NOTICE OF VIOLATION

Duke Power Company
Oconee Nuclear Station Units 2 and 3

Docket Nos. 50-270 and 50-287
License Nos. DPR-47 and DPR 55
EA 96-478

During an NRC inspection conducted on October 6 - November 16, 1996, a violation of NRC requirements was identified. In accordance with the "General Statement of Policy and Procedures for NRC Enforcement Actions," NUREG 1600, the violation is listed below:

Technical Specification 6.4.1, provides that the station shall be operated and maintained in accordance with approved procedures. Technical Specification 6.4.1.e, states that written procedures with appropriate check-off lists and instructions shall be provided for preventive or corrective maintenance which could affect nuclear safety or radiation exposure to personnel.

Restoration Step 12.3 of Maintenance Procedure MP/0/A/1200/89, Valve - Main Steam Safety - Setpoint Test (Revision 18), states ensure "Spindle nut cotter pins are in place and in good mechanical condition".

Contrary to the above, the station was not maintained in accordance with approved procedures in that:

1. On July 17-18, 1996, maintenance personnel failed to implement the requirements of procedure MP/0/A/1200/89 by not installing cotter pins on Main Steam Safety Valves 3MS-0001 and 3MS-0010.

2. On May 4-5, 1996, maintenance personnel failed to implement the requirements of procedure MP/0/A/1200/89 by improperly installing cotter pins on Main Steam Safety Valves 2MS-0001, 2MS-0005, 2MS-0013 and 2MS-0014.

This is a Severity Level IV violation (Supplement I)

Pursuant to the provisions of 10 CFR 2.201, Duke Power Company is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555 with a copy to the Regional Administrator, Region II, and a copy to the NRC Resident Inspector at the Oconee Nuclear Plant, within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation" and should include for each violation: (1) the reason for the violation, or, if contested, the basis for disputing the violation, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken to avoid further violations, and (4) the date when full compliance will be achieved. Your response may reference or include previously docketed correspondence, if the correspondence adequately addresses the required response. If an adequate reply is not received within the time specified in this Notice, an order or

Enclosure 1

Demand for Information may be issued as to why the license should not be modified, suspended, or revoked, or why such other action as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

Because your response will be placed in the NRC Public Document Room (PDR), to the extent possible, it should not include any personal privacy, proprietary, or safeguards information so that it can be placed in the PDR without redaction. However, if you find it necessary to include such information, you should clearly indicate the specific information that you desire not to be placed in the PDR, and provide the legal basis to support your request for withholding the information from the public.

Dated at Atlanta, Georgia
this 23rd day of December 1996

LIST OF ATTENDEES

NRC ATTENDEES:

S. Ebneter, Regional Aministrator, Region II (RII)
L. Reyes, Deputy Regional Administrator, RII
E. Merschoff, Director, Division of Reactor Projects (DRP), RII
D. LaBarge, Project Manager, Project Directorate II-2, Nuclear Reactor Regulation
B. Uryc, Director, Enforcement and Investigations Coordination Staff (EICS), RII
C. Evans, Regional Counsel, RII
L. Wert, Acting Branch Chief, DRP Branch 1, RII
M. Scott, Oconee Senior Resident Inspector, RII
A. Boland, Enforcement Specialist, EICS

DUKE POWER COMPANY ATTENDEES:

J. Hampton, Vice President, Oconee Nuclear Station (ONS)
R. Weatherford, Valve Manager, ONS
D. Hubbard, Maintenance Superintendent, ONS
J. Kiser, Engineering - Relief Valves, ONS
C. Tompkins, Engineering Supervisor, ONS
B. Peele, Station Manaager, ONS
W. Foster, Safety Assurance Manager, ONS
G. Swindlehurst, Duke General Office, Safety Analysis
J. Burchfield, Regulatory Compliance Manager, ONS
T. Lee, Operations, ONS
R. Smith, Maintenance, ONS
C. Watkins, Maintenance, ONS

PREDECISIONAL ENFORCEMENT CONFERENCE AGENDA

OCONEE

DECEMBER 18, 1996
NRC REGION II OFFICE, ATLANTA, GEORGIA

I. OPENING REMARKS AND INTRODUCTIONS
   S. Ebneter, Regional Administrator

II. NRC ENFORCEMENT POLICY
   B. Uryc, Director, Enforcement and Investigation Coordination Staff

III. SUMMARY OF THE ISSUES
   S. Ebneter, Regional Administrator

IV. STATEMENT OF CONCERNS / APPARENT VIOLATION
   E. Merschoff, Director, Division of Reactor Projects

V. LICENSEE PRESENTATION
   J. Hampton, Vice President, ONS
   B. Peele, Station Manager, ONS

VI. BREAK / NRC CAUCUS

VII. NRC FOLLOWUP QUESTIONS

VIII. CLOSING REMARKS
   S. Ebneter, Regional Administrator

Oconee Nuclear Station

MSSV Cotter Pin Predecisional Enforcement Conference December 18, 1996

Agenda

- Introduction
- MSSV Description
- Sequence of Events
- Root Cause
- Safety Significance
- Corrective Actions
- Conclusion

Introduction

- ONS completed an inspection of MSSV cotter pins during the current outage
  - » Unit 1 cotter pins were correctly installed on all 16 MSSVs
  - » Unit 2 cotter pins were incorrectly installed on 2 of the 8 MSSVs on each steam line
  - » Unit 3 cotter pins were missing on 1 of the 8 MSSVs on each steam line
- Inspection Report 96-16 describes an apparent violation with two examples related to maintenance personnel failing to properly install MSSV cotter pins
- ONS agrees that maintenance work practices were inadequate and we are aggressively implementing comprehensive corrective actions

MSSV Description

- Each unit has 16 MSSVs (8 per steam line) with staggered setpoints
- Number of valves which lift on a reactor trip varies depending on:
  - » Initial reactor power level
  - » Pre-trip transient (overcooling vs. undercooling)
  - » Operation of the Turbine Bypass System

MSSV Description

- ONS has Crosby Valve & Gage Company MSSVs
- Cotter pins cannot be installed without proper engagement in spindle nut slot
- Spindle cotter pin holes were drilled by vendor prior to valve assembly and are perpendicular to spindle

Sequence of Events

Date	Description
4/20/84	- IN 84-33 issued on MSSV cotter pin failures
6/84 - 8/84	- Maintenance test procedure revised to include cotter pin inspection
5/89	- ANO-1 trip with MSSV failing to reseat
9/93	- CR-3 trip with MSSV failing to reseat
5/4-5/96	- 2MS-1, 2MS-5, 2MS-13, and 2MS-14 tested during startup
5/19/96	- ANO-1 reactor trip with MSSV failing to reseat

Sequence of Events (cont)

Date	Description
5/29/96	- ONS valve engineer discussed ANO-1 event with ANO-1 and Dresser engineers
5/30/96	- ONS Engineering reviewed procedures for rebuild and testing of MSSVs
6/18/96	- Duke Operating Experience report issued on ANO-1 event
8/14/96	- Resident Inspectors questioned ONS about the need for an immediate inspection of ONS MSSVs
10/14/96	- Unit 2 inspection identifies four MSSVs (2MS-1, 2MS-5, 2MS-13, and 2MS-14) with improperly installed cotter pins

Sequence of Events (cont)

Date	Description
10/15/96	- Unit 1 inspection indicates all 16 MSSV cotter pins installed properly
10/24/96	- Unit 3 inspection identifies 2 MSSVs with missing cotter pins (3MS-1 and 3MS-10)
10/29/96	- 10CFR 50.72 notification on missing Unit 3 cotter pins
10/30/96	- 10CFR 50.72 notification on improperly installed Unit 2 cotter pins

Root Cause

- Root cause analysis included:
  - » Interviews
  - » Review of maintenance test procedure
  - » Barrier analysis and cause and effect charting
  - » Review of industry operating experience

Root Cause (cont)

- Inadequate work practices resulted in cotter pins not being installed properly
  - » A contributing factor was that the procedure was vague in specifying the pin size and when the spindle nut and cotter pin should be reinstalled

Safety Significance of MSSVs Failing to Reseat

- Plant Transient Response
- Effect on Licensing Basis Events
- Event Mitigation and Recovery
- Effect on Plant Equipment
- Effect on Core Damage Frequency
- Summary

Plant Transient Response

- MSSVs lift following reactor/turbine trip above ~20% FP
- The potential existed that MSSVs could have failed to reseat.
  - » Unit 2 - up to two MSSVs per steam line
  - » Unit 3 - up to one MSSV per steam line
- Depending upon which valves are postulated to fail to reseat:
  - » Uncontrolled depressurization of one or both SGs could result
  - » The RCS would overcool and depressurize
  - » HPI System would actuate to compensate for RCS shrinkage
  - » Feedwater would be automatically and manually controlled/isolated to stop the overcooling and stabilize RCS conditions

Effect on Licensing Basis Events

- ONS analyzed the licensing basis events which result in MSSVs lifting
  - » Failed open MSSVs will not result in additional fuel cladding failures
  - » Offsite dose remains within Part 100 limits
    - – SGTR
    - – Rod Ejection Accident

Event Mitigation and Recovery

- Symptom based EOP provides guidance to respond to transients with failed open MSSVs
- Any failed open MSSV would be readily identified as the source of overcooling
- If both SGs are depressurizing:
  - » Feedwater is isolated to both SGs to stop the overcooling
  - » HPI is throttled to prevent pressurized thermal shock
  - » Feedwater is restored to the least affected SG to stabilize RCS temperature and remove decay heat
  - » Other SG is allowed to boil dry

Event Mitigation and Recovery

» Stuck open MSSV on the dry, depressurized SG is closed to recover the SG

» Feedwater is restored to the recovered SG

» Process is repeated on the other SG

- If natural circulation is interrupted:

» HPI will offset shrinkage from overcooling

» EOP guidance exists to:

– restore forced circulation

– restore natural circulation

– implement backup cooling methods

Effect on Plant Equipment

- Overcooling rate from four failed-open MSSVs is bounded by the UFSAR steam line break accident
- Steam line break bounds SG tube loads due to SG blowdown

Effect on Plant Equipment

- Steam line break bounds tube-to-shell delta T stresses
  - » No indication in Units 2 and 3 of the type of SG tube cracks that would be affected by tensile stress
  - » EOP guidance for tensile and compressive tube to shell delta T limits exists
- Failed open MSSVs already considered in reactor vessel PTS analyses
  - » EOP guidance for mitigating PTS conditions exists

Precursor Evaluation

- Key assumptions
  - » All reactor trips challenge the MSSVs
  - » The probability of a MSSV sticking open is assumed to be 0.5
  - » A faulted SG would be used to establish decay heat removal

Dominant Sequences

- Main steam line break with subsequent RCS depressurization and
  - » Failure to throttle HPI results in a stuck open pressurizer code safety valve
  - » Failure to go to recirculation results in core damage
- Main steam line break with subsequent RCS depressurization and
  - » failure of HPI suction sources
  - » seal LOCA with no injection
  - » failure to restore HPI

Precursor Conclusions

- Conditional probability of core damage is less than 1.0E-6
- Postulated event would not be a precursor
- Postulated event not significant with respect to core damage frequency

Summary of Safety Significance

- The potential for failed open MSSVs increases the possibility of an overcooling transient following a reactor trip
- Offsite dose consequences for the licensing basis accidents would have been within Part 100 limits over the time period of interest
- Station EOPs include operator guidance to respond to transients with failed open MSSVs
- Impact of MSSV overcooling scenario on structural integrity of the steam generators and reactor vessel is bounded by the main steam line break accident
- Postulated event not significant with respect to core damage frequency
- Overall impact on public health and safety is very low

Immediate Corrective Actions

- Inspected MSSV cotter pins for all three units
- Problem Investigation Reports (PIPs) initiated to evaluate safety significance

Completed Corrective Actions

- MSSV modifications completed to remove fork levers, spindle nuts, and cotter pins on all three units
- Inspected pressurizer code safety valves
- Reviewed all 551 safety-related mechanical maintenance procedures for removal and restoration steps
- Personnel corrective actions have been taken in accordance with Duke policies
- Completed a work practice common cause assessment
- Communicated lessons learned to other Duke sites and industry

Corrective Actions in Progress

- Cotter pin installation training package being developed
- Develop and implement corrective actions from work practice common cause assessment
- STAR (Stop, Think, Act, Review) simulator training for all station Maintenance personnel

Planned Corrective Actions

- Review non-safety related mechanical maintenance procedures for removal and restoration steps
- Strengthen field validation process for maintenance procedures
- Practical factors training for all Maintenance field personnel
- Remove lift lever assembly on pressurizer code safety valves

Conclusion

- ONS inspected MSSVs at the first available outage
- Maintenance work practices regarding improperly installed or missing cotter pins were unacceptable
- Safety significance of potential overcooling events has been thoroughly analyzed
- ONS has taken aggressive corrective actions to eliminate this potential MSSV failure mode
- ONS has a strong focus on improving work practices