

August 1, 1991

Docket Nos. 50-390  
and 50-391

APPLICANT: TENNESSEE VALLEY AUTHORITY (TVA)

FACILITY: WATTS BAR NUCLEAR PLANT, UNITS 1 AND 2

SUBJECT: MEETING SUMMARY - MEETING ON JULY 29, 1991 ON REVIEW STATUS  
OF VARIOUS CIVIL/SEISMIC ISSUES (TAC NOS. 63625, 71919, 79692,  
79693, 79717, 79718, 80345, 80346, R00508, R00510, R00514 AND  
R00516)

Reference: Meeting Notice by P. S. Tam dated July 16, 1991

The NRC staff met with TVA personnel on July 29, 1991 at the headquarters of  
the Nuclear Regulatory Commission in Rockville, Maryland, to discuss the status  
and planned actions on several licensing activities concerning civil/seismic  
issues. Enclosure 6 is the list of meeting attendees.

TVA provided five documents, which have been included as Enclosures 1-5 in  
this summary. Enclosures 2-5 summarize the current status and expected future  
actions of all the civil/seismic issues. TVA offered to assist the staff to  
facilitate staff review on submittals on the subject issues. The staff stated  
that the review of all issues are ongoing as planned and as allowed by available  
NRR resources. The staff committed to communicate by phone whenever technical  
problems are encountered, and to hold a meeting with TVA personnel whenever  
such is deemed beneficial for resolution of problems.

The staff stated that it has nearly completed review of some issues, and  
expects to find TVA's submittals acceptable for these issues. Enclosure 1,  
which was the meeting agenda, has been annotated to identify such issues, and  
to document the highlight of discussion in the meeting.

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: 9108050276 910801  
As stated PDR ADDCK 05000390  
A PDR

cc w/enclosures:  
See next page

OFC	: PDII-4/LA	: PDII-4/PM	: PDII-4/D	:
NAME	: MSanders <i>ms</i>	: PTam:as/dw <i>PT</i>	: FHebdon <i>for</i>	:
DATE	: 8/1/91	: 8/1/91	: 8/1/91	:

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*Memo*  
*[Signature]*  
*QF01*  
*1/1*

cc:

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Rhea County Courthouse  
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Honorable Johnny Powell, County Judge  
Meigs County Courthouse, Route 2  
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Tennessee Valley Authority  
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Rockville, Maryland 20852

July 29, 1991 10:00 am

TVA/NRC Civil Seismic Project Status and  
Open Items Closure Review MeetingProject Status and Open Item Closure

## MORNING SESSION

1. Structural Issues T. Cheng
  - a. Verification of Eccentricities in Containment Model — Staff expects *close out soon.*
  - b. Structural Questions
    - Request for Additional Information - Thermal Issues
  - c. Status of April 15-19, 1991 Audit Issues — Staff will issue audit *report in near future.*
  - d. Status of September 9, 1991 Audit Plan — Staff will discuss with *TVA in near future re. actual date.*

## AFTERNOON SESSION

2. Other Civil Issues J. Fair
  - a. Classification of Cable Trays and Conduit — Preliminary review results *available in a few days.*
  - b. Number of OBE Events — Expect to be resolved soon.
  - c. Multi-Mode Factor — NRC contractor to complete review by 8/91.
  - d. Conduit Damping — Staff expects discussion with TVA soon.
  - e. Revisions and Dates of Code Cases — TVA response coming soon.
  - f. Feedwater Check Valve Slam — Site review in 8/91. See Enclosure 5.
  - g. Category I (L) Piping Validation — Staff expects discussion with TVA.
  - h. Pressure Relief Devices — Staff finds response acceptable; result to *be published in SER 7.*
  - i. Minimum Load Study for Category I Supports — TVA letter coming.
  - j. Equipment Qualification — TVA will send letter in to adopt SRP *position. Staff would find it acceptable.*
  - k. 79-02 Response — TVA submittal coming soon
  - l. DBA Analysis for SCV — Expect RAI by 8/31/91
  - m. Commodity Critical Case Attribute Coverage, QA Records — Staff needs *more time to decide. Will discuss with TVA.*

Seismic/Civil Program Element Status

Enclosure 2

PROGRAM ELEMENT	OVERALL TASK STATUS	KEY CALCULATIONS	HIGHLIGHTS
HANGER & ANALYSIS UPDATE PROGRAM (HAAUP)			
° Large Bore Piping and Supports	90%	° Pipe Stress and Support Calculations Completed	° Walkdown Completed ° Approximately 4200 Mods Issued (50% Implemented) ° Closure activities in progress
° Small Bore Piping and Supports	60%	° Load Rating of Support Variances 95% Complete ° Pipe Stress Evaluations 50% Complete ° Pipe Support Evaluations 15% Complete	° Approximately 860 Modifications Projected ° 168 Modifications Issued
° Instru- mentation	60%	° Senseline and Support Calculations 70% Complete ° Radiation Monitoring Lines and Supports 50% Complete	° No Modifications Identified to Date ° Qualification of Typicals Completed

PROGRAM ELEMENT	OVERALL TASK STATUS	KEY CALCULATIONS	HIGHLIGHTS
<ul style="list-style-type: none"> <li>◦ Integrated Interactions<sup>1</sup></li> <li>◦ Shakespace</li> <li>◦ II/I Interactions</li> <li>◦ Seismic &amp; Thermal Interactions</li> </ul>	50%	<ul style="list-style-type: none"> <li>◦ Shakespace Evaluation Completed</li> <li>◦ Seismic/Thermal Suspended Systems Interactions 70% Complete</li> <li>◦ II over I Interactions 25% Complete</li> </ul>	<ul style="list-style-type: none"> <li>◦ Shakespace Modifications Identified</li> <li>◦ IPS/ADGB/DGB Evaluations Completed</li> </ul>
<ul style="list-style-type: none"> <li>◦ Equipment Seismic Qualification</li> </ul>	50%	<ul style="list-style-type: none"> <li>◦ 13 Calculations Qualifying Approximately 430 Category I Features Completed</li> </ul>	<ul style="list-style-type: none"> <li>◦ Database Compilation Completed</li> <li>◦ Walkthroughs of Equipment With Known Deficiencies as well as Area Walkthroughs in Progress</li> </ul>
<ul style="list-style-type: none"> <li>◦ Platforms</li> </ul>	60%	<ul style="list-style-type: none"> <li>◦ Worse Case Selection Calculation Completed</li> <li>◦ 6 Worse Case Platform Calculations completed associated with these 6 platforms, 29 Embedded Plate Calc's completed</li> <li>◦ 4 Worse Case Platform Calculations 85% Complete associated with these 4 platforms, 12 embedded plate calc's will be completed</li> <li>◦ 4 Worse case platform calculations between 50%-85% Complete</li> <li>◦ 4 Worse case platform calculations between 50%-85% associated with these 4 platforms, 12 Embedded Plate calc's will be completed</li> </ul>	<ul style="list-style-type: none"> <li>◦ Walkdown of 20 Worse Case Platforms Completed</li> <li>◦ Modifications on 8 of the 20 Worse Case Platforms Projected</li> </ul>
<ul style="list-style-type: none"> <li>Structural Steel Thermal Issues</li> </ul>	55%	<ul style="list-style-type: none"> <li>◦ Worse Case Selection Calculation Completed</li> <li>◦ Test Data Vs Computer Model Calculation Completed</li> <li>◦ 3 Calculations Documenting 15 Worse Case Configurations 58% Complete (1 Calculation With 5 Configurations will be issued by 9 Sep 91)</li> </ul>	<ul style="list-style-type: none"> <li>◦ 15 Worse Cases Comprised of 8 Axial 6 Proximity, &amp; 1 Header Restraints.</li> <li>◦ Modifications on 5 Axial Restraints Expected</li> <li>◦ Currently Preparing Responses to NRC FSAR Information Request</li> </ul>

PROGRAM ELEMENT	OVERALL TASK STATUS	KEY CALCULATIONS	HIGHLIGHTS
Pipe Whip Restraints	60%	<ul style="list-style-type: none"> <li>◦ 6 Calculations Evaluating Field Changes/ VSR DR'S/Attachments Completed</li> <li>◦ 11 Calculations Retrieving Computer Input/ Output Completed</li> <li>◦ 5 Calculations Evaluating the Valve Room Pipe Whip Restraint Steel Structures For Thermal Load are 70% Complete.</li> </ul>	<ul style="list-style-type: none"> <li>◦ Walkdown of Selected Embedded Plates 98% Complete</li> </ul>
Steel Containment Vessel	75%	<ul style="list-style-type: none"> <li>◦ Calculation to Document Parametric Study on Penetration Interaction Completed</li> <li>◦ 3 Calculations Which Evaluate Thermal Movement and Compare old VRS new Movements is Completed</li> <li>◦ 1 Calculation Evaluating 80 Pad Plates is Completed</li> <li>◦ 10 Process Pipe Penetration Calculations Completed</li> <li>◦ 14 Calculations Evaluating 41 Non-Process Pipe Penetrations Completed</li> <li>◦ 1 Calculations Evaluating HVAC/Air Lock Penetrations Completed</li> </ul>	<ul style="list-style-type: none"> <li>◦ Walkdown of SCV Completed</li> <li>◦ Composite Drawing Documenting Walkdown Completed</li> <li>◦ No Modifications Anticipated</li> </ul>
Concrete	65%	<ul style="list-style-type: none"> <li>◦ 6 Calculations Evaluating Tornado Missile Protection Completed</li> <li>◦ 4 Calculatngs Evaluating Prestressed Concrete Members Completed</li> <li>◦ 5 Calculations Evaluating Prestressed Concrete, Slabs, Walls, Beams, &amp; Columns 70% Complete.</li> <li>◦ 3 Calculations Evaluating Shear Walls are 80% Complete</li> <li>◦ 2 Calculations Evaluating Partition Walls are 85% Complete</li> <li>◦ Calculations on Crane Wall/Fill/Base Slab to Start in August</li> </ul>	<ul style="list-style-type: none"> <li>◦ Walkdown of Worse Case Concrete Features Completed</li> <li>◦ Walkdown of Worse Case Partition Walls Completed</li> <li>◦ Modifications for Additional Tornado Missile Protection Have Been Identified</li> </ul>

PROGRAM ELEMENT	OVERALL TASK STATUS	KEY CALCULATIONS	HIGHLIGHTS
Masonry Walls	95%	<ul style="list-style-type: none"> <li>◦ 7 Calculations Evaluating 39 Worse Case Masonry Walls Completed</li> </ul>	<ul style="list-style-type: none"> <li>◦ Walkdown Completed</li> <li>◦ Clip Angle Modifications have been identified</li> <li>◦ DCN For Removal of Unqualified Anchors (Toggle Bolts) Developed</li> </ul>
Equipment Anchorage	35%	<ul style="list-style-type: none"> <li>◦ 3 Calculations Documenting the Selection of Worse Cases For (12 Tanks, 8 Heat Exchnagers, &amp; 16 Pumps) Completed</li> <li>◦ 2 Calculatings Documenting the 2K Or Greater Equipment Selection For Evaluation on Concrete Slabs Completed</li> <li>◦ 1 Calculation Each For Tanks, Heat Exchangers, &amp; Pumps will be issued by 9 Sep 91</li> </ul>	<ul style="list-style-type: none"> <li>◦ Walkthrough for Known Deficiencies Completed</li> </ul>
Embedded Plates	35%	<ul style="list-style-type: none"> <li>◦ Calculation Issued Documenting Worse Case Plates for Large Bore Piping Attachments</li> </ul>	<ul style="list-style-type: none"> <li>◦ Walkthrough of Plates for Large Bore Attachment Worse Case Selection Completed</li> </ul>
Geotechnical	95%	<ul style="list-style-type: none"> <li>◦ Key Calculations Completed</li> </ul>	<ul style="list-style-type: none"> <li>◦ Closure activities in progress</li> </ul>

PROGRAM ELEMENT	OVERALL TASK STATUS	KEY CALCULATIONS	HIGHLIGHTS
Conduit and <sup>1</sup> Supports	50%	<ul style="list-style-type: none"> <li>◦ 108 Calculations to Evaluate old Typical Completed</li> <li>◦ 29 Calculations to Design New Typical Completed</li> <li>◦ 1 Calculation to Evaluate Attachments to Conduit Supports Completed</li> <li>◦ 1 Calculation to Evaluate Junction Box Used as a Support Completed</li> <li>◦ Calculations Evaluating Approximately 900 Supports Completed</li> </ul>	<ul style="list-style-type: none"> <li>◦ Walkdown of Supports Attached to SCV Completed</li> <li>◦ Walkdown for Overweight Conduit 45% Complete</li> <li>◦ Walkthrough for Remainder of Plant 69% (29000 of 42000 SPTS) Complete</li> </ul>
HVAC & Supports <sup>1</sup>	55%	<ul style="list-style-type: none"> <li>◦ 1 Calculation Evaluating 26 Worse Case Tornado Dampers Completed</li> <li>◦ 1 Calculation Evaluating the EGTS Supports</li> </ul>	<ul style="list-style-type: none"> <li>◦ Walkthrough/Walkdown for Tornado Dampers Completed</li> <li>◦ Walkthrough/Walkdown For EGTS Complete</li> </ul>
Cable Trays <sup>1</sup> & Supports	50%	<ul style="list-style-type: none"> <li>◦ 200 Cable Tray Support Calculations Completed</li> <li>◦ 4 Calculations Evaluating 33 SPTS Attached to SCV Completed</li> </ul>	<ul style="list-style-type: none"> <li>◦ Walkthrough/Walkdown for Supports on SCV Completed</li> <li>◦ Walkthrough of Cable Tray Supports Completed</li> <li>◦ Walkthrough of Cable Trays to Start in Early August 1991</li> </ul>

<sup>1</sup> Assessments for intake Pumping Station, DG Building and ADG Building Completed For the Commodities.



SEISMIC/CIVIL PROJECT

NRC OPEN ITEMS STATUS SUMMARY

JULY 26, 1991

SSER-6 ISSUE

Staff expects close out.

JAN FEB MAR APR MAY JUN JUL AUG SEPT

1.	Verification of mass eccentricities in containment model OI-19(c)	1/28 Initial response			5/8 TVA formal submittal					-----> NRC reviewing (Complete 8/30)
2.	Comparison of responses Set A vs Set B OI-19(g)									Routine implementation NRC audits 12/30 -----> Closure
3.*	Classification: Cable Trays and Conduits OI-18	1/29 NRC/TVA meeting	2/15 verbal response		5/8 TVA formal submittal					-----> NRC reviewing (Complete 7/30)
4.	Number of OBE events: FSAR (2) vs SRP (5) OI-19(a)	1/28 Initial response	2/20 NRC/TVA telecon		5/8 TVA formal submittal					-----> Resolved NRC TELECON (7/18/91)
5.*	Use of Multi-mode Factor of 1.2 (FSAR) vs 1.5 (SRP) OI-19(b)	1/28 Initial response					6/14 Formal calc submittal			-----> NRC reviewing (Complete 8/30)
6.*	Conduit Damping: 4% and 7% OI-19(d)	1/28 Initial response			5/8 TVA formal submittal					-----> NRC reviewing (Complete 7/30)
7.	Clarify revisions & dates of Code Cases used OI-19(c)								7/29 Project submit Code Case letter to NRC	-----> NRC review and closure
8.*	Feedwater Check Valve Slam reanalysis OI-20(a)	2/4 Telecon	2/12 Add'l info provided					July NRC site visit	8/2 TVA reanalysis Phase 1 complete	-----> NRC review Phase 1
9.*	Category I(L) Piping verification OI-19(h)								7/30 NRC feedback by 7/30	-----> Discussions expected
10.	Pressure Relief Devices OI-19(i)				5/8 NRC RAIs received	6/28 TVA response to RAIs				-----> NRC review response, no TVA action expected

\* Critical items on which TVA needs early review and feedback.

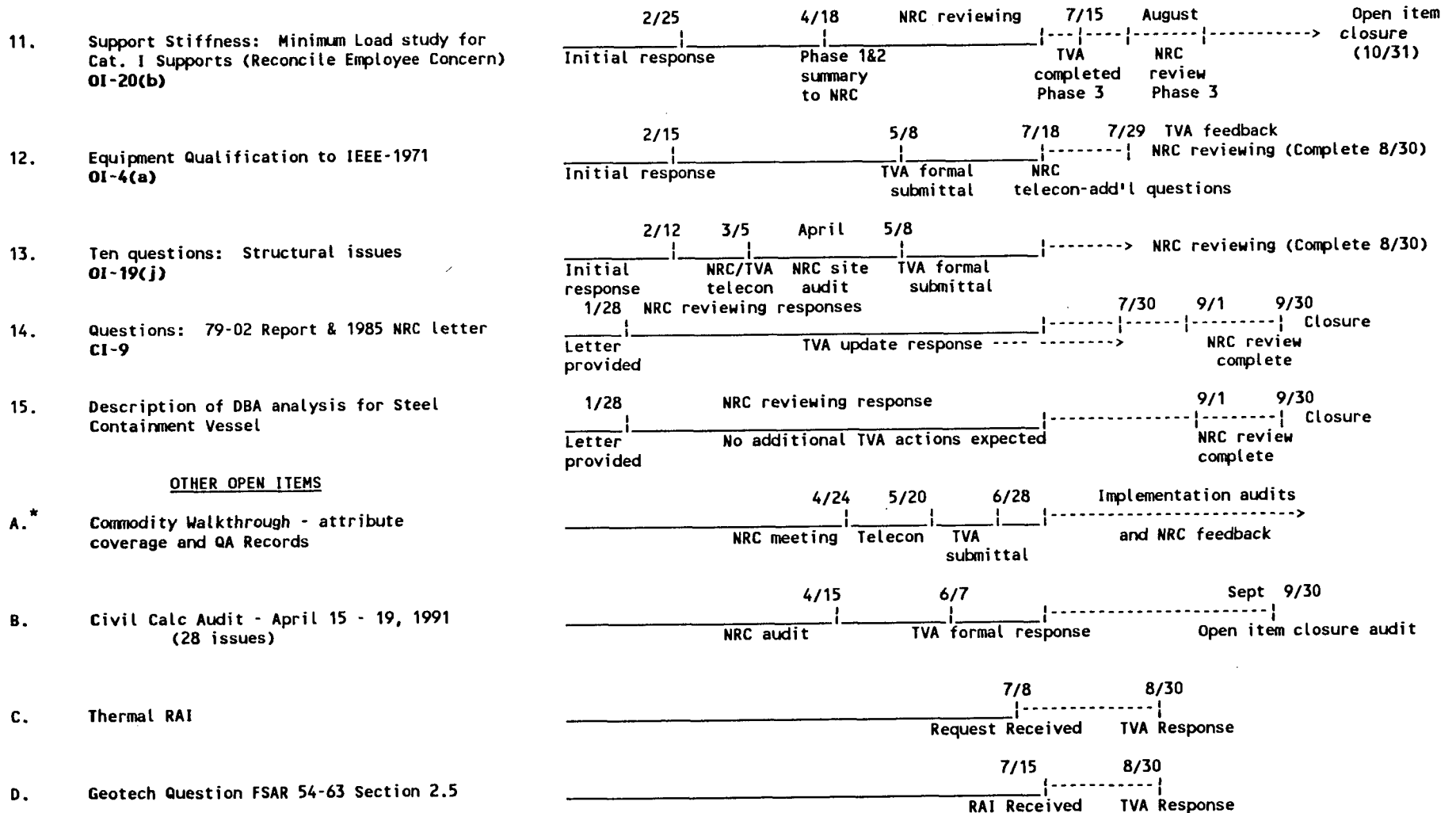
**SEISMIC/CIVIL PROJECT**

**NRC OPEN ITEMS STATUS SUMMARY**

**JULY 26, 1991**

SSER-6 ISSUE

JAN FEB MAR APR MAY JUN JUL AUG SEPT



\* Critical items on which TVA needs early review and feedback.

CIVIL CALCULATIONS  
TASK STATUS PROJECTIONS  
FOR SEPTEMBER 9, 1991

TASK	% OF CALCs COMPLETED	PROJECTED STATUS
STRUCTURAL STEEL PLATFORMS	65%	13 OF WORSE CASE 20 PLATFORMS WILL BE COMPLETED
THERMAL	50%	5 OF THE 15 WORSE CASE EVALUATIONS WILL BE COMPLETED. THESE CALCULATIONS WILL EVALUATE ONE OF EACH OF THE RESTRAINT CONDITIONS (AXIAL, PROXIMITY, & BRACED).
STEEL CONTAINMENT VESSEL	75%	CLOSURE OF OPEN ITEMS
CONCRETE	50%	A) WORSE CASE EVALUATION FOR SLABS, WALLS, & BEAMS, WILL BE COMPLETE. B) SHEAR WALL EVALUATIONS WILL BE COMPLETE. C) REACTOR BLDG BASE SLAB & CRANE WALL SCHEDULED FOR COMPLETION 12/91.
MASONRY WALLS	95%	CLOSURE OF OPEN ITEMS
EQUIPMENT ANCHORAGE	40%	ONE HEAT EXCHANGER, FOUR PUMPS, AND 9 TANKS WILL BE COMPLETED (14 OF 36 FEATURES ALONG WITH WORST CASE SELECTION CALC).
GEOTECHNICAL	95%	CLOSURE OF OPEN ITEMS.
EMBEDDED PLATES	35%	CATEGORIZATION AND GROUPING AS WELL AS COMPLETION OF APPROX 180 OUT OF 500 CALCs.

WBEP - 4481A

## Summary of Analysis Feedwater Check Valve Slam

### Analysis Model Complete

The analysis model has been generated and checked. The model includes the 16 inch/18 inch feedwater line from Steam Generator number 4 to the flued head anchor at the Auxiliary Building, the 2 inch bypass line, and portions of the 4" wet lay-up line to provide an overlap region.

The model is composed of elastic and plastic pipe and elbow elements and nonlinear support elements. The pipe and elbow elements have material nonlinearity only, represented by bilinear stress-strain curves. The stress-strain curves are based on ASME Code values for elastic modulus, yield stress, and ultimate stress and published values of ultimate strain.

Supports have geometrical and/or material nonlinearities. Supports are represented by load-deflection relationships. Supports have been evaluated to define yield or break-away loads; ductile supports are modeled as elastic-perfectly plastic. Gaps in rupture restraints have been field-measured and included in the analysis model.

### Loads Generated

Operating conditions (gravity, thermal expansion, pressure, and thermal anchor movements) are considered to initialize the system.

Nine synthetic seismic time histories were generated to match enveloped and broadened floor response spectra for the attachment points. The seismic time histories correspond to the envelope of Sets B plus C spectra for both OBE and SSE at 2 and 3 percent damping accordingly and meet all SRP requirements for time history input.

### Nonlinear Analysis Underway

Due to model size and complexity and computer limitations, the nonlinear analysis is being performed in discrete time segments of 1.5 seconds. The analysis process is iterative; model and analysis convergence parameters will be adjusted as necessary to ensure correct results for each time segment.

ENCLOSURE 6

NRC/TVA MEETING ON WATTS BAR 1 AND 2

JULY 29, 1991

<u>Name</u>	<u>Organization</u>
T. Chan	NRC/NRR/EMEB
T. Cheng	NRC/NRR/ESGB
M. Cleveland	TVA - Project Management
J. Fair	NRC/NRR/EMEB
R. Hernandez	TVA - Project Engineer
R. Huston	TVA - Rockville Licensing
D. Jeng	NRR/NRC/ESGB
S. Kim	NRR/NRC/ESGB
W. Massie	TVA - Watts Bar Licensing
G. Pannell	TVA - Site Licensing Manager
M. Shulman	CYGNA
P. Tam	NRC/NRR/Watts Bar Project Manager

Distribution

Docket File

NRC PDR

Local PDR

F. Miraglia 12-G-18

J. Partlow 12-G-18

S. Varga 14-E-4

G. Lainas 14-H-3

F. Hebdon

M. Sanders

P. Tam

B. Wilson RII

J. Weschelberger 17-G-21

M. Branch RII

G. Walton RII

K. Barr RII

H. Livermore RII

OGC 15-B-18

E. Jordan MNBB-3701

S. Kim 7-H-15

D. Jeng 7-H-15

J. Fair 7-E-23

T. Chan 7-E-23

T. Cheng 7-E-23

ACRS (10)

H. Wang 9-A-1

WBN Reading File