



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

REGION IV

611 RYAN PLAZA DRIVE, SUITE 400  
ARLINGTON, TEXAS 76011-8064

Dockets: 50-313  
50-368  
Licenses: DPR-51  
NPF-6

Entergy Operations, Inc.  
ATTN: J. W. Yelverton, Vice President  
Operations, Arkansas Nuclear One  
Route 3, Box 137G  
Russellville, Arkansas 72801

SUBJECT: MARCH 8, 1994, ENFORCEMENT CONFERENCE

This refers to the enforcement conference conducted at NRC's request in the Region IV office on March 8, 1994. This enforcement conference related to an apparent violation identified in NRC Inspection Report 50-313/94-12; 50-368/94-12, dated March 1, 1994, and was attended by those on the attached Attendance List.

It is our opinion that this meeting provided a better understanding of the issues regarding the inoperability of an emergency feedwater flow path on Unit 1. You discussed the problem description, operational significance, and chronology of an event related to the inoperability of an emergency feedwater flow path which was caused by a failing steam generator level transmitter. Your discussion included the reasons that this condition was not recognized and corrected by the operations staff in a timely manner.

During this enforcement conference, you also provided the results of your root cause evaluations, contributing factors, and the corrective actions taken to prevent recurrence of such an event. You also provided a perspective on possible enforcement action.

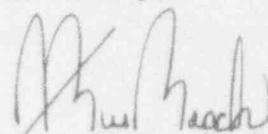
As indicated to you in the enforcement conference, we are evaluating the information you provided to us in the conference and will forward our enforcement decision in the near future. In accordance with Section 2.790 of the NRC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations, a copy of this letter will be placed in the NRC's Public Document Room.

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Should you have any questions concerning this matter, we will be pleased to discuss them with you.

Sincerely,



A. Bill Beach, Director  
Division of Reactor Projects

Attachments:

1. Attendance List
2. Licensee Presentation

cc w/attachments:

Entergy Operations, Inc.

ATTN: Harry W. Keiser, Executive  
Vice President & Chief Operating Officer

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Jackson, Mississippi 39286-1995

Entergy Operations, Inc.

ATTN: John R. McGaha, Vice President  
Operations Support

P.O. Box 31995

Jackson, Mississippi 39286

Wise, Carter, Child & Caraway

ATTN: Robert B. McGehee, Esq.

P.O. Box 651

Jackson, Mississippi 39205

Honorable C. Doug Lunningham

County Judge of Pope County

Pope County Courthouse

Russellville, Arkansas 72801

Winston & Strawn

ATTN: Nicholas S. Reynolds, Esq.

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Washington, D.C. 20005-3502

Arkansas Department of Health

ATTN: Ms. Greta Dicus, Director

Division of Radiation Control and  
Emergency Management

4815 West Markham Street

Little Rock, Arkansas 72201-3867

Entergy Operations, Inc.

-3-

B&W Nuclear Technologies  
ATTN: Robert B. Borsum  
Licensing Representative  
1700 Rockville Pike, Suite 525  
Rockville, Maryland 20852

Admiral Kinnaird R. McKee, USN (Ret)  
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ABB Combustion Engineering  
Nuclear Power  
ATTN: Charles B. Brinkman  
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12300 Twinbrook Parkway, Suite 330  
Rockville, Maryland 20852

bcc to DMB (IE45)

bcc distrib. by RIV:  
L. J. Callan  
Branch Chief (DRP/D)  
MIS System  
RIV File  
Project Engineer (DRP/D)

Resident Inspector  
Lisa Shea, RM/ALF, MS: MNBB 4503  
DRSS-FIPB  
Branch Chief (DRP\TSS)

C:DRP/D	D:DRP			
TFStetka;df	ABBeach			
3/22/94	3/21/94			

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C:DRP/D	D:DRP			
TFStetka;df	ABBeach			
3/22/94	3/21/94			

ATTENDANCE LIST

Attendance at the enforcement conference between Entergy Operations, Inc. and NRC on March 8, 1994, in the Region IV office, Arlington, Texas:

Entergy Operations, Inc.

C. Zimmerman, Operations Manager, Unit 1  
D. Mims, Director, Licensing  
J. Vandergrift, Plant Manager, Unit 1  
J. Yelverton, Vice President, Operations  
M. Goecke, Control Room Supervisor, Unit 1  
R. Carter, Assistant Operations Manager  
M. Cooper, Licensing Specialist  
W. Cusack, Shift Technical Advisor, Unit 2  
C. Dewveall, Reactor Operator, Unit 2  
R. Byford, Training Supervisor, Unit 1  
M. Farmer, Reactor Operator, Unit 1  
D. Easler, Waste Control Operator, Unit 1

NRC

→ W. Beckner, Project Directorate IV-1, Office of Nuclear Reactor Regulation (NRR)  
W. Brown, Regional Counsel  
T. Gwynn, Director, Division of Reactor Safety (DRS)  
A. Beach, Director, Division of Reactor Projects (DRP)  
W. Jones, Project Engineer, DRP  
J. Callan, Regional Administrator  
T. Stetka, Chief, Project Branch D, DRP  
G. Kalman, Project Manager, NRR  
G. Sanborn, Enforcement Officer  
L. Smith, Senior Resident Inspector, Arkansas Nuclear One (ANO), DRP  
S. Campbell, Resident Inspector, ANO, DRP  
J. Pellet, Chief, Operations Branch, DRS  
R. Lantz, Reactor Engineer/Examiner, DRS  
J. Montgomery, Deputy Regional Administrator  
J. Mitchell, Acting Deputy Director, DRS

# ARKANSAS NUCLEAR ONE

## ENFORCEMENT CONFERENCE

MARCH 8, 1994



**Entergy  
Operations**

# AGENDA

- |      |   |   |
|------|---|---|
| I.   | OPENING REMARKS                             | JERRY YELVERTON<br>Vice President, Operations   |
| II.  | INTRODUCTION                                | DWIGHT MIMS<br>Director, Licensing              |
| III. | OPERATIONS OVERVIEW                         | JIMMY VANDERGRIFT<br>Plant Manager, Unit 1      |
| IV.  | ROOT CAUSE EVALUATION<br>CORRECTIVE ACTIONS | CHARLIE ZIMMERMAN<br>Operations Manager, Unit 1 |
| V.   | ANO ENFORCEMENT<br>PERSPECTIVE              | DWIGHT MIMS<br>Director, Licensing              |
| VI.  | CLOSING REMARKS                             | JERRY YELVERTON<br>Vice President, Operations   |



**OPENING REMARKS**

**JERRY YELVERTON**  
Vice President, Operations

# INTRODUCTION

**DWIGHT MIMS**  
Director, Licensing

**OPERATIONS OVERVIEW**

**JIMMY VANDERGRIFT**  
**PLANT MANAGER, UNIT 1**

## OPERATIONS OVERVIEW

- Problem Description
- Operational Significance
- Chronology of Event
- Management Expectations and Involvement
- Safety Significance

# OPERATIONS OVERVIEW

## PROBLEM DESCRIPTION

During Technical Specification Emergency Feedwater Initiation and Control (EFIC) system channel checks, operators failed to recognize a steam generator level indication had drifted outside the allowable tolerance

## INSTRUMENT CHANNEL CHECK TECHNICAL SPECIFICATION DEFINITION

"Verification of acceptable instrument performance by observation of its behavior and/or state; this verification includes comparison of output and/or state of independent channels measuring the same variable."

## OPERATIONAL SIGNIFICANCE

- Operability limit not defined by Technical Specifications
- Values are specified procedural limits
- Instrument readings fluctuate
- OTSG level not affected
- Automatic level control function of one EFW flowpath affected
- Five of six shifts involved (15 operators)
- Multiple operating crews did not recognize that ANO Unit 1 should have been in a Technical Specification (TS) 36 hour Limiting Condition for Operation (LCO) until the LCO allowed outage time was exceeded by 59 hours
- Identified by Reactor Operator (RO) who previously did not recognize out of tolerance condition
- Condition Report initiated per corrective action program
- Low safety significance

# OPERATIONS OVERVIEW

(Continued)

## CHRONOLOGY OF EVENT

- January 22, 1994 - RO observed and logged difference in OTSG level readings, Job Request issued to repair (maximum normal difference >5 inches), log reading circled
- January 24-28, 1994 - ROs continue to log difference
- January 28, 1994 - Specified OPERABILITY difference >8 inches exceeded
- January 28-31, 1994 - Level difference continues to grow to approximately 13 inches
- January 31, 1994 - RO, who had previously logged the out of tolerance reading, realized the level indication differences exceeded the operability difference
  - LCO entered at the time of discovery
  - Orderly shutdown conducted
  - NUE declared due to TS required shutdown
  - Equipment repaired
  - Unit returned to power
- 10CFR50.72 notification made on February 1, 1994, due to TS required shutdown and NUE
- Industry notified on February 23, 1994, via Nuclear Network
- LER submitted on February 25, 1994

# OPERATIONS OVERVIEW

(Continued)

## ROOT/CONTRIBUTING CAUSES

- Human performance on repetitive tasks
- Management feedback and procedures on log taking

## MANAGEMENT EXPECTATIONS

- Operators to be aware of plant condition at all times
- Attention to detail expected during routine repetitive tasks
- Identify abnormal values and trends of process parameters before Technical Specification limits are challenged

## MANAGEMENT INVOLVED IN IDENTIFICATION OF PAST REPETITIVE TASK PROBLEMS

- Hold card errors
- Procedure usage
- Valve configuration control
- STAR Program/Additional Verification
- Auxiliary and waste control operator logs computerized

# OPERATIONS OVERVIEW

(Continued)

## SAFETY SIGNIFICANCE

- Purpose of Emergency Feedwater Initiation and Control system (EFIC)
  - EFW actuation and OTSG level control
  - Isolate SG's during main steam line break
- Only two of four channels required to initiate EFW, three EFIC channels for EFW initiation operable
- No maintenance on EFIC performed during time of level transmitter inoperability
- Affected level control valve manually operable from the control room
  - Redundant EFW flowpath to both OTSG's operable
  - Automatic level control function of one EFW flowpath would not have controlled at the desired setpoint
- AOPs and EOPs provide instructions for verifying proper EFW actuation and using operator intervention and manual control if automatic function is inoperable
- Operators trained to verify SG automatic level control when EFW in use
- Overall low safety significance
  - Three EFW flowpaths unaffected
  - Control of one level control valve degraded
  - Valve could be operated manually
  - Operators trained to manually operate valve from control room
- Recognize the regulatory significance of condition



**ROOT CAUSE EVALUATION  
CORRECTIVE ACTIONS**

**CHARLIE ZIMMERMAN**  
Operations Manager, Unit 1

# ROOT CAUSE EVALUATION CORRECTIVE ACTIONS

- Root Cause Evaluation
- Contributing Factors
- Corrective Actions
  - Short Term
  - Broad Based
- Operations Performance Perspective
- Improving Human Performance
- Summary

# ROOT CAUSE EVALUATION

## ROOT CAUSE

- Operator inattention to detail
  - During log taking and reviews
  - Did not exhibit a questioning attitude as difference continued to grow and exceed operating limit (Operators assumed problem had been dispositioned)

## CONTRIBUTING FACTORS

- Insufficient Operations management feedback on log taking errors
- Procedures for management review of logs vague
- Job Request not given proper priority
- Human factoring of Operations channel check logs (e.g. operator aids for performing repetitive tasks)



# CORRECTIVE ACTIONS

## SHORT TERM

- Dedicated operator stationed in the control room to manually control "A" steam generator level control valve if required
- Appropriate Technical Specification LCO entered and plant shutdown for transmitter repair
- Vice President, Operations and Manager, Unit 1 Operations discussed the importance and significance of this event with the Operations Control Room Supervisors and Shift Superintendents
- Event discussed with Unit 1 operators to communicate management expectations
- January 1994 Unit 1 Operations logs reviewed; no operability concerns identified
- Involved operators responded to a questionnaire which provided their perspective of the event, and recommendations for enhancing operator log taking practices
  - Operators accepted responsibility and accountability for event
- Channel Check logs revised to improve human factors
  - TS log readings segregated on separate log sheets
  - Operators required to write differential values
- Event discussed with ANO Unit 2 Shift Superintendents, importance and significance of the event stressed on February 10, 1994
- Other Entergy nuclear facilities and industry notified of event
- Human Performance Evaluation System (HPES) analysis performed

# CORRECTIVE ACTIONS

(Continued)

## BROAD BASED CORRECTIVE ACTIONS

- Evaluated previous plant conditions to identify any generic implication
  - Applied to routine repetitive tasks
  - Not unit specific
- Methods of addressing log taking errors and documenting deficiencies being evaluated to identify further enhancements
- Evaluating computerizing control room logs
  - Enhanced software programs
- Evaluating Planning and Scheduling process improvements
- Applicable corrective actions assigned to Unit 2
- Lessons learned will be applied to other ANO plant departments
- Improving Human Performance operations task force being formed with the support of Entergy executive management

# OPERATION'S PERFORMANCE PERSPECTIVE

## PERFORMANCE CHALLENGES

- Simple routine tasks represent challenges to human performance
- ANO Unit 1 control room operators record approximately 72,000 log readings per month (800 per eight hour shift)
- Estimated 20%-30% of operator time devoted to log taking
- Large numbers of repetitive tasks increase the potential for mistakes

## PERFORMANCE INDICATORS

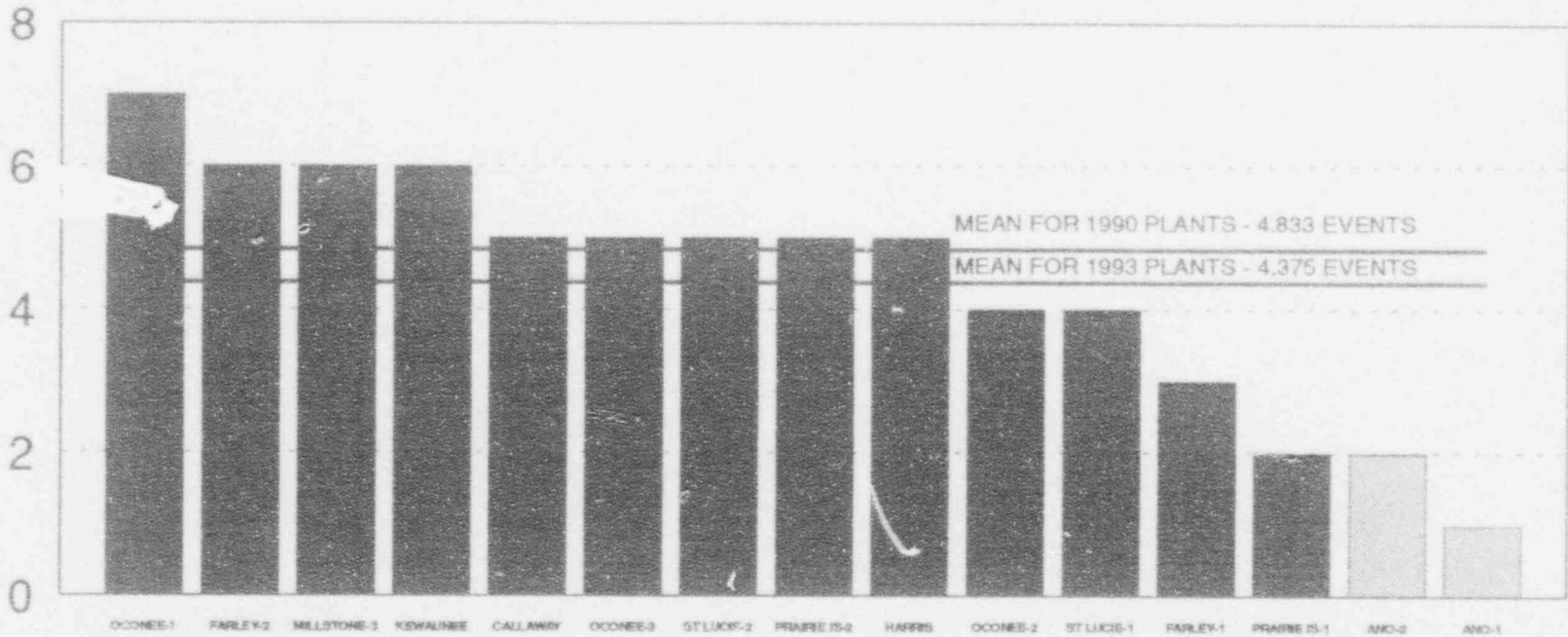
- Characterized ANO operator performance through comparisons with Entergy "Benchmark Plants", and NRC "Good Performers"
  - Minimum significant operator induced events
  - Operations staff well trained to respond to non-routine activities and emergencies

# AEOD PERFORMANCE INDICATORS REPORT

SIGNIFICANT EVENTS FOR LAST 15 QUARTERS\*

ATTRIBUTED TO LICENSED OPERATORS

NUMBER OF EVENTS



## ANO COMPARED TO "BENCHMARK PLANTS"

Benchmark Plants have Upper Quartile Performance  
in Operations, Regulatory, & Cost Categories.

\*DATA THROUGH SEPTEMBER 1993

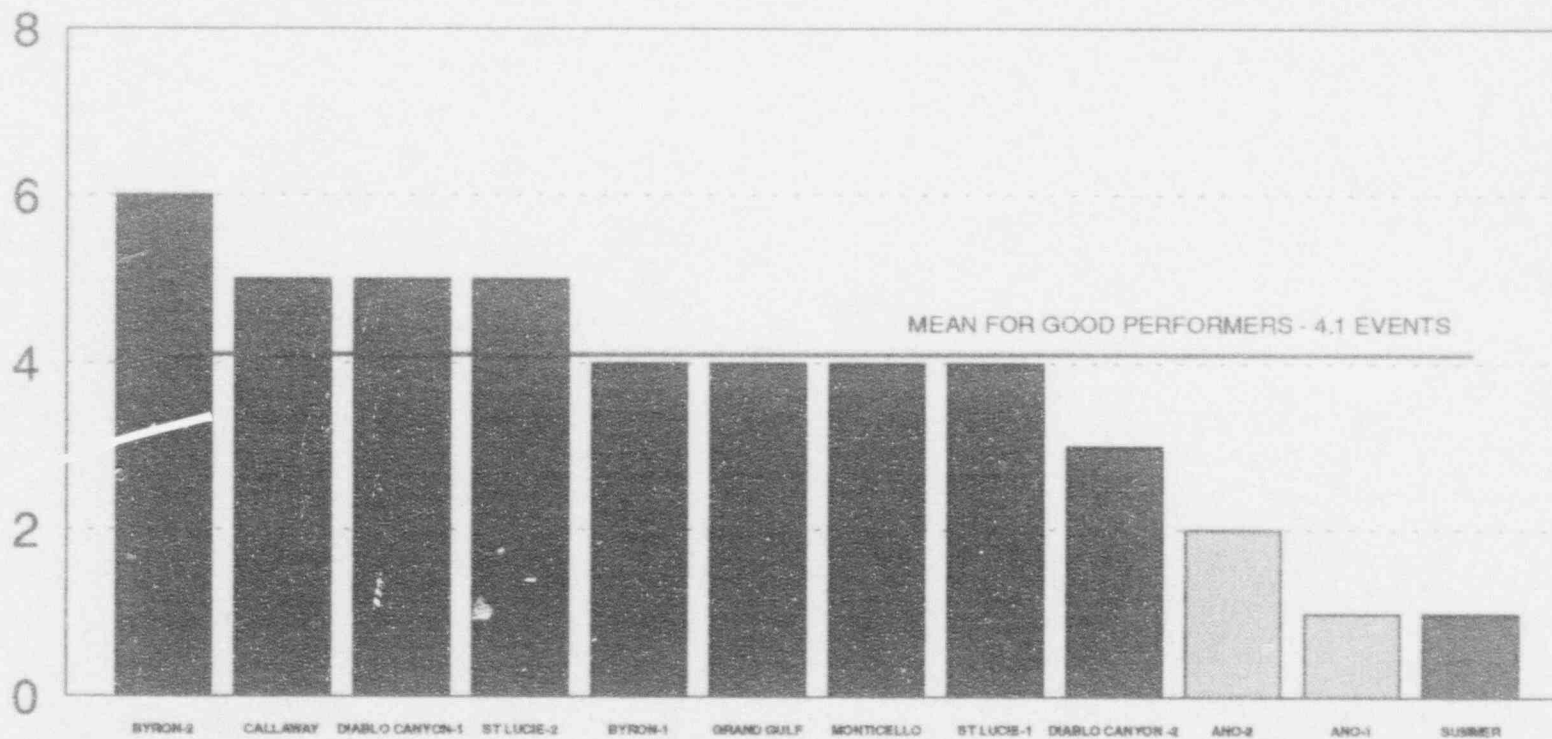


# AEOD PERFORMANCE INDICATORS REPORT

SIGNIFICANT EVENTS FOR LAST 15 QUARTERS\*

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NUMBER OF EVENTS



ANO COMPARED TO NRC "GOOD PERFORMERS"

\*DATA THROUGH SEPTEMBER 1993

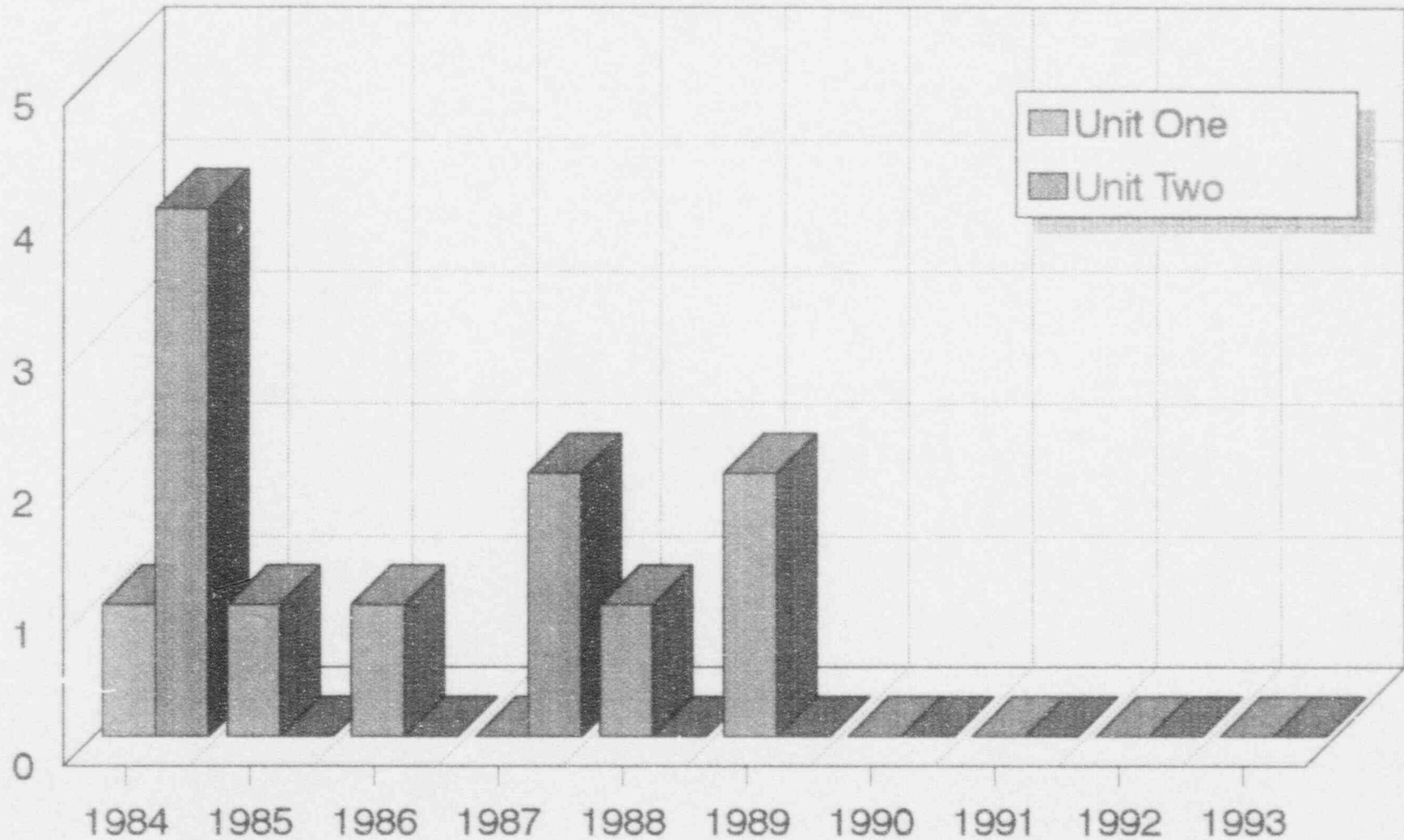


ANO Operations Performance History

1994

# *Operational Errors*

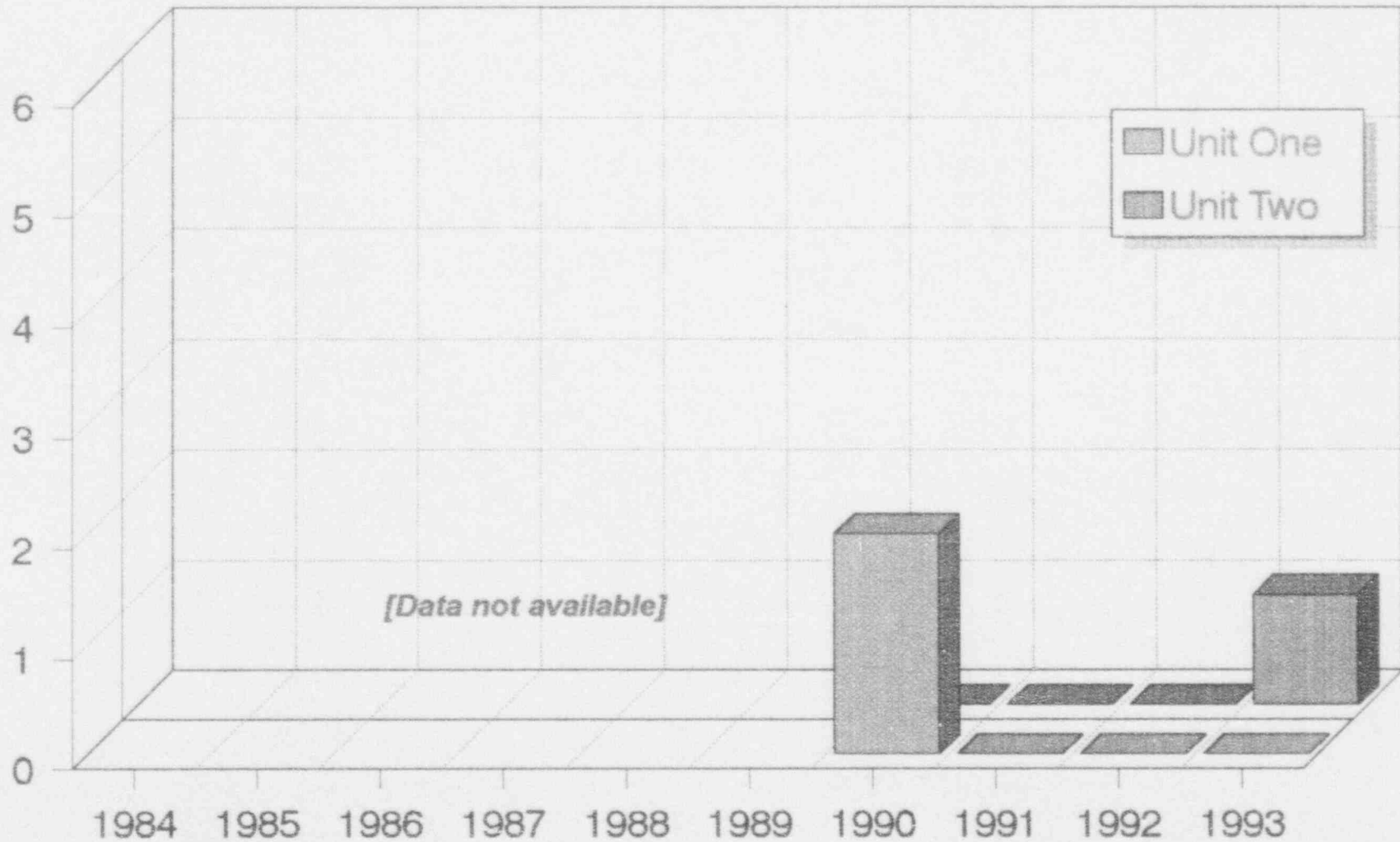
## *Rx Trips due to Operator Error*





# Operational Errors

## Reactor Transients [due to operator error]



## IMPROVING HUMAN PERFORMANCE

- Good human performance is cultural
- Cultural improvements are challenging to manage and slow to change
- Some components of human performance are
  - Knowledge
  - Attitudes/commitment/work ethic/ownership
  - Tools and processes
  - Effective work practices
  - Management observation and feedback affect behavioral changes
  - Personal accountability
- Human performance is not "fixed" but managed to achieve continual improvement

## CORRECTIVE ACTIONS SUMMARY

- Corrective action taken to repair condition and revise logs
- Management involved and discussed with operators
- Broad based corrective actions taken:
  - Reviewed event for generic implications
  - Improving Human Performance operations task force being formed with the support of Entergy executive management
  - Lessons learned to be applied to other ANO groups
- ANO recognizes the importance of performing repetitive tasks correctly and is continuing to look for additional ways to enhance human performance

**ANO ENFORCEMENT  
PERSPECTIVE**

**DWIGHT MIMS**  
Director, Licensing

## ANO ENFORCEMENT PERSPECTIVE

- Severity of Issue
- Adjustment Factors

# SEVERITY LEVEL

## SUPPLEMENT I - REACTOR OPERATIONS

Since multiple operating crews did not recognize that ANO Unit 1 should have been in a TS 36 hour LCO until the LCO allowed outage time was exceeded by 59 hours, the following examples of Supplement I to 10CFR2, App. C, may apply:

- A failure to comply with the Action Statement for a Technical Specification Limiting Condition for Operation where the appropriate action was not taken within the required time.
- Inattentiveness to duty on the part of licensed personnel



# SEVERITY LEVEL

## SAFETY SIGNIFICANCE

- Low safety significance due to redundancy of components and the ability of operators to manually control the steam generator level control valve
- Condition would not have resulted in a loss of safety function
- Increase in risk to public health and safety insignificant

## REGULATORY SIGNIFICANCE

- ANO recognizes our regulatory responsibility as a licensee to be continually aware of plant status and to have processes and tools in place to meet the ANO Operating License requirements at all times
- These findings are not representative of ANO's good performance
  - Two consecutive SALP one ratings in the Operations SALP category
- ANO RO who previously logged out-of-tolerance values self identified the condition
- Corrective actions are timely and broad based
- ANO clearly understands the significance of this condition and is committed to taking comprehensive actions to address the root and contributing causes independent of any enforcement actions

# SEVERITY LEVEL

(Continued)

## CONCLUSION

One Severity Level III Notice of Violation may be considered, however, based on ANO management involvement and the low technical safety significance of the condition, a reasonable conclusion could be a Severity Level IV violation

## CIVIL PENALTY ADJUSTMENT FACTORS

Should the NRC consider this condition for a civil penalty, the following civil penalty adjustment factors are discussed:

### ESCALATION

#### DURATION

- Because the failure to recognize a Technical Specification LCO did not result in a condition of actual safety significance, the event was self identified, and corrective actions were immediate and broad based, the escalation factor for duration should not be considered

#### PRIOR OPPORTUNITY TO IDENTIFY

- Since multiple operating crews failed to identify the condition, via log taking and reviews, this escalation factor appears to apply

# CIVIL PENALTY ADJUSTMENT FACTORS

(Continued)

## MITIGATION

### IDENTIFICATION

- Self-identified by ANO

### ANO PERFORMANCE

- Good overall ANO past performance
- Two consecutive SALP one ratings in the Operations category
- Generally good overall enforcement history
- Self assessments demonstrate management commitment to performance improvements

# CIVIL PENALTY ADJUSTMENT FACTORS

(Continued)

## MITIGATION (Continued)

### CORRECTIVE ACTIONS

- Prompt action to perform repairs
- Immediate management involvement
- Thorough root cause analysis
- Broad, timely and comprehensive

## CONCLUSION

If the NRC concludes that a Severity Level III Notice of Violation is warranted, the NRC Enforcement Policy provides ample justification for complete mitigation of the civil penalty

**CLOSING COMMENTS**

**JERRY YELVERTON**

Vice President, Operations