

59-259

TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401

400 Chestnut Street Tower II

03 JAN 19 12:07

January 14, 1983

U.S. Nuclear Regulatory Commission  
Region II  
ATTN: James P. O'Reilly, Regional Administrator  
101 Marietta Street, Suite 3100  
Atlanta, Georgia 30303

Dear Mr. O'Reilly:

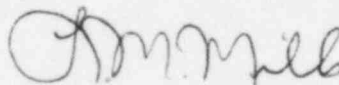
OIE BULLETIN 82-03 - STRESS CORROSION CRACKING IN THICK WALL, LARGE  
DIAMETER, STAINLESS STEEL, RECIRCULATION SYSTEM PIPING AT BWR  
PLANTS - BROWNS FERRY NUCLEAR PLANT

Enclosed is our complete response to IE Bulletin 82-03 for the  
Browns Ferry Nuclear Plant. The enclosed information supercedes  
that submitted by D. S. Kammer's letter to you dated December 9,  
1982. Extension of the response beyond January 12, 1983, as  
committed to in my letter to you dated December 3, 1982, was  
discussed with F. Cantrell of your staff on January 12, 1983. If  
you have any questions, please call Jim Domer at FTS 858-2725.

To the best of my knowledge, I declare the statements contained  
herein are complete and true.

Very truly yours,

TENNESSEE VALLEY AUTHORITY



L. M. Mills, Manager  
Nuclear Licensing

Enclosure

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PDR ADOCK 05000259  
Q PDR

# ENCLOSURE

## RESPONSE TO IE BULLETIN 82-03 BROWNS FERRY NUCLEAR PLANT

1. The ultrasonic examinations specified by the subject IE bulletin were performed by Lambert, MacGill, Thomas, Inc. (LMT) using procedures which have been demonstrated to NRC.
2. Please see attached table.
3. Evaluation of and corrective actions for linear indications noted on welds VR-2-14 and VR-2-36 were presented to NRC on January 6, 1983, and will be transmitted by a separate report before startup of the unit.
- 4.a.1 The isometric drawing for the unit 2 recirculation piping system at Browns Ferry is attached. There were 36 recirculation system welds examined in response to IE Bulletin 82-03.

### Recirculation System

#### Welds Examined

<u>Weld No.</u>	<u>Size</u>	<u>SRI</u>	<u>Weld No.</u>	<u>Size</u>	<u>SRI</u>
N1A (safe end)	28"	1.31	KR-2-17	12"	2.09
N1B (safe end)	28"	1.31	GR-2-14	12"	1.52
GR-2-27	28"	0.87	KR-2-18	12"	2.39
KR-2-24	28"	1.04	GR-2-41	12"	1.93
GR-2-53	28"	1.11	GR-2-42	12"	1.72
GR-2-18	22"	1.07	KR-2-40	12"	2.42
KR-2-45	28"	1.44	GR-2-43	12"	1.71
KR-2-51	28"	1.08	GR-2-38	12"	2.76
GR-2-54	28"	1.17	GR-2-4	4"	N/A
GR-2-51	22"	0.92	GR-2-33	4"	N/A
GR-2-12	12"	2.81	KR-2-37	22"	N/A

<u>Weld No.</u>	<u>Size</u>	<u>SRI</u>	<u>Weld No.</u>	<u>Size</u>	<u>SRI</u>
GR-2-13	12"	1.60	KR-2-15	22"	N/A
N2C (safe end)	12"	1.71	GR-2-52	22"	0.98
N2G (safe end)	12"	1.52	GR-2-35	12"	2.71
KR-2-36	22"	1.95	KR-2-35	22"	2.65
KR-2-41	22"	2.0	KR-2-42	22"	1.91
KR-2-20	22"	0.93	KR-2-19	22"	0.96
KR-2-13	22"	1.85	KR-2-14	22"	1.84

4.a.2 Stress rule index was the basis for selection of N1A, N1B, N2C, and N2G safe end welds, weld KR-2-45, and the ten 12-inch recirculation riser welds. The selection of welds KR-2-37 and GR-2-52 was at the request of NRC inspector, Jim Coley. The selection of weld KR-2-15 was based on previous examination findings at other nuclear facilities. The remaining welds consist of those welds previously examined this outage in accordance with the ASME Section XI in-service inspection program. The 12-inch recirculation riser and 4-inch bypass stub tube welds were examined because of management's concern that they be examined during this outage. The manifold to sweepolet welds were added to the examination scope at management's request after an NRC-conducted examination of weld KR-2-36 revealed questionable indications. Weld GR-2-35 was added when examination of KR-2-36 revealed possible indications in the adjacent weld.

4.a.3 The piping materials are listed below:

<u>Size</u>	<u>Min. Wall</u>	<u>Material</u>
28"	1.088"	A358 Class 1 from plate mt'l. A-240 TP 304
22"	2.088"	A358 Class 1 from plate mt'l. A-240 TP 304
12"	.569"	A358 Class 1 from plate mt'l. A-240 TP 304
4"	.337"	A376 TP 304

4.a.4 The occupational radiation exposure incurred by the examination team as a result of IE Bulletin 82-03 was approximately eight rem. The precautions taken to minimize radiation exposure were a radiation survey of the area to be worked in, radiation "hot spots" noted for the examiner's information, and/or a portable radiation monitor may be required if there are several hazardous radiation areas in the

proximity. In addition, a slave unit was used for weld examinations to enable part of the examination team to remain outside the drywell.

- 4.b Examinations were conducted using the following techniques and equipment:
1. Ultrasonic Instrument - Nortec 131D
  2. Transducer - Harisonic Dual Element, 1.5/MHz, 45° shear wave
  3. Calibration Blocks - flat blocks, A240 material, 1-inch and 1.25-inch nominal thickness
  4. Reference Reflector - 5-percent nominal thickness Vee notches (Sawtooth)
  5. Calibration Range - 2 full Vee-paths
  6. Reference Sensitivity - first ID notch set to 80 percent of full screen height
  7. Scanning Sensitivity - 2x (6db)
  8. Evaluation Sensitivity - essentially 2x because procedure requires recording of all nongeometric reflectors regardless of amplitude
  9. Recording Criteria - all nongeometric reflectors, all geometric reflectors greater than 50 percent of the distance amplitude correction curve at reference sensitivity
- 4.c No previous examinations were conducted using the validated methodology.
- 4.d The examinations were conducted using equipment and techniques qualified by LMT under NRC surveillance at Battelle Columbus Laboratories. In relation to the ultrasonic examinations, the samples used in the qualification are essentially similar to the Browns Ferry piping with regard to type material, pipe wall thickness, and diameter. The weld geometry and access were considered better on the plant piping than on the qualification samples. Based on these variables, the examinations performed at Browns Ferry may be considered capable of detecting similar cracks as large or larger than those in the qualification samples. As the actual size and nature of the sample flaws are not known to TVA, a more quantitative estimate is not possible.

TABLE VI  
EVALUATION BY REPORT  
TVA-038

REPORT	SYSTEM	WELD OR COMPONENT #	SCAN(S)	REMARKS
001	Recirc	GR-2-43	3,4	Intermittent ID/OD Geometry
002	Recirc	KR-2-40	3,4	Intermittent ID/OD Geometry
003	Recirc	GR-2-42	3,4	Intermittent ID/OD Geometry
004	Recirc	KR-2-18	3,4	Intermittent ID/OD Geometry
005	Recirc	GR-2-14	3,4	Intermittent ID/OD Geometry
006	Recirc	KR-2-17	3,4	Intermittent ID/OD Geometry
007	Recirc	GR-2-13	3,4	Intermittent OD Geometry
008	Core Spray	DCS-2-14	3 4	Intermittent ID/OD Geometry No Scan-Valve
009	Core Spray	DSCS-2-9	3,4	Intermittent ID/OD Geometry Prominent Weld Reinforcement (Crown)
010	Recirc	GR-2-12	3	Intermittent ID/OD Geometry
011	Recirc	GR-2-38	3,4	Intermittent ID/OD Geometry
012	Recirc	GR-2-41	3,4	Intermittent ID/OD Geometry
013	Recirc	N2C SE/NOZ	3,4	Intermittent ID/OD Geometry
014	Recirc	N26 SE/NOZ	3,4	Intermittent ID/OD Geometry
015	RHR	DSRHR-2-7	3,4	Intermittent ID/OD Geometry
016	Recirc	N1B-SE	3,4	Intermittent ID Geometry
017	Recirc	N1A-SE	3,4	Intermittent ID/OD Geometry
018	Recirc	GR-2-53	3,4	Intermittent ID/OD Geometry
019	RHR	DSRHR-2-6	3,4	Intermittent ID/OD Geometry
020	Recirc	KR-2-45	3,4	Intermittent ID/OD Geometry
021	Recirc	GR-2-54	3,4	Intermittent ID/OD Geometry
022	RHR	DSRHR-2-4A	3,4	Intermittent ID/OD Geometry

TABLE VI  
EVALUATION BY REPORT  
TVA-038

REPORT	SYSTEM	WELD OR COMPONENT #	SCAN(S)	REMARKS
023	RHR	DRHR-2-7		No Apparent Discontinuities
024	Recirc	KR-2-51	3,4,9,11, 12	Intermittent ID/OD Geometry Includes Longitudinal Seams @ 9:00 and 11:00:
025	Recirc	GR-2-27	3 4,11,12	No Scan - Pump Intermittent ID/OD Geometry Includes Longitudinal Seams @ 3:00,
026	Recirc	KR-2-24	3,4,7,8 11,12,14	Intermittent ID/OD Geometry OD Geometry Includes Longitudinal Seams @ 2:00, 6:00, 12:00
027	Recirc	KR-2-15	3,4,7,8	Intermittent ID/OD/Geometry Includes Longitudinal Seam at 1:00
028	Recirc	KR-2-37	3,4,9	Intermittent ID/OD Geometry Includes Longitudinal Seam @ 11:30
029	Recirc	GR-2-18		No Apparent Discontinuities No Scan 3 - Crossover
030	RHR	DSRHR-2-11	3,4	Includes Longitudinal Seam @ 11:30 Intermittent ID/OD Geometry
031	RHR	DHS-2-1		Includes Longitudinal Seam at 7:00 No Apparent Discontinuities
032	RHR	DSHS-2-12	5	No Scan 4 - Flange ID Geometry
033	Recirc	GR-2-51		No Apparent Discontinuities
034	Recirc	GR-2-52	9	ID Geometry
035	RWCU	DRWC-2-2		Includes Longitudinal Seam @ 11:00 No Apparent Discontinuities No Scan 4 - Valve

TABLE VI  
EVALUATION BY REPORT  
TVA-038

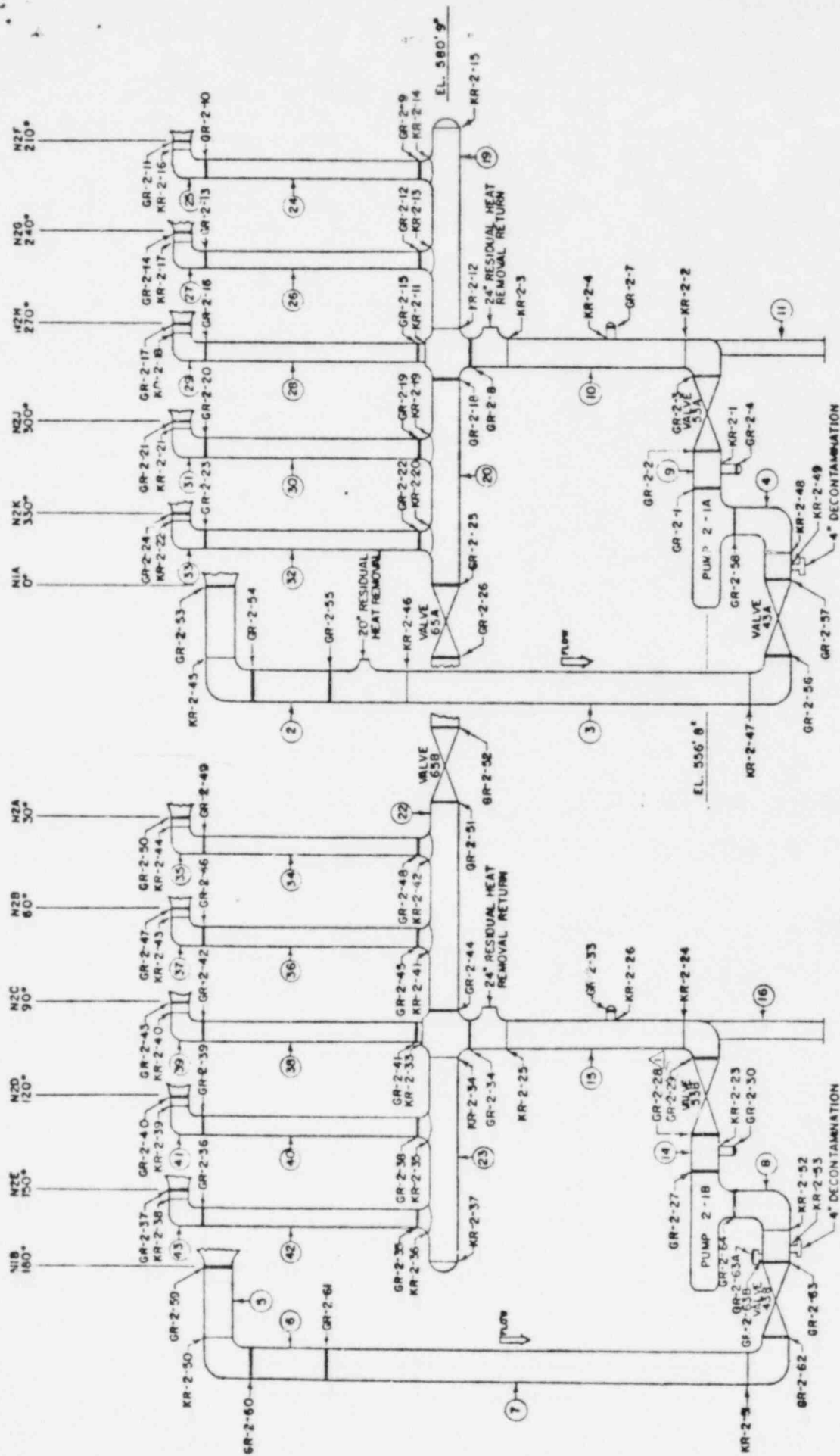
REPORT	SYSTEM	WELD OR COMPONENT #	SCAN(S)	REMARKS
036	RWCU	DRWC-2-1A		Intermittent ID Geometry No Scan 4 - Valve
037	Recirc	GR-2-4	3,4	Intermittent ID Geometry
038	Recirc	GR-2-33	3,4	Intermittent ID Geometry
039	RHR	DSRHR-2-9	3,4,5,6,7, 8,11,12, 13,14	Intermittent ID/OD Geometry Includes Longitudinal Seams @ 3:00, 6:00, 9:00
040	RHR	DSRHR-2-4	3,4,5,6, 11,12,14	Intermittent ID/OD Geometry Includes Longitudinal Seams @ 12:00 and 6:00



TABLE VI  
EVALUATION BY REPORT  
TVA-039

REPORT	SYSTEM	WELD OR COMPONENT #	SCAN(S)	REMARKS
001	Recirc	KR-2-36	3,4	Linear Indications 12:00 +10", 4:00, 5:00 60% DAC Maximum Amplitude, Scan 3
002	Recirc	KR-2-14	3,4	Linear Indication, 6/5" CW of Longitudinal Seam, 60% DAC Maximum Amplitude, Scan 3
003	Recirc	KR-2-20		No Apparent Discontinuities SEE NOTE 1
004	Recirc	KR-2-42		No Apparent Discontinuities SEE NOTE 1
005	Recirc	GR-2-35		Intermittent ID/OD Geometry, 360°
006	Recirc	KR-2-15		No Apparent Discontinuities SEE NOTE 1
007	Recirc	KR-2-35		No Apparent Discontinuities SEE NOTE 2
008	Recirc	KR-2-41		No Apparent Discontinuities SEE NOTE 2
009	Recirc	KR-2-30		No Apparent Discontinuities
NOTES:	<p>1. Intermittent areas of increased baseline noise. Possibly due to early metallurgical changes leading to IGSC.</p> <p>2. Increase in general "noise" level. Increased level is essentially constant over entire examination.</p>			





REF. DWGS.

TVA 47K0544-1

GE 153F754

KELLOGG BF 2-180

KR-N-N  
K = KELLOGG SHOP WELD  
G = GE FIELD WELD

RECIRCULATION UNIT NO. WELD NO.

○ INDICATES PIECE NUMBER

REVISIONS  
NO. DATE

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