REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:8507220151 DOC.DATE: 85/07/17 NOTARIZED: NO DOCKET #
FACIL:50-269 Oconee Nuclear Station, Unit 1, Duke Power Co. 05000269
50-270 Oconee Nuclear Station, Unit 2, Duke Power Co. 05000270
50-287 Oconee Nuclear Station, Unit 3, Duke Power Co. 05000287
AUTH.NAME AUTHOR AFFILIATION
TUCKER,H.B. Duke Power Co.
RECIP.NAME RECIPIENT AFFILIATION
DENTON,H.R. Office of Nuclear Reactor Regulation, Director
THOMPSON,H.L. Division of Licensing

SUBJECT: Responds to Generic Ltr 85-02 re program for steam generator tube integrity & steam generator tube rupture mitigation. Factors to be considered include results of previous insps & info obtained from pulled tubes.

DISTRIBUTION CODE: A058D COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 16
TITLE: OR/Licensing/Generic Submittal: Steam Generator Tube Integrity (Water

NOTES:AEOD/Ornstein:1cy. 05000269
OL:02/06/73
AEOD/Ornstein:1cy. 05000270
OL:10/06/73
AEOD/Ornstein:1cy. 05000287
OL:07/19/74

	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL
	NRR ORB4 LA	1	1	NICOLARAS,H	1	1
INTERNAL:	ACRS	6	6	IE DIR	1	1
	NRR/ADL	1	1	NRR/ADOR	1	1
	NRR/ADSA	1	1	NRR/DE DIR	1	1
	NRR/DE/CEB	2	2	NRR/DE/GIB	1	1
	NRR/DE/MTEB	1	1	~~NRR/DL~~ DIR	1	1
	NRR/DL/ORAB	3	3	REG FILE 01	1	1
EXTERNAL:	24X	1	1	LPDR	1	1
	NRC PDR	1	1	NSIC	1	1
NOTES:		1	1			

TOTAL NUMBER OF COPIES REQUIRED: LTTR 27 ENCL 27

DUKE POWER COMPANY
P.O. BOX 33189
CHARLOTTE, N.C. 28242

HAL B. TUCKER
VICE PRESIDENT
NUCLEAR PRODUCTION

TELEPHONE
(704) 373-4531

July 17, 1985

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: H. L. Thompson, Director
Division of Licensing

Subject: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287
Generic Letter 85-02

Dear Sir:

By a letter dated April 17, 1985 the NRC Staff transmitted Generic Letter 85-02 to obtain information on Licensee's overall program for Steam Generator Tube integrity and Steam Generator tube rupture mitigation in order to address Staff recommended actions which were developed as part of the integrated program for the resolution of unresolved Safety Issues A-3, A-4 and A-5. This Generic Letter (GL 85-02) requested that all Pressurized Water Reactor (PWR) Licensee's submit to the NRC, no later than 60 days from the date of the Generic Letter, a description of their overall programs for assuring steam generator tube integrity and for steam generator tube rupture mitigation.

By my letter dated June 17, 1985, the NRC was informed of Duke's desire for additional time in order to fully develop a response for Oconee, McGuire, and Catawba Nuclear Stations, and to allow for sufficient time for internal review. This delay was discussed with the NRC Staff. The Staff indicated no particular problem with this schedule, provided that there are no additional delays.

Accordingly, please find attached (Attachment 1) Duke's response to Generic Letter 85-02 for Oconee Nuclear Station. Duke's response for McGuire and Catawba Nuclear Stations has been provided by a separate letter dated July 1985. Attachment 2 provides Duke's response to enclosure 2 of the Generic Letter.

Very truly yours,

Hal B. Tucker

Hal B. Tucker

PFG:slb

Attachment

A058
1/1

cc: Mr. J. Nelson Grace, Regional Administrator
U. S. Nuclear Regulatory Commission
Region II
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30323

Ms. Helen Nicolaras
Office of Nuclear Regulatory Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Mr. J. C. Bryant
NRC Resident Inspector
Oconee Nuclear Station

Attachment 1

Duke Power Company
Oconee Nuclear Station

Response to
Generic Letter 85-02

REQUEST FOR INFORMATION CONCERNING CATEGORY C-2

STEAM GENERATOR TUBE INSPECTIONS

Information Requested

The enclosed draft NUREG-0844 Section 2.2.1.2 describes certain limitations which the staff believes to be inherent in the present Technical Specification steam generator ISI requirements pertaining to Category C-2 inspection results. Licenses and applicants are requested to provide a description of their current policy and actions relative to this issue and any recommendations they have concerning how existing Technical Specification steam generator ISI requirements pertaining to Category C-2 inspection results could be improved to better ensure that adequate inspections will be performed. This description should include a response to the following questions:

1. What factors do, or would, the license or applicant consider in determining (a) whether additional tubes should be inspected beyond what is required by the Technical Specifications, (b) whether all steam generators should be included in the inspection program, and (c) when the steam generators should be reinspected.

2. To what extent do these factors include consideration of the degradation mechanism itself and its potential for causing a tube to be vulnerable to rupture during severe transients or postulated accident before rupture or leakage of that tube occurs during normal operation.

Response

1a) The factors which should be considered, when determining the basis for any follow-up inspections, are the results of previous inspections; information obtained from any pulled tubes; background information from similar units; the location of the defects; the defect type; and the size of the initial sample.

1b) At ONS all Steam Generators are inspected each outage. The same factors addressed in the response to item 1a above should also be used to determine whether a particular defect is generic. If a defect is generic, then all steam generators should be inspected in the affected area. On the other hand, if a defect is not generic then only the affected units should be inspected. If, however, the defect is new or the mechanism is not well defined, then a statistically valid sample of the other steam generator would be more appropriate.

1c) Reinspection should be based on understanding the cause of the defect. The factors that should be considered are the growth rate of the defect and the potential tube rupture during the interval.

2) Any test program must consider this aspect in some way. The best plan would use an understanding of the degradation mechanism where possible, and a statistically valid random sample in other cases.

Understanding of the defect mechanism is gained using the factors cited in 1a above.

Attachment 2

Duke Power Company
Oconee Nuclear Station

Response to
Generic Letter 85-02
Enclosure 2

1.a PREVENTION AND DETECTION OF LOOSE PARTS (INSPECTIONS)

Staff Recommended Action

Visual inspections should be performed on the steam generator secondary side in the vicinity of the tube sheet, both along the entire periphery of the tube bundle and along the tube lane, for purposes of identifying loose parts or foreign objects on the tubesheet, and external damage to peripheral tubes just above the tubesheet. An Appropriate optical device should be used (e.g., mini-TV camera, fiber optics). Loose parts or foreign objects which are found should be removed from the steam generators. Tubes observed to have visual damage should be eddy current inspected and plugged if found to be defective.

These visual inspections should be performed: (1) for all steam generators at each plant at the next planned outage for eddy current testing, (2) after any secondary side modifications, or repairs, to steam generator internals, and (3) when eddy current indications are found in the free span portion of peripheral tubes, unless it has been established that the indication did not result from damage by a loose part or foreign object.

For PWR OL applicants, such inspections should be part of the preservice inspection.

For steam generator models where certain segments of the peripheral region can be shown not to be accessible to an appropriate optical device, licensees and applicants should implement alternative actions to address these inaccessible areas, as appropriate.

Licensees should take appropriate precautions to minimize the potential for corrosion while the tube bundle is exposed to air. The presence of chemical species such as sulfur may aggravate this potential, and may make exposure to the atmosphere inadvisable until appropriate remedial measures are taken.

Response

Extensive visual inspections have been performed on all Oconee once through Steam Generators (OTSG). These inspections were performed in 1984 for unit 1; 1983 for unit 2 and 1978 for unit 3. During these inspections, the vicinity of the tube sheet was examined to determine the presences of any loose parts or foreign objects on the tubesheet, and to determine if there was any external damage to the tube as a result of loose parts or foreign objects. In addition, all periphery tubes have been tested during recent inspections. The results of these examinations did not reveal the presence of any loose parts or foreign objects. Based on the results of these inspections, Duke does not plan to perform a visual inspection at the next planned outage for eddy current testing at Oconee Nuclear Station.

Duke will, however, perform a secondary side visual inspection after any significant secondary side modifications, or repairs, to Steam Generator

internals. In addition, when any eddy current indications are found in the free span portion of peripheral tube, every effort possible would be made to determine the cause. Based on the results of the evaluation of the damage, appropriate actions would be taken. These actions may include a secondary side visual inspection.

Prior to performing maintenance or inspections on the steam generators, they are placed in a wet layup condition. If draining is necessary, it is performed using nitrogen over pressure.

1.b PREVENTION AND DETECTION OF LOOSE PARTS (QUALITY ASSURANCE)

Staff Recommended Action

Quality assurance/quality control procedures for steam generators should be reviewed and revised as necessary to ensure that an effective system exists to preclude introduction of foreign objects into either the primary or secondary side of the steam generator whenever it is opened (e.g., for maintenance, sludge lancing, repairs, inspection operations, modifications). As a minimum, such procedures should include: (1) detailed accountability procedures for all tools and equipment used during an operation, (2) appropriate controls on foreign objects such as eye glasses and film badges, (3) cleanliness requirements, and (4) accountability procedures for components and parts removed from the internals of major components (e.g., reassembly of cut and removed components).

Response

Based upon a review of Oconee Nuclear Station directives and procedures, there is reasonable assurance that the existing procedures are adequate to preclude the introduction of foreign objects into either the primary or secondary side of the steam generator whenever it is opened for maintenance and inspections. The procedures provide a means by which all tools and equipment used during an operation are accounted for. There are appropriate controls on foreign objects which could be introduced into the steam generators when open, and cleanliness requirements are specified. Precautions are taken to minimize foreign objects such as film badges and eyeglasses. The precaution includes, but are not limited to taping all film badges to protective clothing.

Principally, tools, parts and materials accountability is accomplished in accordance with maintenance procedure MP/O/A/1800/1. Prior to entering the steam generator tools, parts and materials which are used inside the steam generator are visually inspected for soundness and integrity. When practical, methods for insuring that tools, parts and materials do not accidentally enter the steam generator are employed. Prior to opening the steam generator, the immediate area is thoroughly cleaned as necessary in order to prevent the entry of foreign material. The cleanness of the work area is maintained throughout the work activity and on a random basis, the work area is inspected by a QC inspector, noting any discrepancies. The log sheets, utilized to maintain accountability of all tools, parts and materials, are reviewed to verify that all items except additions to the steam generator have been removed or accounted for prior to the conclusion of the work activity.

2.a INSERVICE INSPECTION PROGRAM (FULL LENGTH TUBE INSPECTION)

Staff Recommended Action

The Standard Technical Specifications (STS) and Regulatory Guide 1.83, Part C.2.f, currently define a U-tube inspection as meaning an inspection of the steam generator tube from the point of entry on the hot-leg side completely around the U-bend to the top support of the cold-leg side. The staff recommends that tube inspections should include an inspection of the entire length of the tube (tube end to tube end) including the hot leg side, U-bend, and cold leg side.

This recommended action does not mean that the hot leg inspection sample and the cold leg inspection sample should necessarily involve the same tubes. That is, it does not preclude making separate entries from the hot and cold leg sides and selecting different tubes on the hot and cold leg sides to meet the minimum sampling requirements for inspection.

Consistent with the current STS requirements, supplemental sample inspections (after the initial 3% sample) under this staff recommended action may be limited to a partial length inspection provided the inspection includes those portions of the tube length where degradation was found during initial sampling.

Response

Oconee is a Babcock and Wilcox (B&W) pressurized water reactor and, as such, utilizes the B&W once-through-steam generator (OTSG). That is, the steam generators at Oconee are the vertical, straight tube, tube and shell heat exchanger type. The inservice inspection of these tubes usually consists of a non-destructive examination by eddy-current testing of the entire length of the tube (tube end to tube end).

2.b INSERVICE INSPECTION PROGRAM (INSPECTION INTERVAL)

Staff Recommended Action

The maximum allowable time between eddy current inspections of an individual steam generator should be limited in a manner consistent with Section 4.4.5.3 of the Standard Technical Specifications, and in addition should not extend beyond 72 months.

Response

The Oconee Nuclear Station technical specification concerning steam generator inspection interval (specification 4.17.4) have been reviewed. Based on this review, the maximum allowable time between inspections, as allowed by Oconee's specifications, is consistent with section 4.4.6.3 of the Babcox & Wilcox Standard technical specifications.

3.a SECONDARY WATER CHEMISTRY PROGRAM

Staff Recommended Action

Licenses and applicants should have a secondary water chemistry program (SWCP) to minimize steam generator tube degradation.

The specific plant program should incorporate the secondary water chemistry guidelines in SGOG Special Report EPRI-NP-2704, "PWR Secondary Water Chemistry Guidelines," October 1982, and should address measures taken to minimize steam generator corrosion, including materials selection, chemistry limits, and control methods. In addition, the specific plant procedures should include progressively more stringent corrective actions for out-of-specification water chemistry conditions. These corrective actions should include power reductions and shutdowns, as appropriate, when excessively corrosive conditions exist. Specific functional individuals should be identified as having the responsibility/ authority to interpret plant water chemistry information and initiate appropriate plant actions to adjust chemistry, as necessary.

The referenced SGOG guidelines above were prepared by the Steam Generator Owners Group Water Chemistry Guidelines Committee and represent and consensus opinion of a significant portion of the industry for state-of-the-art secondary water chemistry control.

Response

Duke Power has been intimately involved with the development in the secondary water chemistry guidelines in SGOG special report EPRI-NP-2704, "PWR Secondary Water Chemistry Guidelines," October 1982. Oconee Nuclear Station has adopted the guidelines in principle and philosophy. Oconee program, as referenced in these Guidelines, addresses measures to minimize steam generator corrosion. This includes progressive corrective actions and identification of the functional individuals responsible for interpreting plant water chemistry information and initiating appropriate plant actions.

Based on Oconee's capabilities, operating goals for steady state chemistries that are more stringent than the SGOG Guidelines are specified. These goals include a few critical chemistry parameters and air ejector off-gas. A majority of the time, Oconee meets or exceeds these goals. Those which are not being met have an action plan in order to try to obtain these goals within a reasonable period of time.

A brief description of Oconee's secondary side water chemistry program is provided in section 10.3.5 and 10.4.5 of the Oconee's Final Safety Analysis Report (FSAR).

3.b CONDENSER INSERVICE INSPECTION PROGRAM

Staff Recommended Action

Licensees should implement a condenser inservice inspection program. The program should be defined in plant specific safety-related procedures and include:

1. Procedures to implement a condenser inservice inspection program that will be initiated if condenser leakage is of such a magnitude that a power reduction corrective action is required more than once per three month period; and

2. Identification and location of leakage source(s), either water or air;

3. Methods of repair of leakage;

4. Methodology for determining the cause(s) of leakage;

5. A preventive maintenance program

RESPONSE

A comprehensive condenser test program which is performed at each refueling inspection, has been in existence at Oconee since 1981 for Unit 1; 1980 for Unit 2; and 1982 for Unit 3. The program includes eddy current testing of condenser tubes and a visual inspection of the condenser. The visual inspection include, but are not necessarily limited to; the examination of the water boxes for corrosion; and examination of the tubes for pitting and inlet erosion; and the inspection of the steam side for steam erosion, baffle damage, and tube damage by loose parts.

In addition, during normal operation the utilization of Amertap cleaning system and one overall excellent quality of the lake water contribute to condenser integrity and reliability.

Finally, Duke acknowledges that the staff recommendation in the generic letter states that... "The program should be defined in plant specific safety-related procedures...". A Review of NUREG-0844 reveals that the Staff Recommended Action (2.6.1) does not mention that the program be defined in safety-related procedures. Duke concurs with the Steam Generators Owners Group that condenser inspection and leakage are not safety issues. Duke's contends, that our overall condenser program is completely adequate and addresses all staff recommendations, and we also believe that a safety grade program will not improve condenser integrity.

4. PRIMARY TO SECONDARY LEAKAGE LIMIT

Staff Recommended Action

All PWRs that have Technical Specifications limits for primary to secondary leakage rates which are less restrictive than the Standard Technical Specifications (STS) limits should implement the STS limits.

Response

Oconee Nuclear Station technical specification 3.1.6 provides the limiting condition for operation of the reactor coolant system leakage. This specification has been reviewed in contrast with the standard technical specification for Babcock and Wilcox Pressurized Water Reactors (NUREG-0103 Rev. 4).

For unit 1 only, the Oconee technical specifications (3.1.6.4) require that a reactor shutdown be initiated within 4 hours if the leakage through the Unit 1 steam generator tubes equals or exceeds 0.3 gpm. This unique specification was a result of a special problem associated with the Unit 1 steam generators.

Excluding the above specifications, Oconee technical specifications do not explicitly limit primary to secondary leakage through the steam generator tubes. The limits specified are more general in nature. Specifically, specification 3.1.6.1 states that if the total reactor coolant leakage rate exceeds 10 gpm, then the reactor shall be shutdown within 24 hours of detection. Continuing, specification 3.1.6.2 states that if an unidentifiable reactor coolant leakage exceeds 1 gpm, then the reactor shall be shutdown within 24 hours of detection.

Duke does not consider a steam generator tube leak to be an unidentifiable reactor coolant leakage. In practice, however, Duke has always initiated a shutdown when the steam generator tube leakage was large enough such that there is a reasonable assurance that present techniques, when employed, will be able to identify which tube(s) were leaking. Normally, when the measured leak rate reaches 0.3 to 0.5 gpm, an orderly shutdown is initiated in order to identify which tube(s) are leaking and effect repairs where necessary.

5. COOLANT IODINE ACTIVITY LIMIT

Staff Recommended Action

PWRs that have Technical Specifications limits and surveillance for coolant iodine activity that are less restrictive than the Standard Technical Specification (STS) should implement the STS limits. Those plants identified above that also have low head high pressure safety injection pumps should either: (1) implement iodine limits which are 20% of the STS values, or (2) implement reactor coolant pump trip criteria which will ensure that if offsite power is retained, no loss of forced reactor coolant system flow will occur for steam generator tube rupture events up to and including the design basis double-ended break of a single steam generator tube, and implement iodine limits consistent with the STS.

Response

Technical Specification 3.1.4 specifies the reactor coolant system activity limits for Oconee Nuclear Station. This specification is based on limiting the consequences of a postulated accident involving the double-ended rupture of a steam generator tube. The criteria for the steam generator tube rupture event are the does limits specified in 10CFR100. A discussion of the analysis and Results of the licensing basis seam generator tube rupture accident is provided in Section 15.9 of the Oconee FSAR.

Specifically, the limiting value for the specific activity of the Reactor Coolant system, as established by specification 3.1.4, insure that the whole body dose at the site boundary will not exceed 0.5 rem during a design basis steam, generator tube rupture event. Therefore, specification 3.1.4 provides reasonable assurance that reactor coolant activity will not contribute unacceptably to offsite doses as a result of a design-basis steam generator tube rupture event.

Further, to ensure compliance, routine surveillance of the reactor coolant activity is performed. This program measures and tracks the activity of the reactor coolant by monitoring several isotopes, including iodine. Specifically, Table 4.1-3, Item 1 on page 4.1-10 of the Oconee Technical Specifications define the minimum sampling frequency and analysis program for the Reactor Coolant.

6. SAFETY INJECTION SIGNAL RESET

Staff Recommended Action

The control logic associated with the safety injection pump suction flow path should be reviewed and modified as necessary, by licenses, to minimize the loss of safety function associated with safety injection reset during and SGTR event. Automatic switchover of safety injection pump suction from the boric acid storage tanks (BAST) to the refueling water storage tanks should be evaluated with respect to whether the switchover should be made on the basis of low BAST level alone without consideration of the condition of the SI signal.

Response

The current Oconee design contains no automatic control logic to realign high pressure injection (HPI) pump suction flow on low level in the letdown storage tank (LDST). The ability to manually realign the running HPI pump suction while in the RCS makeup mode is not affected by resetting the safety injection signal. Alarms are provided to alert the operators to low level conditions in the LDST. In addition, automatic suction switchover to the borated water storage tank (BWST) will occur following an Engineered Safeguards (ES) signal, even if the ES signal has been previously received and reset.

There is planned Nuclear Station Modification (NSM ON-1515) at Oconee which would realign HPI pump suction from the LDST to the BWST on low LDST level. The circuit is being designed so that it will achieve its protective function independent from Engineered Safeguards signals. The modification is in the final design phase, and it has not yet been installed at any of the units.