REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:8306140410 DOC.DATE: 83/06/10 NOTARIZED: NO DOCKET #
FACIL:50-244 Robert Emmet Ginna Nuclear Plant, Unit 1, Rochester G 05000244
AUTH.NAME AUTHOR AFFILIATION
MAIER,J.E. Rochester Gas & Electric Corp.
RECIP.NAME RECIPIENT AFFILIATION
CRUTCHFIELD,D. Operating Reactors Branch 5

SUBJECT: Documents tube R34C54 removal from B steam generator 2 hot leg.Results of BMI analyses will be submitted in Fall 1983. Sequence of events & eddy current insp encl.

DISTRIBUTION CODE: A001S COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 10
TITLE: OR Submittal: General Distribution

NOTES:NRR/DL/SEP 1cy. 05000244

	RECIPIENT ID CODE/NAME		COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME		COPIES LTTR	COPIES ENCL
	NRR ORB5 BC	01	7	7				
INTERNAL:	ELD/HDS4		1	0	NRR/DE/MTEB		1	1
	NRR/DL DIR		1	1	NRR/DL/ORAB		1	0
	NRR/DSI/METB		1	1	NRR/DSI/RAB		1	1
	REG FILE	04	1	1	RGN1		1	1
EXTERNAL:	ACRS	09	6	6	LPDR	03	1	1
	NRC PDR	02	1	1	NSIC	05	1	1
	NTIS		1	1				
NOTES:			1	1				

TOTAL NUMBER OF COPIES REQUIRED: LTTR 26 ENCL 24

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

ROCHESTER GAS AND ELECTRIC CORPORATION • 89 EAST AVENUE, ROCHESTER, N.Y. 14649

JOHN E. MAIER
Vice President

TELEPHONE
AREA CODE 716 546-2700

June 10, 1983

Director of Nuclear Reactor Regulation
Attention: Mr. Dennis M. Crutchfield, Chief
Operating Reactors Branch No. 5
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Steam Generator Tube Pull
R. E. Ginna Nuclear Power Plant
Docket No. 50-244

Dear Mr. Crutchfield:

This letter is in response to a request from the NRC Staff to document the pulling which was performed during the current outage of tube R34C54 from the B Steam Generator hot leg. Based on eddy current indications of stress corrosion cracks at or just above the tube roll transition termination point in the tube sheet seen in the Fall 1982 and the Spring 1983 inspections, the decision was made to remove the portion of R34C54 between the tube sheet and the first support plate. The objective was to remove this rolled area for chemical and metallurgical evaluation.

The tube cutting equipment was identical to that successfully used for removal of tubes on the periphery of the B Steam Generator during the Spring 1982 outage. As indicated in the detailed sequence of events for the pulling operation presented in Attachment A, the first attempt to pull the tube was unsuccessful in that no movement was observed. Following a second cutting cycle, tube pulling began and tube movement was observed. A force of approximately 24,000 pounds was required to initially pull the tube. After the tube started moving, a force of approximately 8000 pounds or less was required for the pull.

Slight reverse movement, or spring back, of the tube was first observed when the tube had been pulled 8.5". Pulling continued in order to remove the first section of tubing. Spring back was observed each time when jacking pressure was released until 21¼" had been pulled. A 17¼" section of tubing was cut and it was determined that a fiberoptic inspection of R34C54 was appropriate to determine whether the tube had been cut at the first support plate. When this inspection proved inconclusive, R34C54 was inspected with multifrequency eddy current. This

A001
1/1

inspection indicated the tube had been cut 40% to 70% throughwall. Based on this information, R34C54 and 6 adjacent tubes were eddy current inspected. The objective of the inspections was to determine whether any damage had been done to adjacent tubes. The eddy current results, presented in detail in Attachment B, confirmed that R34C54 had been stretched nearly uniformly over its entire hot leg side from above the 6th support plate. The eddy current also showed that the tube immediately beneath R34C54, that is R33C54, had been affected immediately above the 6th support plate. This tube was subsequently removed from service by plugging. None of the other tubes had been affected.

Following the eddy current inspection, R34C54 was cut approximately 4 inches below the first support plate and was removed by hand in three additional pieces. Dimensions of the four sections of tubing are provided in Figures A1 and A2 and show a uniform O.D. reduction from the original 0.875 inch nominal to approximately 0.855 inches. No reduction was seen in the lowest 13½" inches of tubing since the pulling technique was designed to preclude any stretching of that portion of the tubing. No visual signs of tubing distress were apparent on the tubing.

The following conclusions are drawn regarding the tube pull and the current condition of the B Steam Generator.

1. R34C54 was nearly uniformly stretched over the hot leg side up to the U-bend. There was no abnormal necking down of the tube. These conclusions are based on eddy current indications of the magnetite from the original tube support plate intersections and on the fact that a standard 0.720 inch probe passed up through the 6th support plate. Downward movement of the tube in the hot leg, U-bend area was evidenced by the fact that a 0.700 inch probe was necessary to inspect above the 6th support plate.

2. R33C54, the tube immediately below the pulled tube, was affected by the pulled tube only in a section immediately above the 6th support plate. This presumably was caused by contact of R34C54 with R33C54, directly underneath it at the U-bend. No major affects occurred since a 0.700 inch probe was able to pass through this area and since the length of the tube with a signal was limited.

3. No other tube was affected by the pull. The eddy current inspection is capable of detecting any contact or near contact between tubes as evidenced by its capability to inspect sleeved tubes.

4. The integrity of the support plates was not affected. The eddy current inspection showed no changes in the support plate region. The pulled tubing, which included the first support plate intersection, showed no signs of being affected by the first support plate. The initial pulling force of approximately 23760 pounds and the typical force of approximately 8000 pounds which was applied while the tube was being stretched through the 6 hot leg side support plate locations is consistent with forces which have been required for previous secondary side tube pulls in which tubes are pulled through all six support plates. In Spring 1978, tube R45C52 required 20317 pounds to initially move the tube, 18900 pounds to pull the tube through the first 4 feet, and 8400 pounds typically through most of the pull. In Spring 1982, tube R45C47 typically required 8200 pounds to pull it. Fiberoptic inspections conducted during the Spring 1982 outage of the bottom of the first support plate at locations R45C52 and R45C47 showed no changes to the support plate integrity as a result of forces applied for tube pulling, verifying that the forces applied in those two pulls did not damage the 1st support plate.

Since the pulled tube has not experienced any abnormalities other than minor O.D. reduction and minor movement in the U-bend region and has been plugged, since only one other tube had indication which presumably was affected by the tube pull operation and it has been plugged, and since the support plate integrity has been assured, the B Steam Generator is acceptable for continued operation.

The sections of tubing removed from R34C54 will be examined by Battelle Columbus Laboratories. Examinations will include a comprehensive metallography as well as a chemical analysis of tube sheet crevice deposits. It is expected that a report of the inspection will be available in the Fall of 1983. A copy of the report will be provided to you when available.

Very truly yours,

John E. Maier

Attachments

Attachment A
Sequence of Events

The sequence of events for the tube pull is as follows:

1. Procedures were reviewed, personnel were trained, and tools were checked out and qualified.

2. The tube end and tube to tube sheet seal weld were machined 0.4 inches into primary face of tubesheet.

3. The tube cutter was qualified in the Steam Generator primary work area (tent) by cutting Inconel 600 tubing.

4. The cutting head was replaced.

5. The tubing to be removed was measured and marked by installing a positive collar. This was to ensure that the tube would be cut at 70 inches plus or minus 1/2 inch from the cutting edge, or 4 inches plus or minus 1/2 inch below the first support plate.

6. The cutter was inserted into Tube R34C54 and the cutter motor was turned on.

7. Based on previous experience with this cutting technique, when the cutter speed reached a certain speed, the motor was stopped, the cutter head was withdrawn and inspected. These conditions indicated that the tube was cut.

8. The tube extraction mandrel was inserted into the tube, the hydraulic jack was installed over the mandrel, and the jack nut was screwed onto the bottom of the mandrel.

9. Hydraulic pressure was applied to the jack, with the pressure being ramped up to 4,200 psig, or a force of 30240 pounds. No movement was observed.

10. The mandrel was removed.

11. Steps 3 through 8 were repeated.

12. Hydraulic pressure was applied, pressure was ramped up slowly from 2,500 psig (18000 pounds) to approximately 3,300 psig (23760 pounds) at which point the tube started to pull.

13. The pressure required to keep the tube moving decreased to approximately 1,000 psig (7200 pounds).

14. Spacers were installed between primary tube sheet jacking plate and the jack as the tube was pulled. Jacking pressures varied between 500 and 1,100 psig and no evidence of spring back occurred.

15. With an 8.5 inch spacer installed and with the jack at end of its stroke, pressure on the jack was relieved. At this point, evidence of spring back began via small reverse (upward) movement (0 to 1/4 inch) on video.

16. The jacking continued when the next spacer (10.5 inch) was installed. 1,000-1,100 psig pressure on jack was required throughout the length of the stroke.

17. Based on prior experience with both primary and secondary tube pulls including pressures and constant ability to increase spacer lengths, while paying attention to the spring back, steam generator supervision authorized continuation of tube pull.

18. Tube pull spring back remained consistent until with the 17 1/2 inch spacer was installed. At this point, spring back of about 1 inch occurred, although hydraulic pressures had remained at 1,000-1,100 psig.

19. It was recognized at this point that it was very possible that the tube was not cut.

20. The tube pull was continued because:

    a. Sufficient tubing must be removed to allow cutting of the sample above the upper end of the mandrel.

    b. Sufficient tubing must be left protruding from the tubesheet after the cut to permit use of tooling for continued tube pull.

    c. The pressure required to keep the tube sample moving never exceeded 1,100 psi.

21. With 21 1/4 inches of tube protruding from tubesheet, a cut was made leaving 4 inches protruding and a 17 1/4 inch tube specimen.

22. Emphasis was then directed on verifying the tube cut.

23. A fiberoptic inspection was attempted. The results pointed to evidence of attempted cut, but the inspection results were not conclusive.

24. A multifrequency eddy current inspection revealed a 40-70% thru-wall indication at the approximate cut location.

25. The decision was made to perform multifrequency eddy current inspection test of R34C54 and 6 adjacent tubes as described in Attachment B.

26. After evaluation of the eddy current results and the other data, the Plant Operations Review Committee reviewed all information. Authorization was given to proceed to cut the tube and then continue with the pull.

27. The tube was cut as per steps 3, 4, 5 and 6. At this point, the tube would rotate freely and was extracted by hand.

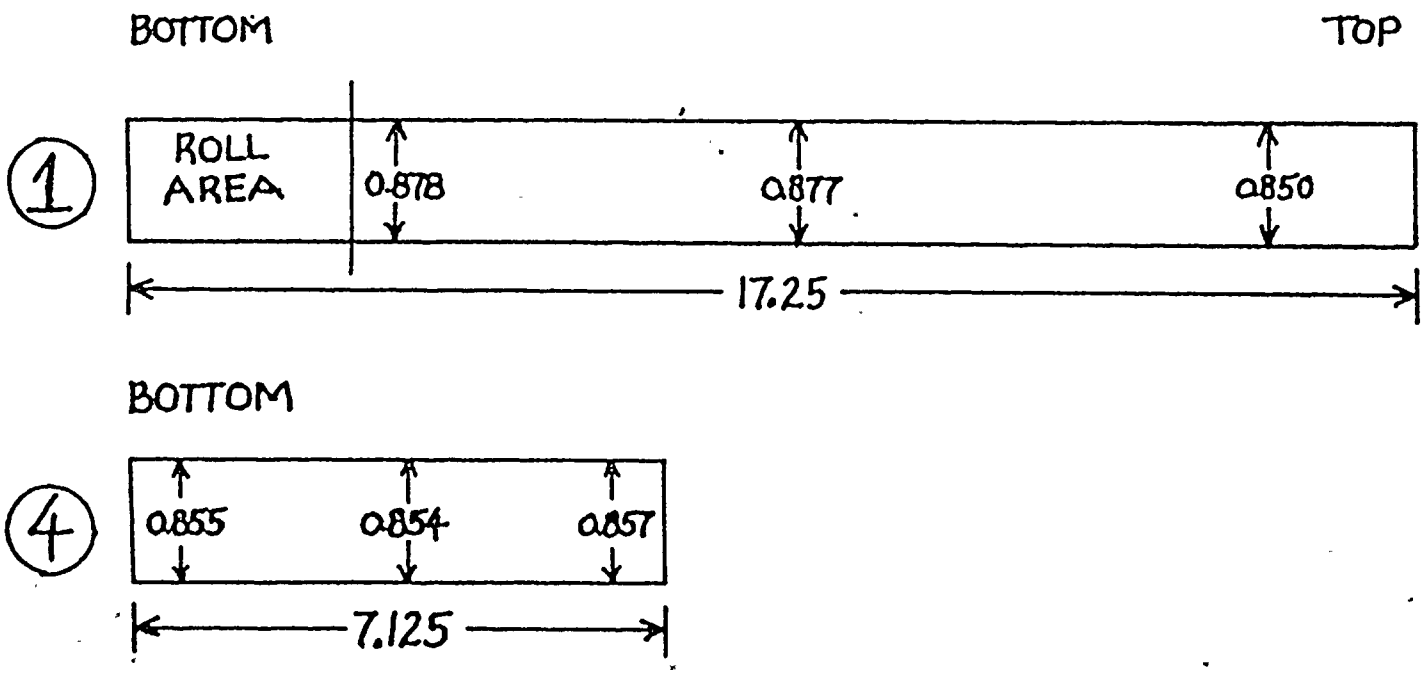
28. Three additional tube lengths were removed as shown in Figures A1 and A2. The total cutting length was selected to ensure that approximately 4" of tubing remained below the first support plate.

29. Outside diameter measurements were taken (at a later date) and are recorded on the Figures.

30. R33C54 was explosively plugged in both hot and cold leg due to eddy current indications at and above the 6th support plate.

31. A welded tapered plug was installed into hot leg tube sheet barehole, R34C54, and inspected. An explosive plug was installed in the cold leg at R34C54.

FIGURE A1



1

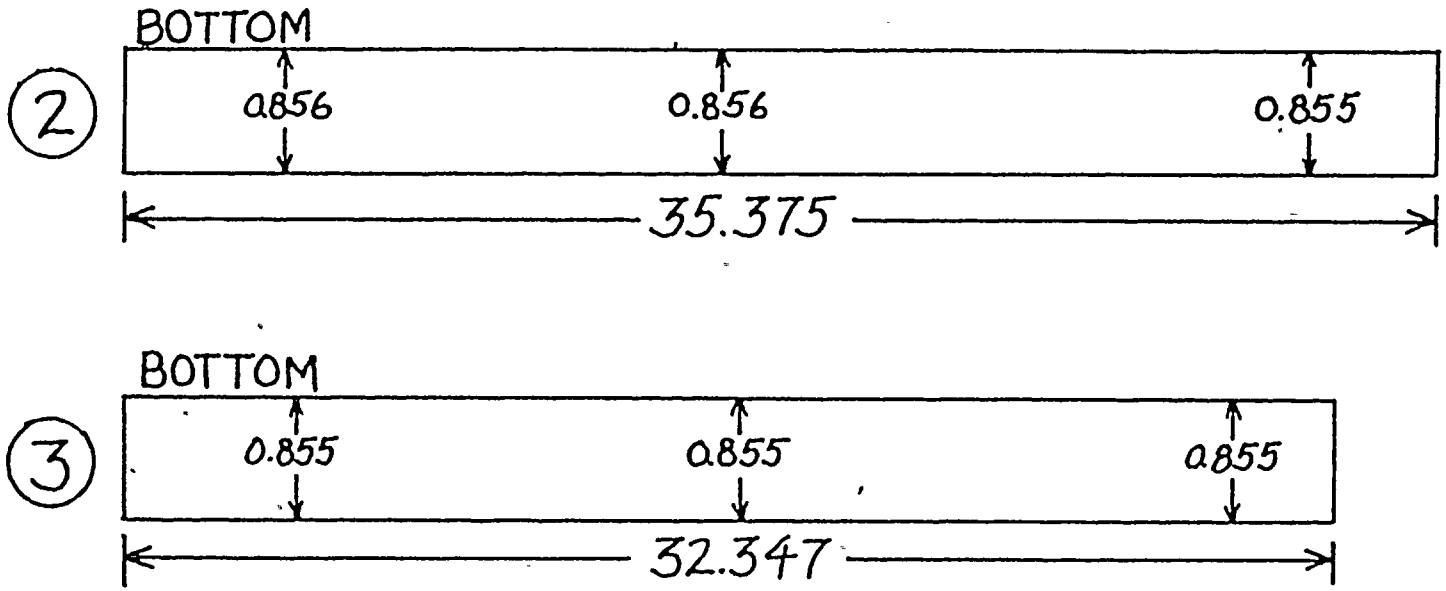
TUBE SPECIMEN IS 17.25" LONG. MEASUREMENTS WERE TAKEN ABOVE ROLL AREA, MIDDLE OF SPECIMEN AND ONE INCH BELOW TOP OF SPECIMEN. SCALE FOR NO. 1 AND NO. 4 - 1/2" = 1.0"

4

TUBE SPECIMEN IS 7.125" LONG MEASUREMENTS TAKEN TOP, MIDDLE & BOTTOM

TUBE SPECIMENS PULLED FROM B 9/G R34 C54 - O.D MEASUREMENTS

FIGURE A2



(2) TUBE SPECIMEN IS 35.375 INCHES LONG MEASUREMENTS TAKEN ONE INCH ABOVE BOTTOM, MIDDLE AND ONE INCH BELOW TOP.
SCALE - 1/4" = 1.0"

(3) TUBE SPECIMEN IS 32.437 INCHES LONG MEASUREMENTS TAKEN SAME LOCATION AS SPECIMEN NO. 2

TUBE SPECIMENS PULLED FROM B S/G R34 C54 - O.D. MEASUREMENTS

Attachment B
Eddy Current Inspection
Associated with Tube Pull

Following the attempted tube pull when it became apparent that the tube might not be cut, a comprehensive eddy current inspection program of the tube to be removed and 6 adjacent tubes were undertaken. The objective of the program was to determine whether R34C54 was cut and, if not, to ascertain whether any damage had been done to adjacent tubes. The multifrequency inspection used the same techniques and frequencies as are used for all Ginna inspections. Except as noted in the discussion of results, a standard 0.720 inch probe was used for all inspections. All tubes, except for R34C53 which has a sleeve in it, were inspected from the hot leg side up through the U bend and down at least past the 5th support plate on the cold leg side. Rather than use a smaller diameter probe for the sleeved tube, the 0.720 inch probe was inserted from the cold leg side and the tube was inspected from the cold leg side up through the U bend and down past the 1st support plate on the hot leg side to the top of the sleeve. Inspection was terminated at this point due to limited length of the probe.

The results for each tube are presented below:

R34C54

The inspection confirmed that the tube had not been cut but had been stretched over its hot leg side length. Based on the eddy current voltage change due to a magnetite signal, which corresponds to the original tube to tube support plate intersection, it was determined that the tube moved down through each of the support plates by the following amounts.

Support Plate	Downward Movement
6	1-2 inches
5	3-4 inches
4	7-8 inches
3	10-11 inches
2	11-12 inches
1	16-17 inches

These values indicate the amount of stretch which occurred in tubing initially above a given support plate. The balance of the 21¼ inches of stretch occurred in the tubing initially below the first support plate but above the upper pulling mandrel, an initial tube length of 60½ inches.

In order to inspect above the 6th support plate, since the 0.720 inch probe would not pass above the location, a 0.700 inch probe was used.

The inspection revealed no change in the signals at support plates. No significant tube thinning was identified.

R34R55

There were no indications.

R33C54

Deformation, or a dent, was seen at the 6th support plate. In addition, review of the absolute channel showed a shift in signal from the 6th support plate up to 12 inches above the 6th support plate. The 0.700 inch probe was required in order to inspect above the 6th support plate. This indicated some deformation of this portion of the tube, presumably due to contact between the pulled tube and R33C54 which is located directly below the pulled tube. No baseline data were available for this portion of R33C54. No other indications were observed in this tube. R33C54 was subsequently plugged.

R33C53

A small (less than 0.5 mil) dent was observed at the 5th support plate intersection on the hot leg side. No baseline data are available for this portion of this tube, however, this degree of minor denting is not unusual for the Ginna generator. Based on this fact, the fact that no other indications were seen on this tube, and the fact that the dent did not occur at the uppermost (6th) support plate but at a lower location, it was concluded that this tube was unaffected by the attempted tube pull.

R32C54

No indications.

R34C53

No indications.

R33C55

No indications.