Duke Power®
A Duke Energy Company

GARY R. PETERSON
Vice President
Catawba Nuclear Station

Duke Power
CN01VP / 4800 Concord Rd
York, SC 29745

803 831 4251
803 831 3221 fax
grpeters@duke-energy com

November 21, 2002

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Subject: Duke Energy Corporation
Catawba Nuclear Station, Unit 2
Docket Number 50-414
Steam Generator Outage Summary Report
for End of Cycle 11 Refueling Outage
Response to NRC Request for Additional
Information

Reference: Letter from Duke Energy Corporation
to NRC, dated January 17, 2002

The reference letter transmitted the steam generator tube surveillance program results for the Unit 2 End of Cycle 11 refueling outage. On October 10, 2002, a telephone conference call was held among representatives of Duke Energy Corporation and the NRC. The purpose of this letter is to transmit a formal response to the Request for Additional Information discussed in the conference call.

There are no regulatory commitments contained in this letter or its attachment.

If you have any questions concerning this material, please call L.J. Rudy at (803) 831-3084.

Very truly yours,

Gary R. Peterson

LJR/s

Attachment

A001

xc (with attachment):

L.A. Reyes, Regional Administrator
U.S. Nuclear Regulatory Commission, Region II
Atlanta Federal Center
61 Forsyth St., SW, Suite 23T85
Atlanta, GA 30303

E. Guthrie, Senior Resident Inspector
U.S. Nuclear Regulatory Commission
Catawba Nuclear Station

C.P. Patel, Senior Project Manager (addressee only)
U.S. Nuclear Regulatory Commission
Mail Stop O8-H12
Washington, D.C. 20555-0001

REQUEST FOR ADDITIONAL INFORMATION
CATAWBA UNIT 2
END OF CYCLE 11 STEAM GENERATOR INSPECTION REPORT

The technical specifications for Catawba Unit 2 require the complete results of the steam generator tube surveillance program be reported to the NRC. This report was submitted to the NRC in a letter dated January 17, 2002. The staff has reviewed the report and has multiple questions necessary for the staff to better understand the indications and imperfections that have been identified and left in service. The staff requests that the licensee respond to the following questions in order for the staff to complete their review.

1. The licensee's submittal identifies the number of tubes inspected full length and the number of tubes inspected partial length. These numbers, particularly the partial length inspections, do not appear to match those provided to the NRC staff during a conference call that took place during the outage (ML021780129 - summary of call). For example, during the conference call, the licensee stated that 100% of in service tubes in three steam generators were examined at the hot leg top-of-tubesheet (TTS) with a rotating pancake coil (RPC) probe. This should consist of approximately 4500 partial length inspections per steam generator, which does not match the licensee's documentation of approximately 225 partial length inspections per steam generator. Clarify the source of the totals for the tubes inspected full length and partial length.

Duke response
In our letter dated January 17, 2002 we identified the number of tubes inspected by bobbin. The partial length inspections were due to running low row U-bends to the top support. This number of bobbin inspections is a subset of the total inspections discussed during the conference call during the outage. The reporting

of tubes inspected by bobbin is consistent with previously submitted reports. Future reports will specify the inspection type for the quantity of tubes inspected.

2. Provide definitions for all codes used in the report under the "IND" and "COMMENT1" columns and explain how they are used at Catawba Unit 2. For example, VOL might mean "volumetric", but it is not clear what imperfection(s) it is used for (i.e., manufacturing burnish mark, intergranular attack, wear mark, etc.).

Duke response
The three letter codes used are explained in the EPRI PWR SG Examination Guidelines and our site-specific guidelines. Because there are some site specific codes utilized that will not appear in the EPRI guidelines, a copy of the three letter codes used for this examination are being sent to the staff and will be incorporated in future reports. The example given, "VOL", would be a signal indicative of all the "imperfections" listed in the RAI, i.e., MBM's, IGA, wear, etc. The characterization, i.e., "VOL", SAI, SCI, etc., of an indication is determined based on the signal response by coil. The characterization initially has nothing to do with determining the morphology or "imperfections it is used for". This is a determination based on resolution analysts and dispositioners reviewing the history and signature of the signal. The characterization entered into our eddy current database is by analysts as directed by the Duke guidelines. Once reported to the database, further evaluation of these indications is part of the dispositioning process that considers the previous history of the tube and the signature of the eddy current signal. All the information required to disposition the indications is not contained in the database or the report. Inclusion of those factors of the dispositioning process into the eddy current database or the reports is not feasible. Previous experience has demonstrated that it is more conservative to leave these coded as VOL in the historical database, therefore ensuring they will get evaluated in the next inspection for any potential changes. This evaluation each

inspection interval of the VOL indications generates a more independent dispositioning than might be obtained should the indications be characterized as MBM in the database.

The following is a general description of the process used to perform historical comparison or disposition indications detected and reported at Catawba Unit 2.

Historical comparison

In general, the historical comparison is performed as part of the overall process.

- Initially, the reporting is the responsibility of the primary and secondary analysts where they would report all indications according to the analysis guidelines. Part of this analysis process is to ensure historical indications have been addressed, i.e., reporting again, "INR", etc. This is accomplished by use of what is called a "report validator".
- The next step of the process occurs during resolution of any discrepancies between the primary and secondary analysts. The resolution analysts are responsible for reviewing indications to determine whether they are indications indicative of degradation. It is the responsibility of the resolution analysts to perform a historical comparison of indications which have been reported in the past as well as the current outage. This historical comparison is accomplished by using objective criteria established as part of the analysis guidelines. The criteria include changes in voltage and phase as well as the requirement for an indication to have previously been inspected with a rotating coil technology. No historical comparison is to be performed on any indication which did not exist in a previous outage or was not previously inspected with a rotating coil technology. In addition to the historical comparison, the resolution analysts also review signal signatures to aid in determining the morphology of indications.
- The last step of the process is final dispositioning which is performed by Steam

Generator Maintenance Engineering engineers and an ECT Level III. This dispositioning process is very similar to the resolution process with some minor differences. The dispositioners do not determine the reportability of indications. Indication queries, generated by the data management database, are reviewed to further determine whether they should be left in service or removed. The disposition process includes reviewing historical results for signal changes, all information related to indications, i.e., location in the tube, location of the tube, signal signature, industry experience, etc., to the final disposition of indications/tubes.

Each analyst (primary, secondary, resolution) has the option of reporting a volumetric indication as a Single or Multiple Volumetric Indication, SVI/MVI, if they determine the indication should be considered for removal from service.

3. Identify all types of imperfections that are being left in service (e.g., wear, loose parts, manufacturing burnish marks, etc.), the number of each type of imperfection, and the basis for leaving them in service. Ensure that this information, in combination with the information requested in RAI #2 enables the staff to read the January 17, 2002, report and identify the imperfection listed for each tube and the basis for leaving it in service.

Duke response

The only active flaw at Catawba 2 is AVB wear. We also see wear from foreign objects and indications of PLP's which are thought to be sludge or deposits. MBM's are routinely observed and IGA has not been identified. To summarize, the indications that are left in service are mechanical wear and small volumetrics that are (to date) all MBM's. Wear is most typically found in the u-bend regions at the AVB supports, while the small volumetric indications can be found over the length of the tube (free span and supports). According to our guidelines VOL calls are below the plugging limit. As described in response to item 2, the dispositioning process

completes an independent review of these indications each inspection to determine if they may remain in service.

4. Denting at tube supports and in the free span was reported. Are these dents manufacturing related or corrosion related?

Duke response
Yes, there are manufacturing dents at both the tube support plates and in the freespan. There are no corrosion induced dents. The voltage threshold for dent calling was changed in 2001 from 5 volts to 2 volts to be more consistent with industry practices. Because of the shift to a lower threshold for reporting dents, the report for End of Cycle 11 contains DNT indications that are not reported in prior outages.

5. Ensure that the following questions are addressed in response to questions above, or separately.

   a. In the January 17, 2002, report, a tube was identified (steam generator A, Row 2 Column 8) with an NQI based on a bobbin probe examination and a VOL at the same location based on a rotating probe examination. This tube was left in service. In a letter to the NRC dated October 23, 2001, the licensee discussed a tube (steam generator B, Row 16 Column 29) with the same coding (NQI/VOL) and was removed from service during the end of cycle (EOC) 10 steam generator inspection. Explain how two tubes with the same coding result in different outcomes.

Duke response
Row 16 Column 29 in steam generator B was plugged because of its location. The location is at the upper edge of the flow distribution baffle in the hot leg. The indication also had no previous history from prior inspections. The indication was below the repair limit and was conservatively removed from service.

Row 2 Column 8 in steam generator A had an indication 9 inches above a preheater baffle in

the freespan of the tubing. The indication depth was shallow. The indication had previous history and was dispositioned as an MBM.

b. The code of PID was used for a number of tubes during the EOC 11 steam generator inspection. The staff typically sees this code associated with an inspection performed for "positive identification" to ensure that the correct tube will be plugged/repaired. However, at Catawba Unit 2 this code was used and no tubes were plugged/repaired. (One example is in steam generator A, Row 5, Column 63.) Explain how PID is used at Catawba Unit 2.

Duke response
The "PID" code is simply used to ensure repeatability. The misnomer historically applied to the "PID" code has been this was to verify tubes to be repaired/removed from service. Our interpretation of the "PID" code has always been that it was a method of verifying the original tube inspected, thus the repeatability of the exam.

Row 5, Column 63 in steam generator A was an indication from a tubesheet examination. The guidelines at that time would have PID'ed all tubesheet indications called.

Attachment 2A
Bobbin Three Letter Characterization Codes

#		CODE	DESCRIPTION
1		ADI	Absolute Drift Indication
2	*	AXI	Axial Indication
3		BLG	Bulge
4		BOR	Boron
5	*	CHG	Indication Exhibits Change
6		CHT	Chatter
7	*	DBH	Dispositioned By History
8		DNT	Dent
9		DWI	Dent With Indication
10		FC	Final Calibration
11		FCL	Final Calibration Late
12		HLC	History Location Changed, Resolution code only, Current location different than history location due to landmark table change.
13	*	HNC	Has Not Changed
14		HNI	Has Not-changed Indication
15		ICR	Incomplete Roll
16		IC	Initial Calibration
17	*	IDOK	Tube ID Verified; This code shall be used to identify tubes acquired more than once during the current outage. Use of this code requires tube to tube comparison or fingerprinting of the affected tube(s).
18		INF	Indication Not Found
19		INR	Indication Not Reportable
20		IRR	Irregular Roll
21	*	L3R	Level III Review
22		MSG	Analyst Message
23		NEX	No Expansion
24		NFC	No Final Calibration
25		NQI	Non-Quantifiable Indication
26		NSR	Needs SGME Review
27		OBS	Obstructed
28		OVR	Over Roll
29		OXP	Over Expansion
30		PID	Positive Identification
31	*	PLG	Plugged Tube
32		PLP	Possible Loose Parts
33		PVN	Permeability Variation
34		RBD	Retest - Bad Data
35		RVB	Retest - AVB
36		RIC	Retest - Incomplete
37		RNC	Retest - Tube Number Check
38		ROB	Retest - Obstructed
39		RRC	Retest - Rotating Coil
40		RPD	Retest - Positive Identification
41		SAT	Satisfactory
42		SLG	Sludge
43		SKR	Skip Roll
44	*	WAR	Wear
45		WTG	Wetting/Leaking

* Denotes code to be used in the "UTIL 1" field

APPENDIX B
D5 ROTATING COIL ANALYSIS GUIDELINES

Attachment 1B
Three Letter Characterization Codes

#	CODE	DESCRIPTION
1	ARC	Circumferential Extent Measurement
2	AXI*	Axial Indication
3	DNT	Dent
4	IDOK*	Tube ID Verified; This code shall be used to identify tubes acquired more than once during the current outage. Use of this code requires tube to tube comparison or fingerprinting of the affected tube(s).
5	L3R*	Level III Review
6	LEN	Axial Extent Measurement
7	MAI	Multiple Axial Indication
8	MCI	Multiple Circumferential Indication
9	MMI	Mixed-Mode Indication
10	MVI	Multiple Volumetric Indications
11	NDD	No Degradation Detected
12	NDF	No Degradation Found
13	OBS	Obstructed
14	PID	Positive Identification
15	PLP	Possible Loose Part
16	PVN	Permeability Variation
17	RBD	Retest - Bad Data
18	RIC	Retest – Incomplete
19	RNC	Retest - Tube Number Check
20	ROB	Retest – Obstructed
21	RPD	Retest – Positive Identification
22	SAI	Single Axial Indication
23	SCI	Single Circumferential Indication
24	SVI	Single Volumetric Indication
25	VOL	Volumetric
26	WAR*	Wear
27		

*** Denotes code to be used in the "UTIL 1" field.**