 and EA-12-051,  
 dated March 27, 2015