

*official copy*

MAY 01 1992

Docket Nos. 50-327, 50-328  
License Nos. DPR-77, DPR-79

Tennessee Valley Authority  
ATTN: Dr. Mark O. Medford, Vice President  
Nuclear Assurance, Licensing and Fuels  
3B Lookout Place  
1101 Market Street  
Chattanooga, Tennessee 37402-2801

Gentlemen:

SUBJECT: ENFORCEMENT CONFERENCE SUMMARY (NRC INSPECTION REPORT  
NOS. 50-327/92-06 AND 50-328/92-06)

This letter refers to the Enforcement Conference held at our request on May 1, 1992. This meeting concerned activities authorized at your Sequoyah facility. The issues discussed at this conference related to the apparent inoperability of the ice condenser lower inlet doors which were jammed by the rising floor wear pads. A list of attendees and a copy of your handouts are enclosed. We are continuing our review of these issues to determine the appropriate enforcement action.

In accordance with Section 2.790 of the NRC's "Rules of Practice," Part 2, Title 10 Code of Federal Regulations, a copy of the letter and its enclosures will be placed in the NRC Public Document Room.

Should you have any questions concerning the letter, please contact us.

Sincerely,

(Original signed by L. Reyes)

Luis A. Reyes, Director  
Division of Reactor Projects

Enclosures:

- 1. List of Attendees
- 2. Ice Condenser Handout

cc w/encls: (See page 2)

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PDR ADOCK 05000327  
G PDR

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Tennessee Valley Authority

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cc w/encls:

Mr. John B. Waters, Director  
Tennessee Valley Authority  
ET 12A  
400 West Summit Hill Drive  
Knoxville, TN 37902

TVA Representative  
Tennessee Valley Authority  
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General Counsel  
Tennessee Valley Authority  
ET 11H  
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Knoxville, TN 37902

Mr. J. R. Bynum, Vice President  
Nuclear Operations  
Tennessee Valley Authority  
3B Lookout Place  
101 Market Street  
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Ms. Marci Cooper, Site Licensing  
Manager  
Sequoyah Nuclear Plant  
Tennessee Valley Authority  
P. O. Box 2000  
Soddy-Daisy, TN 37379

Mr. Jack Wilson, Vice President,  
Sequoyah Nuclear Plant  
Tennessee Valley Authority  
P. O. Box 2000  
Soddy-Daisy, TN 37379

Mr. M. J. Burzynski, Manager  
Nuclear Licensing and  
Regulatory Affairs  
Tennessee Valley Authority  
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Mr. Michael H. Mobley, Director  
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T.E.R.R.A. Building 6th Floor  
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Nashville, TN 37219-5404

County Judge  
Hamilton County Courthouse  
Chattanooga, TN 37402

State of Tennessee

bcc w/encls: (See apge 3)

MAY 01 1992

Tennessee Valley Authority

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bcc w/encl:

S. D. Ebnetter, RII

L. A. Reyes, RII

J. R. Johnson, RII

G. C. Lainas, NRR

F. J. Hebdon, NRR


P. J. Kellogg, RII

D. E. Labarge, NRR

NRC Document Control Desk

NRC Senior Resident Inspector  
U.S. Nuclear Regulatory Commission  
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Soddy-Daisy, TN 37379

DRP/RII

  
PKellogg

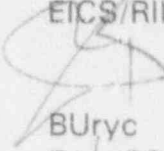
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DRP/RII

  
BWilson

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ETCS/RII

  
BUryc

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## ENCLOSURE 1

### LIST OF ATTENDEES

#### NRC

J. L. Milhoan, Deputy Regional Administrator, Region I, (RII)  
L. A. Reyes, Director, Division of Reactor Projects, RII  
A. F. Gibson, Director, Division of Reactor Safety (DRS), RII  
E. W. Merschoff, Deputy Director, Division of Reactor Safety, RII  
F. J. Hebdon, Director, Project Directorate II-4, Nuclear Reactor Regulation (NRR)  
C. A. Julian, Chief Engineering Branch, DRS, RII  
J. J. Blake, Chief, Materials and Process Section, DRS, RII  
J. L. Coley, Reactor Inspector, RII  
W. E. Holland, Senior Resident Inspector, RII  
P. J. Kellogg, Chief, Reactor Projects Section 4A, RII  
D. E. LaBarge, Senior Project Manager, NRR  
B. Uryc, Senior Enforcement Specialist, Enforcement and Investigation Coordination Staff, RII  
R. Pedersen, Enforcement Specialist, Office of Enforcement (by telephone)  
C. E. Evans, Regional Counsel  
T. Y. Liu, Reactor Inspector Intern, RII  
W. P. Kleinsorge, Reactor Inspector, DRS, RII

#### TVA

J. R. Bynum, Vice President, Nuclear Operations  
M. O. Medford, Vice President, Nuclear Assurance, Licensing and Fuels  
N. C. Kazanus, Vice President Completion Assurance  
J. L. Wilson, Vice President, Sequoyah  
R. J. Beecken, Plant Manager  
M. A. Cooper, Site Licensing Manager  
T. A. Flippo, Site Quality Manager  
P. G. Trudel, Engineering Manager  
V. Morton, Engineering Technologist, South West Research Institute  
D. F. Goetcheus, Outage Support Manager  
F. C. Leonard, Technical Specialist Inspection Services  
J. Smith, Regulatory Licensing Manager  
J. P. Maciejewski, Quality Assurance Manager  
J. N. Ward, Engineering and Modifications Manager  
R. Bryan, Manager, NSSS and Analysis  
M. L. Turnbow, Inspection Services Manager  
D. L. Love, Maintenance Planning and Technical Supervisor  
V. A. Zilberstein, Senior Materials Engineer, Stone and Webster

**TVA/NRC ENFORCEMENT CONFERENCE**

**SEQUOYAH NUCLEAR PLANT**

**ICE CONDENSER FLOOR ISSUE**

**IR 50-327, 328/92-06**

**MAY 1, 1992**

# ICE CONDENSER FLOOR ISSUE

## AGENDA

- I. INTRODUCTION/OVERVIEW
- II. SEQUENCE OF EVENTS LEADING TO DISCOVERY
- III. ICE CONDENSER FLOOR DESIGN
- IV. AS FOUND CONDITIONS
- V. INVESTIGATION ACTIONS
- VI. CAUSE OF CONDITION
- VII. ACTIONS TAKEN AND PLANNED
- VIII. SAFETY IMPLICATIONS
- IX. CONCLUSIONS

## **I. INTRODUCTION/OVERVIEW**

- **Unit 2 Door Binding Identified During Outage Activities**
- **Unit 1 Promptly Inspected, Leading to Prudent Unit Shutdown**
- **Promptly Reported to NRC - Extensive Continuing Exchange of Information**
- **Condition Resulted From Incomplete Sealing During Initial Construction Combined With Water Intrusion**
- **Extensive Evaluation and Corrective Actions Implemented to Restore and Establish Operability**
- **Evaluations Concluded Minimal Safety Significance**

## **II. SEQUENCE OF EVENTS LEADING TO DISCOVERY**

- March 13      Unit 2 Enters Cycle 5 Refueling Outage**
- March 15      Maintenance Foremen Identify Difficulty in Opening  
Some Doors**
- March 16      Tech Support Performs Walkdown  
1400 EST**
- March 17      Tech Support and Nuclear Engineering Perform  
1330 EST      Inspection; Floor Cracking Identified and  
Inspected; Frost Upheaval of Wear Slab Noted;  
PER Initiated**
- Plant Management Notified Following Evaluation of  
Unit 2 Ice Condenser Condition**
- 1745 EST      NRC Notified of Unit 2 Ice Condenser Condition**
- Planning Initiated for Unit 1 Ice Condenser Inspection**



## II. SEQUENCE OF EVENTS LEADING TO DISCOVERY (cont'd)

- March 18      Detailed Inspection Plan Developed; Including Unit 2  
Mock-Up Walk-Thru
- 2000 EST      Tech Support and Nuclear Engineering Perform  
'At Power' Inspection of Unit 1 Ice Condenser;  
Similar Conditions Noted; 11 of 48 Doors Declared  
Inoperable
- 2048 EST      LCO 3.6.5.3 Entered
- 2143 EST      NRC Notified of Unit 1 Ice Condenser Problem
- 2210 EST      Unit 1 Shutdown Initiated as Prudent Action
- 2245 EST      NRC Notified of Unit 1 Shutdown
- March 19  
0247 EST      Unit 1 Entered Hot Standby

### III. ICE CONDENSER FLOOR DESIGN

- **Floor Assembly Detail**
  - **Structural Slab**
  - **Foam Concrete**
  - **Vapor Barrier**
  - **Grout Layer**
  - **Steel Plate With Glycol Piping**
  - **Wear Slab**
  - **Floor Drain**

#### IV. AS FOUND CONDITIONS

- 27 of 48 Doors Difficult to Open on Unit 2
- 11 of 48 Doors Difficult to Open on Unit 1
- Wear Slab Raised Small Amounts up to 2-3 Inches
- Wear Slab Cracking Noted Near Points of Rigid Restraint
- Turning Vanes in Contact With Wear Slab in Some Bays
- Drains Separated From Wear Slab in Some Bays

## **V. INVESTIGATION ACTIONS**

- **Perform Structural Walkdowns and Inspections**
- **Perform Mapping of Wear Slab Configuration**
- **Perform Structural Evaluation - TVA and Independent**
- **Consult Westinghouse Ice Condenser Specialist**
- **Review of Initial Design and Construction**
- **Review of Maintenance Practices**
- **Monitoring for Immediate Changes**

## **VI. CAUSE OF CONDITION**

**Direct Cause: Intrusion of Water Beneath Wear Slab Resulting in Frost Upheaval Over Time**

### **Root:**

- **Construction**
  - **Lack of Sealant at Some Joints**
  - **Vapor Barrier Extends Thru Sealant at Some Joints**
- **Field Design Changes**
  - **Omission of Expansion Joint**
  - **Deletion of Flashing at Crane Wall**

### **Contributor:**

- **Maintenance Activities**
  - **Cleaning**
  - **Defrosting**

## **VI. CAUSE OF CONDITION (cont'd)**

### **Comparison of Other Ice Condenser Plants**

#### **Design**

- **Common**
  - **Expansion Joint Seal Detail**
  - **Wear Slab Coating**
  - **Door Flashing**
  
- **Different**
  - **Drain Detail (Fiberglass vs Steel)**
  - **Crane Wall Flashing (Only Cook)**

#### **Construction**

- **No Known Difference**

## VI. CAUSE OF CONDITION (cont'd)

### Maintenance

- **Common**
  - **Sequoyah And Cook Floor Defrost**
- **Different**
  - **Catawba And McGuire Do Not Floor Defrost**
  - **Sequoyah Has More Frequent And Longer Defrosts**
  - **Other Plants Actively Pursue Removing Water Accumulation**

## VII. ACTIONS TAKEN AND PLANNED

### Unit 1 Actions

- **Temporary Alterations to Door Flashing and Seal**
  - **Lower Section of Sheetmetal Flashing Removed**
  - **Insulation Bags Replaced With Strip Insulation**
- **Tech Spec 'Pull-Test' Performed on Doors**
- **On Line Monitoring Plan Established**
  - **Displacement Transducers Installed in Each Bay**
  - **Ice Condenser Camera Available for Visual Inspection**
  - **Lower Plenum Entry Plan Available as Backup Method**
- **Operational Guidance Established**
- **Structural Evaluation Completed - Functionality Maintained**



## **VII. ACTIONS TAKEN AND PLANNED (cont'd)**

### **Structural Evaluation Details**

- **Detailed Walkdowns and Inspections Conducted, Including Boroscope**
- **No Apparent Cracking or Areas of Obvious Distress on Structural Slab**
- **Turning Vanes Inspected for Contact With Wear Slab, Bolting Deformation, and Wear Slab Cracking at Points of Contact**
- **Minimal Additional Downward Loading Impact on Structural Slab**
- **Minimal Additional Dead Weight Impact From Water/Ice Beneath Wear Slab**
- **Wear Slab Position Will be Maintained During Seismic Event**
- **No Indications of Corrosion at Steel Containment Vessel Interface**

## **VII. ACTIONS TAKEN AND PLANNED (cont'd)**

### **Unit 2 Actions**

- **Unit 2 Design Changes**
  - **Door Seals**
  - **Drains**
  
- **Structural Evaluation Completed**
  
- **Changes to Outage Maintenance Practices**
  - **Minimize Water Generation**
  - **Minimize Water Exposure**
  - **Enhanced Surveillance Scheduling**
  
- **On Line Monitoring Plan Established**

## VII. ACTIONS TAKEN AND PLANNED (cont'd)

### Longer Term Actions For Both Units

- Continued Monitoring
- Evaluation of Floor Sealing
- Evaluate Effectiveness of Corrective Actions
- Submit TS Change

## VIII. SAFETY IMPLICATIONS

### Unit 1

- Evaluation of Door Opening Time Sensitivities
- Concluded:
  - All Doors Would Open
  - No Change in Opening Times
  - No Impact on FSAR Analyses

### Unit 2

- Evaluation of Impaired Door Effects - Assumed 6 of 48 Doors Would Not Open
- Concluded:
  - Insignificant Effect on Peak Containment Pressure (LBLOCA Limiting)
  - Acceptable Increase in Subcompartment Pressures (LBLOCA Limiting)
  - No Change in Peak Containment Temperature (MSLB Limiting)

## VIII. SAFETY IMPLICATIONS (cont'd)

### Overall Conclusions

- **Margin Between TS Requirements and Safety Limit Impact**
- **Ice Condensers Would Have Performed Intended Function**
- **Safety Analyses Conclusions Remain Valid**

## **IX. CONCLUSIONS**

- **Condition Identified by Licensee Inspections**
- **Prudent Operational Decisions**
- **Condition Effects Evaluated With Independent Specialist Reviews**
- **Corrective Actions to Restore Operability and Monitor Effectiveness**
- **Longer Term Evaluation to Optimize Corrective Actions**
- **Ice Condensers Would Have Performed Intended Function - Minimal Safety Significance**
- **Enforcement Discretion Warranted**