ARGONNE NATIONAL LABORATORY
9700 South Cass Avenue, Argonne, Illinois 60439

Telephone: 312/972-6144

June 13, 1988

Mr. E. Murphy
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Murphy:

Subject: Westinghouse Method for Evaluation of Steam Generator Tube Vibration-Induced Fatigue

Argonne National Laboratory has been providing consultation to the U.S. NRC in the review of the North Anna Unit 1 steam generator tube failure assessment and the evaluation methodology developed by Westinghouse. The current status of the Westinghouse method is given in WCAP-11799 which documents the application of the method to evaluate the steam generator tubes of Beaver Valley Unit 1 nuclear station.

The review took place over a period of several months (September 1987 to date) that included the time period during which the Westinghouse method was under development. Among other things, as part of the review Argonne called attention to a number of uncertainties related to the inherent complexities of the physical situation and to associated inadequacies in state-of-the-art modeling and analysis techniques.

Upon review of the recent assessment of the Beaver Valley Unit 1 steam generator tubing (WCAP-11799), it is concluded (based on documentation, a laboratory visit, and correspondence) that Westinghouse has satisfactorily identified and appropriately addressed the major uncertainties associated with the test and analysis program; as an example, See Sections 8.2 - 8.7 of WCAP-11799. As a result, it is further concluded that the Westinghouse method as presently developed represents a sound engineering approach that, if properly implemented, will provide reasonable assurance that future steam generator tube failures of the type experienced at North Anna Unit 1 are not likely to occur.

Sincerely,

M. W. Wambsganss

M. W. Wambsganss
Materials and Components Technology Div.

MWW:cml

9201280193 910621
PDR FOIA
WILLIAM91-106 PDR

C/19

SLB

Row 9
Row 8 > Assign leak rate = 1000 gallons/day

$\frac{\theta}{2} = 23°$

SLB → 2250 ΔP early in

... both directions

... → 2... → leak increases to 325 gpd

... → ... → 355 gpd

SLB → 2600

$\frac{\theta}{2}$ 158° → tube burst for row 9 tube

critical

C/20

				Volt - 1.61	
R4-C3	2H	720	DI	← Reanalysis of May 87 data	
		RPC	DI	.7 v	
R4-C8	3H	8x1	PI	7.11 v (one coil response)	plugged May 1987
		RPC	PI	2.7 v	
R37-C25	1H	720	NDD	5.28 v (one coil)	
		8x1	PI	2.08 v	
R11-C45	1H	8x1	PI	.89 (one coil)	
		RPC	PI	.92	
R46 C47	3H+0	8x1	PI	.66 (one coil)	
	+.2	RPC	PI	.55	
	4H+0	8x1	PI	5.26 (one coil)	
	+.2	RPC	PI	.25	
R11-C51	1H +1.22/.99	720	DI	2.51 v	May 1987 record
	-1.01/.99	720	DI	3.57 v	May 1987 record
	+.92	8x1	PI	12.54 v	(one coil)
	+0	RPC	DI	2.92 v	
R16-C71	2H -.77/.91	720	DI	2.53 v	
		8x1	NDD		
		RPC	DI	2.32 v	

holy shit ?!

R12 - C27	TSH + 0	8x1	PI	37.23 v	(8 coils)
		RPC	PI	6.99 v	
R22 - C31	TSH + 0	720	NDD		
		8x1	PI	5.94 v	(one coil)
		RPC	PI	2.43 v	
~~R5 - C32~~					
R9 - C32	TSH + .8	.720	TI	2.00 v	
		8x1	NDD		
		RPC	TI	.86 v	
R21 - C32	TSH + 0	8x1	PI	18.9 v	(3 coil response)
		RPC	PI	8.27 v	
R19 - C34	TSH + 0	.720	NDD ~~[illegible]~~		
		8x1	PI	7.50 v	(1 coil)
		RPC	PI	2.92 v	
R13 - C36	TSH + 1.4	.720	TI	1.72 v	
	+ 0	8x1	PI	5.92 v	(eight coils)
	+ 1.2	RPC	TI	1.34 v	
	+ 1.6	RPC	TI	.96 v	
R13 - C40	TSH + .89	720	TI	2.49 v	
	+ 1.00	8x1	PI	2.28 v	(eight coils)
	+ .65	RPC	TI	.6 v	
	+ .7	RPC	TI	.71 v	
R22 - C42	TSH + 6.75	720	22%	2.12 v	(Normal Coil
		8x1	NDD		

R12-C41	TSH +1.53	720	TI*	2.61 V
		8x1	NDD	
	+1.5	RPC	TI	5.15 V
R11-C43	TSH +.82	720	TI	.87 V
		8x1	NDD	
	+1.1	RPC	TI	1.61 V
R12-C43	TSH +1.36	720	TI	2.95 V
		8x1	NDD	
	+1.4	RPC	TI	1.65 V
R13-C43	TSH +.8	720	TI	2.91 V
		8x1	NDD	
		RPC	TI	.57 V
R13-C44	TSH +1.32	720	TI	1.64 V
	+.86	720	TI	2.57 V
		8x1	NDD	
	+1.2	RPC	TI	1.2 V
R14-C44	TSH +.72	720	TI	
		8x1	NDD	
	+.3	RPC	TI	
R13-C46	TSH +1.23	720	TI	
	+.65	720	TI	
		8x1	NDD	
	+.60	RPC	TI	

~~R14-C44~~ TSH

R 13 - C47	TSH + .57	720	TI	
	+ 1.12	720	TI	
		8x1	NDD	
	+ .7	RPC	TI	
R 14 - C47	TSH + .76	720	TI	
		8x1	NDD	
	+ .5	RPC	TI	
R 24 - C47	TSH + .6	8x1	PI	(5 coils)
	+ 0	RPC	PI	
R 32 - C47	TSH + 1.08	720	TI	√ 2 C.C3 v (Reanalysis of May 87 data)
	+ 0	8x1	PI	
	+ 0	RPC	PI	
R 13 - C48	TSH + .88	720	TI	
	+ .65	720	TI	
		8x1	NDD	
	+ .6	RPC	TI	

R 13 - C49 TI/PI/TI

R 31 - C49 TI/NDD/?

R 31 - C53 <20% @ 6.2" ATS with ~~EI~~ 720 (normal)

R 21 - C57 <20% @ 4.32" ATS " " "

R 31 - C67 <20% @ 26.74" ATS " " "

R9-C32	7C + .8A/.3	720	DE	3.7C ?	(AVB visible)
		8x1	NDD		
	T.7/0	RPC	DE	.8C ?	
R9-C51	Ruptured tube				
R10-C51	7C + O	.720	37%	.82 ?	(normal indic.)

R19 - C23	1C + 17.45	720	23%	.52 volts		✓
		8x1	NDD			
R34 - C24	2C	720	<20%	.13 volts		✓
		8x1	NDD			
R39 - C26	6C	720	NDD		What is PV	
		8x1	PV	V = 153.7 v		✓
		RPC	NDD			
R42 - C46	1C + 30.43	720	26%	V = .73 v		
		8x1	NDD			

R9 - C27	TSC +.8	720	TI	1.04 v	
		RPC	55%	.52 v	
R4 - C28	TSC +.5	720	TI	2.56 v	
		8x1	PI	5.88 v	(one coil)
		RPC	TI	1.53 v	
R4 - C29	TSC +.10	720	TI	1.96 v	
		8x1	PI	3.00 v	(one coil)
		RPC	81%	1.26 v	
R15 - C30	TSC +.1	720	TI	.85 v	
		8x1	NDD		
		RPC	57%	.84 v	
R5 - C31	TSC +1.0	720	TI	1.98 v	
		8x1	PI	2.71 v	(one coil)
		RPC	50%	.85 v	
R5 - C32	TSC +.1.6	720	TI	2.07 v	
	+ 1.17	8x1	PI	1.80 v	(five coil) !!
	+ 1.7	RPC	59%	.75 v	
R20 - C36	TSC +.9	720	TI	1.64 v	
		8x1	NDD		
		RPC	77%	.88 v	

J/R/A ASSOCIATES
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March 11, 1991
OGW-062

FREEDOM OF INFORMATION
ACT REQUEST

FOIA-91-106
Rec'd 3-15-91

Mr. Donnie H. Grimsley, Director
Division of Freedom of Information and
Publications Services
U.S. Nuclear Regulatory Commission
Washington, DC 20555

SUBJECT: FREEDOM OF INFORMATION ACT REQUEST

Dear Mr. Grimsley:

Pursuant to the Freedom of Information Act, 5 U.S.C. §552 and NRC's regulations, I am herein requesting that all documents, not previously released to the public via the Public Document Room, re the North Anna Unit 1 and Ginna steam generator tube rupture events, be placed in the Public Document Room.

I would appreciate your prompt response within ten working days of the receipt of this letter, as provided by the Code. I will be responsible for costs associated with processing this request, however, please provide an estimate if the fees exceed $50.00. I can be reached at 301/249-9672, if there are questions.

Thank you.

Sincerely,

Ophelia G. Williams

Ophelia G. Williams

~~9104190072~~

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

APR 4 1981

MEMORANDUM FOR: Thomas H. Novak, Assistant Director
for Operating Reactors
Division of Licensing

FROM: V. S. Noonan, Assistant Director
for Materials & Qualifications Engineering
Division of Engineering

SUBJECT: GINNA STATION STEAM GENERATOR TUBES INSERVICE INSPECTION PROGRAM FOR THE 1980-1989 INTERVAL (TAC #43196)

Plant Name: R. E. Ginna Unit No. 1
Suppliers: Westinghouse; Gilbert Associates
Docket Number: 50-244
Responsible Branch and Project Manager: ORB#5; R. P. Snaider
Reviewer: D. T. Huang
Description of Task: Review of Ginna Station's Steam Generator Tubes Inservice Inspection Program for the 1980-1989 Interval
Review Status: Additional Information Needed

The Inservice Inspection Section of the Materials Engineering Branch, Division of Engineering has reviewed that portion of Rochester Gas and Electric Corporation's submittal dated November 6, 1980 regarding the Ginna Station Steam Generator Tubes Inservice Inspection Program for the 1980-1989 interval. We conclude on the basis of our review that the Ginna Station Steam Generator Tube Inservice Inspection Program for the 1980-1989 Interval is acceptable if the following two conditions are met:

1) Plugging limit for the ten test sleeves be established.

2) Two typographical errors mentioned in our Safety Evaluation be corrected.

Our Safety Evaluation is attached.

Vincent S. Noonan, Assistant Director
Materials & Qualifications Engineering
Division of Engineering

Contact: D. T. Huang
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D. T. Huang

C/1

~~8104130434~~ (8pp.)

R. E. GINNA NUCLEAR POWER PLANT
REVIEW OF THE STEAM GENERATOR TUBE INSERVICE INSPECTION PROGRAM
FOR THE 1980 TO 1989 INTERVAL
SAFETY EVALUATION REPORT

MATERIALS ENGINEERING BRANCH
INSERVICE INSPECTION SECTION

INTRODUCTION

By letter dated November 6, 1980, Rochester Gas and Electric Corporation (the licensee) submitted the "Ginna Station Inservice Inspection Program for the 1980-1989 Interval" for review. Changes have been incorporated into Paragraph 5.7.1.1 and 6.5 of the Ginna Inservice Inspection Program in order to permit the installation of a maximum of ten test sleeves in steam generator tubes which would otherwise require plugging. These changes permit sleeving instead of plugging of tubes with unacceptable defects.

EVALUATION

We have reviewed the licensee's submittal dated November 6, 1980 regarding the Ginna Inservice Inspection Program. Based upon our review, we conclude that this inspection program meets the recommendations of Regulatory Guide 1.83, "Inservice Inspection of Pressurized Water Reactor Steam Generator Tubes," Revision 1 and the requirements of Section XI of ASME Code with respect to the inspection methods to be used, provisions for a baseline inspections, selection and sampling of tubes, and inspection intervals. However, the Ginna Inservice Inspection Program is incomplete with respect to the installation of ten test sleeves in steam generator tubes, since it does not contain actions to be taken in the event defects are identified in the test sleeves, e.g. plugging limit for the ten test sleeves. Furthermore, two typographical errors should be revised to convey the same meaning regarding scope of

steam generators inservice inspection as originally intended. They are as follows:

1. The reference number in Paragraph 3.5 should be changed to 5 in order to be consistent with the reference list.
2. Paragraph 5.7.1.1 should be revised to indicate that the plant may resume operation only when both conditions (a) and (b) are met.

In conclusion, we find that the steam generator tube inservice inspection portion of the "Ginna Station Inservice Inspection Program for the 1980-1989 Interval" is acceptable with the condition that plugging limit for the ten test sleeves be established and the two typographical errors mentioned above be corrected.