UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30303

Report Nos.: 50-269/83-37, 50-270/83-38 and 50-287/83-37

Licensee: Duke Power Company
422 South Church Street
Charlotte, NC 28242

Docket Nos.: 50-269, 50-270, and 50-287

License Nos.: DPR-38, DPR-47, and DPR-55

Facility Name: Oconee 1, 2, and 3

Inspection at Oconee site near Seneca, South Carolina

Inspector: P. T. Burnett — 10 Jan 84 (Date Signed)

Approved by: F. Jape, Section Chief — 1/11/84 (Date Signed)
Engineering Program Branch
Division of Engineering and Operational Programs

SUMMARY

Inspection on December 27 - 29, 1983

Areas Inspected

This routine, announced inspection involved twenty inspector-hours on site inspecting reactor coolant system leakage calculations.

Results

No violations or deviations were identified.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*J. E. Smith, Station Manager
J. N. Pope, Superintendent of Operations
*T. S. Barr, Acting Technical Superintendent
*T. D. Curtis, Reactor Engineer
J. W. Collier, Acting Reactor Engineer
M. L. Elder, Assistant Engineer
*T. Matthews, Compliance

Other licensee employees contacted included five office personnel.

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on December 29, 1983, with those persons indicated in paragraph 1 above. The licensee was informed that their program for calculating RCS leakage gave results in good agreement with those from the NRC Independent Measurements Program, but that the appropriateness of the allowance for evaporative losses, although allowed by technical specifications would be reviewed with NRR.

3. Licensee Action on Previous Enforcement Matters

The resolution of unresolved items 269/270/287/82-35-01 is discussed in paragraph 6.

4. Unresolved Items

Unresolved items were not identified during this inspection.

5. Measurements of Reactor Coolant Leakage (61700, 92706)

a. Documents Reviewed

(1) PT/1,2,3/600/10, RCS Leakage Evaluation Test.
(2) OP/0/A/1103/13, Reactor Coolant System Leak Detection,
(3) TP/1/600/10-3, RCS Hot Leakage Test, performed April 11, 1973.
(4) TP/2/A/600/10, RCS Hot Leakage Test, performed November 5, 1973.
(5) TP/3/A/600/10, RCS Hot Leakage Test, performed June 21-22, 1974.

b. Tests Performed

To confirm compliance with technical specification 3.1.6.2, the licensee performs periodic tests, PT/1,2,3/A/600/10, daily on each unit. The test-specified period of observation for the tests is one hour. At the request of the inspector, the time periods were increased to four hours for each unit. In addition to the beginning and ending data recorded by the unit computers for use in the unit computer calculation of RCS leak rate, the licensee also provided a printout at five-minute intervals of the following parameters: time, RCS pressure (psig), pressurizer level, RCS average temperature (T-AVG), let down storage tank (makeup tank) level, and quench tank level.

Using a portable microcomputer and the RCSLK8 program, a part of the NRC Independent Measurements Program, the leakrate data were independently analyzed, and the results compared with the licensee's calculations. In the following pairs of data, the licensee's results are given first and the results from RCSLK8 second.

Unit	Unidentified Leakage (gpm)	
1	0.57	0.56
2	0.23	0.29
3	0.38	0.38

The agreement in all cases is well within the +/-0.2 gpm deemed acceptable.

The RCSLK8 output for each calculation is appended to this report along with unit-specific parameters used in the analysis. Those parameters were obtained during inspection 269/270/287/82-35.

c. Evaporative Losses

The leakage values above are not those that the licensee would report for unidentified leakage. Technical specification 3.1.6.2, refers to allowances for normal evaporative losses. In the appropriate periodic test procedues (600/10) normal evaporative losses are given as 0.50 gpm, 0.73 gpm, and 0.52 gpm for Units 1, 2, and 3 respectively. Hence, in many cases, including those above, a net inleakage to the high-pressure system would be reported. This, of course, is physically unreal.

The sources for the values for normal evaporative losses are the three test procedures (TPs) identified in subsection a. Review of the tests revealed them to be leakrate tests much like those performed routinely, except that a considerable effort was made to identify and quantify small leaks and leakages throughout the primary system. Those identified leakages were subtracted from the apparent leakage, and the remainder classified as normal evaporative losses. Actually, the remainders should be classified as the baseline unidentified leakage.

By use of the normal evaporative loss concept, the amount of unidentified leakage tolerated at Oconee is considerably in excess of that allowed licensees operating under standard technical specifications. NRR will be requested to review the evaporative loss allowance to determine if it is still defensible.

6. Closeout of a Previously Unresolved Item (92701)

(Closed) URI 269/270/287/82-35-01: Resolve method of accounting for temperature changes in RCS leak rate calculations. The licensee has determined that the method of accounting for changes in RCS average temperature was incorrect in the computer program then in use. The programming has been corrected. Further in reviewing a sampling of twelve tests performed in June to August 1982, it was found that the maximum temperature rise during a test was 0.1 degrees, which would lead to an inconsequential nonconservative error.

NRC

INDEPENDENT MEASUREMENTS PROGRAM

REACTOR COOLING SYSTEM LEAK RATES

STATION: OCONEE
UNIT : 1
DOCKET : 50-269

TEST DATE : 28 DEC 83
START TIME: 0820
DURATION : 4 hours

TEST DATA

	Initial	Final
System Parameters:		
Pressure, psia	2189	2189
T Ave, degrees F	579.04	578.86
Water Levels:		
Pressurizer, inches	223.8	223.8
Quench Tank, inches	82.65	89.25
Makeup Tank, inches	82.8	70.68
Drain Tank, inches	0	0

Water Charged = 0 gal Water Drained = 0 gal

TEST RESULTS

Change in Water Inventory in pounds:

Vessel & Piping	142	Quench Tank (1)	1907
Pressurizer	0	Drain Tank (1)	0
Makeup Tank (1)	-3161		
Less: Water Charged	0	Collected Leakage	1907
Plus: Water Drained	0		
Cooling System	-3020		

Leak Rates in gpm (3):

Gross	1.51
Identified	0.95
Unidentified	0.56

(1) Determined from tank calibration curve.
(2) Determined from tank dimensions.
(3) The density used for converting inventory change to leak rate was 62.31 pounds/cubic foot based on standard conditions.

NRC

INDEPENDENT MEASUREMENTS PROGRAM

REACTOR COOLING SYSTEM LEAK RATES

STATION: OCONEE
UNIT : 2
DOCKET : 50-270

TEST DATE : 27DEC83
START TIME: 2115
DURATION : 4 hours

TEST DATA

	Initial	Final
System Parameters:		
Pressure, psia	2140.7	2142.7
T Ave, degrees F	578.6	578.9
Water Levels:		
Pressurizer, inches	219.7	219
Quench Tank, inches	82.25	84.35
Makeup Tank, inches	74.9	71.5
Drain Tank, inches	0	0

Water Charged = 0 gal Water Drained = 0 gal

TEST RESULTS

Change in Water Inventory in pounds:

Vessel & Piping	-222	Quench Tank (1)	607
Pressurizer	-78	Drain Tank (1)	0
Makeup Tank (1)	-887		
Less: Water Charged	0	Collected Leakage	607
Plus: Water Drained	0		
Cooling System	-1187		

Leak Rates in gpm (3):

Gross	0.59
Identified	0.30
Unidentified	0.29

(1) Determined from tank calibration curve.
(2) Determined from tank dimensions.
(3) The density used for converting inventory change to leak rate was 62.31 pounds/cubic foot based on standard conditions.

NRC

INDEPENDENT MEASUREMENTS PROGRAM

REACTOR COOLING SYSTEM LEAK RATES

STATION: OCONEE
UNIT : 3
DOCKET : 50-287

TEST DATE : 28 DEC 83
START TIME: 1630
DURATION : 4 hours

TEST DATA

	Initial	Final
System Parameters:		
Pressure, psia	2228	2226
T Ave, degrees F	578.95	578.77
Water Levels:		
Pressurizer, inches	219.56	221.1
Quench Tank, inches	84.8	88.25
Makeup Tank, inches	72.44	64.6
Drain Tank, inches	0	0

Water Charged = 0 gal Water Drained = 0 gal

TEST RESULTS

Change in Water Inventory in pounds:

Vessel & Piping	124	Quench Tank (1)	997
Pressurizer	159	Drain Tank (1)	0
Makeup Tank (1)	-2045		
Less: Water Charged	0	Collected Leakage	997
Plus: Water Drained	0		
Cooling System	-1762		

Leak Rates in gpm (3):

Gross	0.88
Identified	0.50
Unidentified	0.38

(1) Determined from tank calibration curve.
(2) Determined from tank dimensions.
(3) The density used for converting inventory change to leak rate was 62.31 pounds/cubic foot based on standard conditions.

PARAMETER LIST

Unit Identification:	
Plant Name	OCONEE
Unit Number	1
Docket Number	50-269
Nuclear Steam System Supplier	Babcock & Wilcox
Vessel and Piping:	
Volume	10428 cubic feet
Pressurizer:	
Level Units	inches
Temperature Compensated	Yes
Nominal Level	220 inches
Volume Below Nominal Level	800 cubic feet
Volume Above Nominal Level	700 cubic feet
Calibration Curve	
Slope	3.2 cubic feet per inch
Upper Level Limit	400 inches
Lower level Limit	64 inches
Relief	Quench Tank
Makeup Tank:	
Level Units	inches
Calibration Curve	
Slope	260.832 pounds per inch
Upper Level Limit	100 inches
Lower level limit	0 inches
Geometric Method Available	No
Drain Tank:	
Level Units	inches
Calibration Curve	
Slope	0 pounds per inch
Upper Level Limit	0 inches
Lower level limit	0 inches
Geometric Method Available	No
Quench Tank:	
Level Units	inches
Calibration Curve	
Slope	288.912 pounds per inch
Upper Level Limit	125 inches
Lower level limit	80 inches
Geometric Method Available	No

PARAMETER LIST

Unit Identification:	
Plant Name	OCONEE
Unit Number	2
Docket Number	50-270
Nuclear Steam System Supplier	Babcock & Wilcox
Vessel and Piping:	
Volume	10596 cubic feet
Pressurizer:	
Level Units	inches
Temperature Compensated	Yes
Nominal Level	220 inches
Volume Below Nominal Level	800 cubic feet
Volume Above Nominal Level	700 cubic feet
Calibration Curve	
Slope	3.2 cubic feet per inch
Upper Level Limit	400 inches
Lower level Limit	64 inches
Relief	Quench Tank
Makeup Tank:	
Level Units	inches
Calibration Curve	
Slope	260.832 pounds per inch
Upper Level Limit	100 inches
Lower level limit	0 inches
Geometric Method Available	No
Drain Tank:	
Level Units	inches
Calibration Curve	
Slope	0 pounds per inch
Upper Level Limit	0 inches
Lower level limit	0 inches
Geometric Method Available	No
Quench Tank:	
Level Units	inches
Calibration Curve	
Slope	288.912 pounds per inch
Upper Level Limit	125 inches
Lower level limit	80 inches
Geometric Method Available	No

PARAMETER LIST

Unit Identification:	
Plant Name	OCONEE
Unit Number	3
Docket Number	50-287
Nuclear Steam System Supplier	Babcock & Wilcox
Vessel and Piping:	
Volume	10596 cubic feet
Pressurizer:	
Level Units	inches
Temperature Compensated	Yes
Nominal Level	220 inches
Volume Below Nominal Level	800 cubic feet
Volume Above Nominal Level	700 cubic feet
Calibration Curve	
Slope	3.2 cubic feet per inch
Upper Level Limit	400 inches
Lower level Limit	64 inches
Relief	Quench Tank
Makeup Tank:	
Level Units	inches
Calibration Curve	
Slope	260.832 pounds per inch
Upper Level Limit	100 inches
Lower level limit	0 inches
Geometric Method Available	No
Drain Tank:	
Level Units	inches
Calibration Curve	
Slope	0 pounds per inch
Upper Level Limit	0 inches
Lower level limit	0 inches
Geometric Method Available	No
Quench Tank:	
Level Units	inches
Calibration Curve	
Slope	288.912 pounds per inch
Upper Level Limit	125 inches
Lower level limit	80 inches
Geometric Method Available	No