



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

December 1, 1993

Docket Nos. 50-390
and 50-391

APPLICANT Tennessee Valley Authority (TVA)
FACILITY: Watts Bar Nuclear Plant, Units 1 and 2
SUBJECT: MEETING SUMMARY - NOVEMBER 10, 1993 MEETING ON IPE AND SAMDA
(TAC M74488, M77222 AND M77223)
REFERENCE: Meeting notice by P. S. Tam, November 3, 1993

The purpose of this meeting was to discuss issues regarding TVA's ongoing effort to revise the Watts Bar Individual Plant Evaluation (IPE), submitted September 1, 1992, and NRC staff concerns regarding TVA submittals on severe accident mitigation design alternatives (SAMDA), submitted February 11 and June 5, 1993. Enclosure 1 is the list of the meeting participants. Enclosure 2 is slides used by TVA.

TVA stated that the estimated core damage frequency (CDF) for Watts Bar, previously among the highest in the country, has been reduced by a factor of 4 (from $3.3E-4$ to $9E-5$) through improvements in emergency procedures, expanding operator training on risk-significant scenarios, and re-evaluating the success criteria of the component cooling system. These changes were described and are summarized in Enclosure 2. The final estimate is to be determined and will be documented in the revision to the IPE submittal, due by December 31, 1993. This submittal will provide a more complete description of each of the modifications to the IPE, and their impacts on major core damage sequences for Watts Bar.

Before issuing an operating license to Watts Bar, the staff needs to issue a supplement to the Watts Bar Final Environmental Statement (NUREG-0498) to document the staff's evaluation regarding SAMDAs. The staff identified and discussed a number of concerns with TVA's analysis of design alternatives during the meeting, including the following: (1) additional information to provide a more complete picture of the risk profile for Watts Bar, in terms of major contributors to both core damage frequency and containment failure/releases, (2) the design alternatives evaluated by TVA were not clearly focused on plant vulnerabilities/leading contributors identified through the IPE, and (2) several of the design changes appear very close to meeting the \$1000/person-rem criterion but have not been implemented. Accordingly, the staff requested TVA to consider additional design alternatives to further reduce risk. One example is that no credit was taken for a fifth on-site diesel generator. The staff expressed a view that relatively low-cost modifications to this generator might further reduce risk, and should therefore be considered in this reassessment.

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Memorandum
DFO 1/1

TVA agreed to propose an approach and schedule for addressing staff concerns and to discuss this with the staff again by mid-December 1993.

Original signed by

Peter S. Tam, Senior Project Manager
Project Directorate II-4
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:

1. Participant list
2. TVA slides on IPE and SAMDA

cc w/enclosures:
See next page

OFFICE	PDII-4/LA	SPSB/BC	SCSB/BC	PDII-4/PM	PDII-4/D
NAME	BC Layton	MRubin	RBarrett	PTam	FHebbon
DATE	11/2/93	11/24/93	11/30/93	11/29/93	12/1/93

DOCUMENT NAME: IPESUMM

TVA agreed to propose an approach and schedule for addressing staff concerns and to discuss this with the staff again by mid-December 1993.



Peter S. Tam, Senior Project Manager
Project Directorate II-4
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:

1. Participant list
2. TVA slides on IPE and SAMDA

cc w/enclosures:

See next page

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LIST OF PARTICIPANTS
MEETING ON IPE AND SAMDA
November 10, 1993

<u>Name</u>	<u>Affiliation</u>
Fred Adcock	TVA Corporate Engineering
Charles Ader	NRC/RES/Severe Accident Issues Branch
Rich Barrett	NRC/NRR/Containment Systems and Severe Accident Branch
Jin Chung	NRC/RES/Severe Accident Issues Branch
Stephen Clements	TVA Risk Assessment
John Flack	NRC/RES/Severe Accident Issues Branch
Walt Elliott	TVA Watts Bar Engineering
Fred Hebdon	NRC/NRR/Project Directorate II-4
Michael Hellums	TVA Licensing
Dean Houston	NRC/ACRS
Christopher Jackson	NRC/NRR/Project Directorate II-4
Frank A. Koontz, Jr.	TVA Watts Bar Engineering
John C. Lane	NRC/RES/Severe Accident Issues Branch
Erasmia Lois	NRC/RES/Severe Accident Issues Branch
William z. Mims, Jr.	TVA
John Monninger	NRC/NRR/Containment Systems and Severe Accident Branch
Bob Palla	NRC/NRR/Probabilistic Safety Assessment Branch
George Pannell	TVA Watts Bar Site Licensing
Mark Rubin	NRC/NRR/Probabilistic Safety Assessment Branch
John Schiffgens	NRC/NRR/Probabilistic Safety Assessment Branch
Ann Ramey-Smith	NRC/NRR/Probabilistic Safety Assessment Branch
Peter Tam	NRC/NRR/Project Directorate II-4
Doug True	Erin Engineering (TVA Contractor)
Ashok Thadani	NRC/Division of Systems Safety and Analysis
John Vorees	TVA Watts Bar Site Licensing
Richter Wiggall	TVA Watts Bar Operations

WATTS BAR IPE UPDATE
SAMDA REVIEW

Status Discussion With NRC

November 10, 1993

**NRC/TVA IPE/SAMDA MEETING
NOVEMBER 10, 1993
1:00 P.M.**

MEETING AGENDA

Introductions and Opening Remarks	TVA-John Vorees/ NRC-Peter Tam
IPE Background	TVA-Ric Wiggall
IPE Update Summary	TVA-Ric Wiggall
IPE Update Criteria/Model Changes	ERIN-Doug True
IPE Results and Conclusion	TVA-Frank Koontz
SAMDA Discussion	TVA-Bill Mims
Closing Remarks	TVA-John Vorees/ NRC-Peter Tam

WATTS BAR IPE BACKGROUND

- **IPE Initiated in September 1989**
- **Project Freeze Date: December 1991**
- **RISKMAN®-Based Level 2 PSA
Performed by TVA With Support
From PLG and ERIN Engineering**
- **Submitted September 1, 1992**

WATTS BAR IPE UPDATE PROJECT OBJECTIVES

- Update Level 1 IPE Models to Reflect
 - Current Plant Design
 - Current Plant Procedures/Training

- Provide More Realistic IPE Through Identification and Removal of Conservatisms/NonConservatisms

SIGNIFICANT WBN PLANT CHANGES AFFECTING THE ORIGINAL IPE MODEL

- **EOPs And AOlS Revised and Reformatted
(Procedure Upgrade Program [PUP])**
- **Initial Operator Licensing Training Nearing
Completion**
- **Numerous Design Changes Implemented**
- **Design Basis Calculations Completed as
Part of System Turnover**

PLANT CHANGES EXPECTED TO IMPACT IPE MODEL

- **AOI-15, "Loss of Component Cooling System"(CCS) Procedure Significantly Improved**
- **Simulator Scenario Training Performed on Loss of Component Cooling System**
- **Design Change Made to Improve Local Operator Actions in Station Blackout and Appendix R**
- **Design Basis Calculation Demonstrated Only One CCS Pump Required to Support Train "A" Operation**

UPDATE CRITERIA

- **Dominant Initiators, Sequences and Split Fractions Reviewed to Determine Degree to Which Results Were Impacted By:**
 - **Modeling Assumptions**
 - **Common Cause Failure Data**

- **Key Human Actions Reviewed to Assess Impact of New Procedures and Training**

CHARACTERIZATION OF MODEL CHANGES

- **Incorporation of Design Changes**
 - Design Change Review Process
 - S/G PORV Control in SBO/Appendix R Events

- **Incorporation of Procedure/Operator Training Improvements**
 - AOI-15 Upgrade (PUP)
 - Simulator Scenarios For Loss of CCS
 - Improved Procedure Format
 - Recent Operator Interviews

- **Changes To Success Criteria**
 - CCS Train "A" Pump Requirements
 - AFW/CCS Pump Room Cooling Requirements
 - PORV Requirements For Bleed & Feed

CHARACTERIZATION OF MODEL CHANGES (continued)

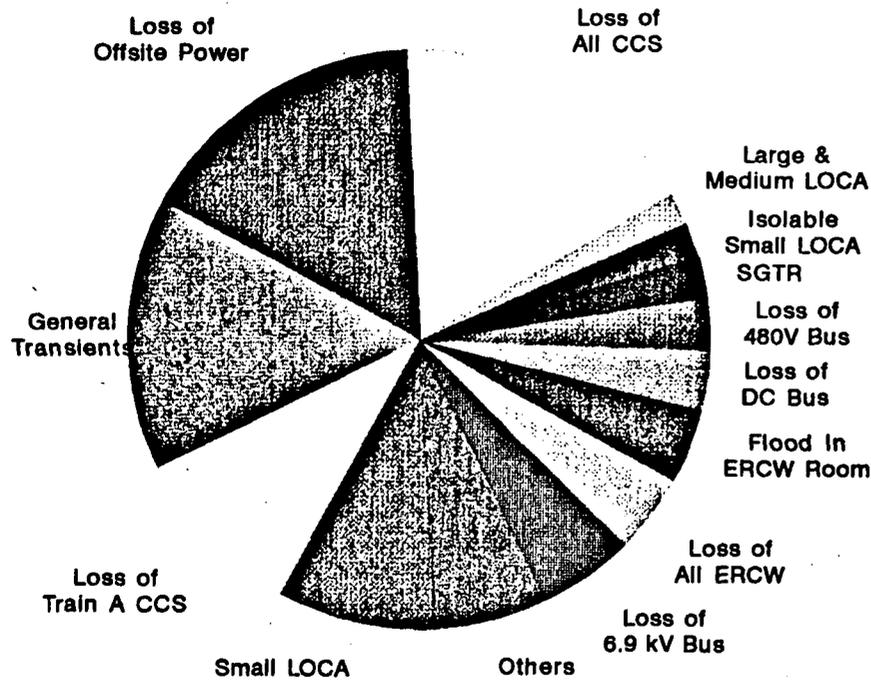
- **Review of Common Cause Failure Data & Models**
 - "Failure To Run" Data For Initiating Events
 - Reactor Trip Breaker Modeling

- **Non-Conservatisms Identified/Addressed**
 - Manual Control of AFW Flow Control Valves In SBO
 - Procedure For ERCW Cross-tie To Charging Pump
 - S/G PORV Control In SBO

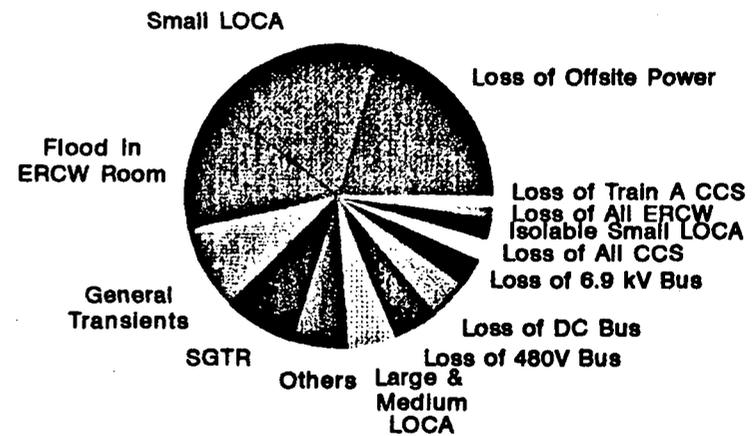
- **Conservatisms Identified/Addressed**
 - Maintenance of 480 Vac Busses
 - Maintenance of ERCW Trains
 - Use of Spare Battery Chargers
 - Treatment of Offsite Grid

WBN CDF COMPARISON

IPE Submittal vs. Preliminary Update Results



IPE Submittal
CDF = 3.3×10^{-4} /yr



Current Update
CDF = 9×10^{-5} /yr

SUMMARY AND CONCLUSIONS

- **Revision Will Reflect Current Plant Design, Procedures and Training**
- **Job Performance Measure (JPM) To Be Implemented on Establishing ERCW Cooling to Charging Pump**
- **Conservatisms/Non-Conservatisms In IPE Evaluated**
- **Net Results Expected CDF Reduction**
- **Update of WBN Level 1 IPE Nearing Completion**
- **IPE Update Targeted for Submittal to NRC by December 31, 1993**

WATTS BAR SAMDA BACKGROUND

- **NRC Requested TVA Perform SAMDA
Evaluation - January 29, 1991**
- **TVA/NRC Teleconference To Discuss Scope Of
SAMDA Evaluation - November 30, 1992**
- **SAMDA Evaluation Methodology Developed
And Submitted To NRC - February 11, 1993**
- **SAMDA Evaluation Performed Based On
That Methodology**
- **SAMDA Evaluation Final Report Submitted -
June 5, 1993**

SELECTION OF CANDIDATE SAMDAS

- Documents Reviewed For Candidate SAMDAs
 - WBN IPE (Section 6, Potential Plant Improvements)
 - Comanche Peak SAMDA Submittal/Final Environmental Statement
 - Limerick SAMDA Submittal/Final Environmental Statement
 - Sequoyah NUREG-1150
 - NUREG-5589 - "Ice Condenser Containment Performance Issues"

- Screening Criteria Used for Evaluating Candidate SAMDAs
 - Maximum Theoretical Benefit Of 57.4 Person Rem/Reactor Year
 - Total Risk of 2300 Person-Rem for Plant Life
 - Maximum Benefit \$2.3 Million (\$1000 Per Person-Rem Averted)

- Detailed Evaluation Performed for Candidate SAMDAs That Met Screen Criteria

EVALUATION OF CANDIDATE SAMDAS

- **Sixteen Candidate SAMDAs Selected For Evaluation (Including 2 WBN IPE Potential Plant Improvements)**
- **More Detailed Assessment Performed By Either Quantitatively or Qualitatively Determining Reduction Of Dose Risk In Each Accident Progression Bin (APB)**
- **Quantitative Assessment Included**
 - **Modification Of WBN PRA Model**
 - **Requantifying PRA Model**
 - **Rebinning Release Categories Into Appropriate APBs**
 - **Delta In Population Dose And Cost-Benefit Determined**
- **The Candidate SAMDA Associated Functions Were Assumed To Always Be Available From A PRA Perspective**

METHOD FOR DETERMINING COST-BENEFIT

- **Conceptual cost estimates**
 - **Published Industry Documents**
 - **Available TVA Estimates**
 - **WBN-Specific Estimates**

- **Historical Estimates Escalated To 1993 Dollars**

- **NUREG-1150 Source Terms and Dose Conversion Factors for SQN Utilized**

- **Benefits Of Each Candidate SAMDA Based On Value Of Averted Population Dose Within A 50-Mile Radius**

- **SQN Dose Conversion Factors Used (Factor of 4)**

EFFECT OF UPDATED WBN IPE ON SAMDA RESULTS

- **The WBN IPE Update Will Potentially Reduce The Benefit Of A Given Candidate SAMDA**
- **The Impact Of The CDF Reduction Will Result In Even Higher \$ Per Averted Man-Rem Estimates**
- **No Further SAMDA Analysis is Justified**

SUMMARY AND CONCLUSIONS

- **The Evaluation Of Candidate SAMDAs Has Been Completed And No Candidate SAMDAs Have Been Determined To Be Cost Beneficial**
- **Review of the Results of the Updated WBN IPE Do Not Indicate A Need To Reevaluate Any Candidate SAMDAs**
- **No Additional Candidate SAMDAs Identified in the Updated WBN IPE**

Distribution Enclosure 1 only:

T. Murley/F. Miraglia	12-G-18
L. J. Callan, Acting	12-G-18
S. Varga	
G. Lainas	
F. Hebdon	
C. Jackson	
B. Clayton	
OGC	15-B-18
E. Jordan	MNBB-3701
Charles Ader	NLS-324
R. Barrett	8-H-7
ACRS (10)	
L. Plisco	17-G-21
J. Chung	12-G-18
J. Flack	NLS-324
D. Houston	P-315
J. Lane	NLS-013
Erasmia Lois	NLS-314
J. Monninger	8-D-1
B. Palla	10-E-4
M. Rubin	8-E-23
J. Schiffgens	10-E-4
A. Ramey-Smith	8-E-23
A. Thadani	8-E-2
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Distribution Enclosures 1 & 2:

Docket File
NRC & Local PDRs
WBN Rdg. File
P. Tam/C. Jackson