

From: Douglas Pickett *NP*
To: Allen Hiser, Andrea Lee; Anthony Mendiola, Art Howell, Beth Wetzel, Bill Bateman; Carol Moyer; Chia-Fu Sheng, Edward Andruszkiewicz; James Davis; Jay Collins; Jin Chung; Keith Wichman; Kenneth Chang, Kenneth Karwoski; Michael Switzer; Stephanie Coffin; Stephen Sands; Steven Bloom; Steven Long, Terence Chan; Timothy Steingass, William Cullen
Date: 5/15/02 4:53PM
Subject: Fwd: Serial 1-1274 - Supplemental Information in Response to NRC Question Number24 on the Preliminary Probable Cause Summary Report dated March 22, 2002

The Davis-Besse letter of April 30, 2002, provided responses to the staff's 32 questions on the original 4-page root cause summary. In the licensee's letter, they committed to provide a response to question #24 (through-wall profile of the cracks) by May 15, 2002. The attached letter provides this information

CC: Christine Lipa, James Gavula; John Grobe; John Jacobson, Laura Collins; Melvin Holmberg

B/40

From: <lajennison@firstenergycorp.com>

To: <dvp1@nrc.gov>

Date: 5/15/02 4:27PM

Subject: Serial 1-1274 - Supplemental Information in Response to NRC Question Number24 on the Preliminary Probable Cause Summary Report dated March 22, 2002

First Energy

(See attached file: Serial 1-1274.pdf)

Howard W. Bergendahl
Vice President - Nuclear419-321-8588
Fax 419-321-8337

Docket Number 50-346

License Number NPF-3

Serial Number 1-1274

May 15, 2002

Mr. J. E. Dyer, Administrator
United States Nuclear Regulatory Commission
Region III
801 Warrenville Road
Lisle, IL 60532-4351Subject: Supplemental Information in Response to NRC Question Number 24 on
the Preliminary Probable Cause Summary Report dated March 22, 2002

Ladies and Gentlemen:

On April 30, 2002, Davis-Besse Nuclear Power Station, Unit 1 (DBNPS) submitted to the NRC letter Serial Number 1-1272, "Responses to NRC Questions on the Preliminary Probable Cause Summary Report dated March 22, 2002" regarding the Reactor Pressure Vessel (RPV) head degradation. The purpose of this letter is to provide the NRC with supplemental information on crack profiles for significant cracks on nozzles 2 and 3, as discussed in the response to question number 24 of the aforementioned letter.

Cracks that extend above the root of the J-Groove weld were profiled. Crack profiles are provided for two cracks on nozzle 3 and seven cracks on nozzle 2. Elevation values are referenced from the Control Rod Drive nozzle flange face.

Some of the crack profiles show what appears to be a separate inside diameter (ID) connected crack above the main crack. According to the UT-Level III Examiner, it is possible that this is actually connected to the main crack, however, the data shows separation between the cracks. The separation could be caused by loss of contact due to weld shrinkage and may account for what appears to be two separate cracks when in fact they may be the same crack.

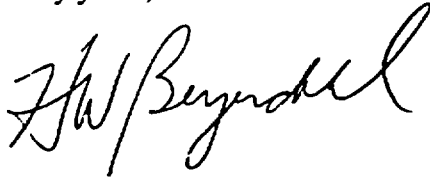
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In addition, a revised ultrasonic examination data sheet and top-down profile are enclosed for nozzle 2, which includes the recently added flaw 13 that was discussed with the NRC during the May 7, 2002 Root Cause Analysis Meeting. Flaw 13 was not identified in the Root Cause Analysis Report, which was submitted to the NRC on April 18, 2002 by letter Serial Number 1-1270, therefore, the enclosed revision to Table 2 and Figure 9 are provided to update that report. A Condition Report has been generated to evaluate the omission of flaw 13 from the Root Cause Analysis Report.

If you have any questions or require additional information, please contact Mr. David H. Lockwood, Manager – Regulatory Affairs, at (419) 321-8450.

Very truly yours,

A handwritten signature in black ink, appearing to read "D.H. Lockwood". The signature is written in a cursive, flowing style.

Enclosure and Attachment

cc: USNRC Document Control Desk
D.V. Pickett, DB-1 NRC/NRR Project Manager
C.S. Thomas, DB-1 Senior Resident Inspector
Utility Radiological Safety Board

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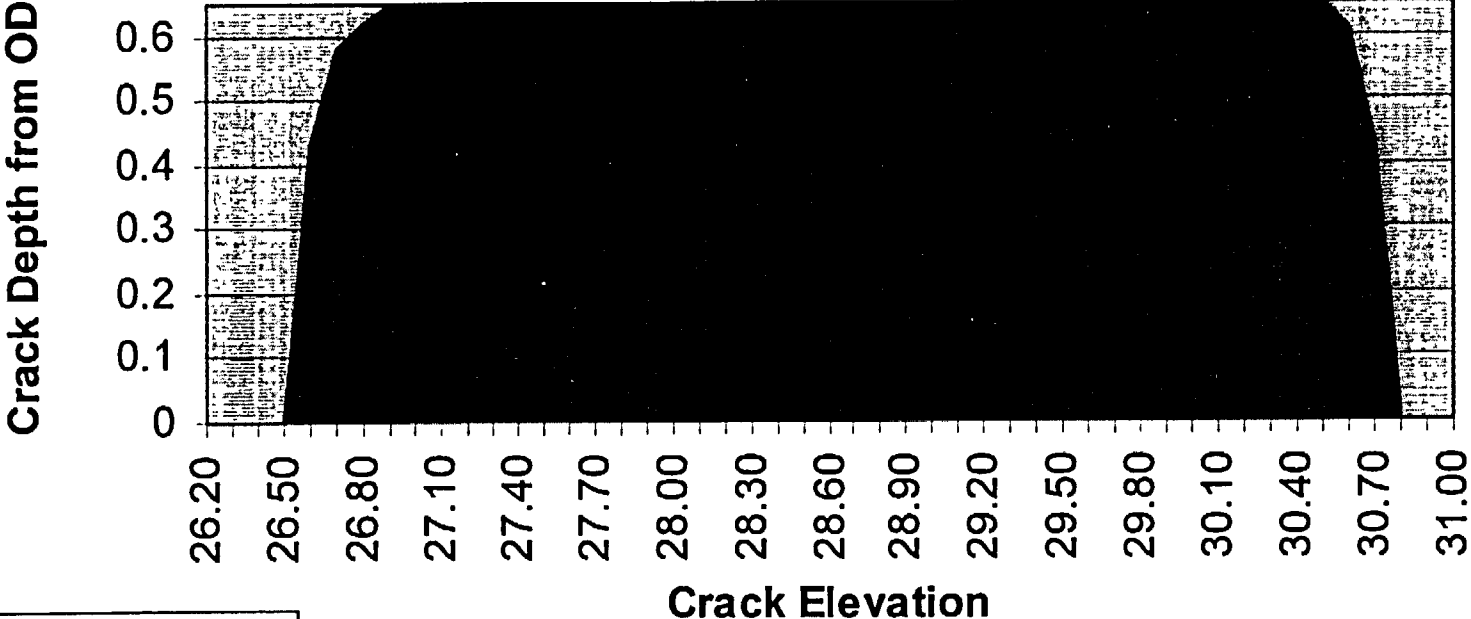
Nozzle 3

Flaw #1

Wall Tk.	0.649 in.
	Elevation
Crack Start	26.6 in.
Crack End	30.68 in.
Upper Weld Edge	27.8 in.
Lower Weld Edge	29.1 in.
End of Nozzle	30.75 in.

Meas. Location	Elevation	Depth from Tube OD	UT Depth from ID
A	26.60	0.429	0.22
B	26.70	0.579	0.07
C	26.80	0.619	0.03
D	26.90	0.649	0
E	27.00	0.649	0
F	27.10	0.649	0
G	27.20	0.649	0
H	27.30	0.649	0
I	27.40	0.649	0
J	27.50	0.649	0
K	27.60	0.649	0
L	27.70	0.649	0
M	27.80	0.649	0
N	27.90	0.649	0
O	28.00	0.649	0
P	28.10	0.649	0
Q	28.20	0.649	0
R	28.30	0.649	0
S	28.40	0.649	0
T	28.50	0.649	0
U	28.60	0.649	0
V	28.70	0.649	0
W	28.80	0.649	0
X	28.90	0.649	0
Y	29.00	0.649	0
Z	29.10	0.649	0
AA	29.20	0.649	0
AB	29.30	0.649	0
AC	29.40	0.649	0
AD	29.50	0.649	0
AE	29.60	0.649	0
AF	29.70	0.649	0
AG	29.80	0.649	0
AH	29.90	0.649	0
AI	30.00	0.649	0
AJ	30.10	0.649	0
AK	30.20	0.649	0
AL	30.30	0.649	0
AM	30.40	0.649	0
AN	30.50	0.649	0
AO	30.60	0.609	0.04
AP	30.70	0.429	0.22

Crack Profile for Nozzle 3, Flaw #1



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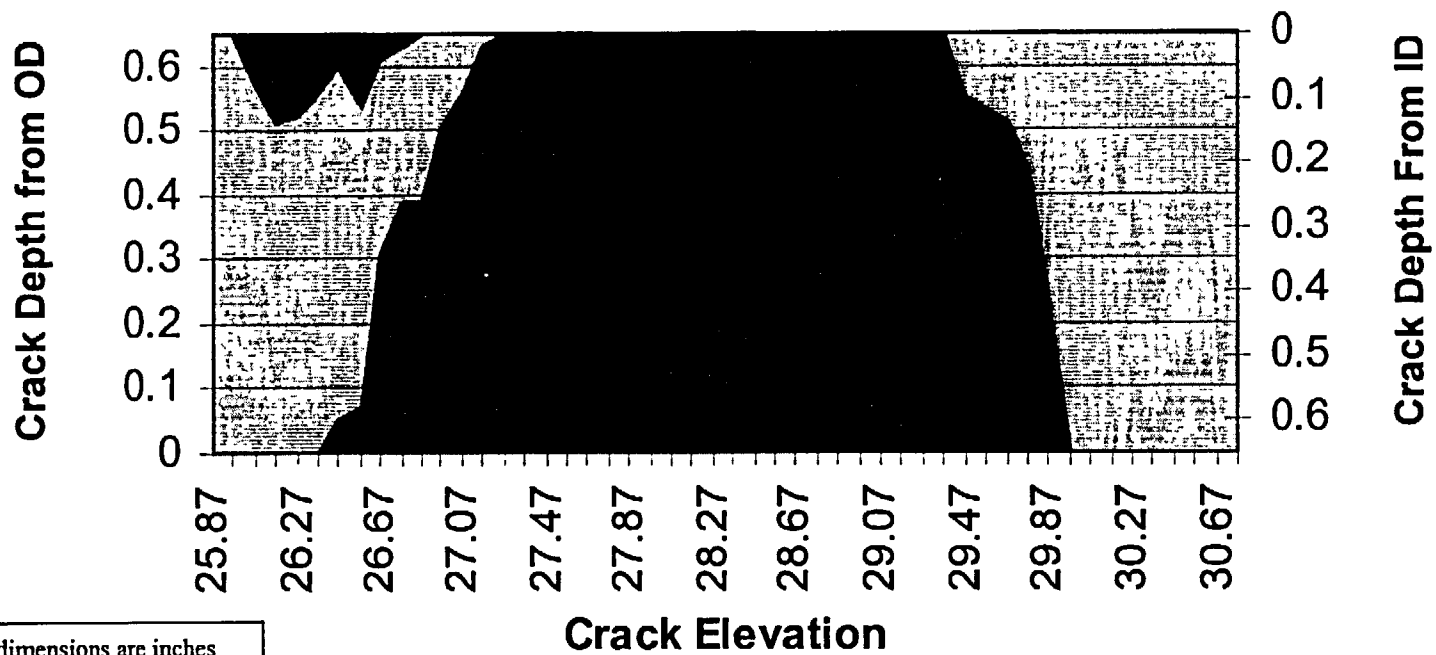
Nozzle 3

Flaw #4

Wall Tk.	0.649 in.
	Elevation
Crack Start	26.07 in.
Crack End	29.89 in.
Upper Weld Edge	26.9 in.
Lower Weld Edge	28.4 in.
End of Nozzle	30.75 in.

Meas. Location	Elevation	Depth from Tube OD	OD Connected Portion	ID Connected Portion
			UT Depth from ID	UT Depth from ID
A	26.07			0.08
B	26.17			0.14
C	26.27			0.13
D	26.37			0.09
E	26.47	0.049	0.6	0.05
F	26.57	0.069	0.58	0.11
G	26.67	0.309	0.34	0.04
H	26.77	0.389	0.26	0.02
I	26.87	0.389	0.26	
J	26.97	0.499	0.15	
K	27.07	0.559	0.09	
L	27.17	0.629	0.02	
M	27.27	0.649	0	
N	27.37	0.649	0	
O	27.47	0.649	0	
P	27.57	0.649	0	
Q	27.67	0.649	0	
R	27.77	0.649	0	
S	27.87	0.649	0	
T	27.97	0.649	0	
U	28.07	0.649	0	
V	28.17	0.649	0	
W	28.27	0.649	0	
X	28.37	0.649	0	
Y	28.47	0.649	0	
Z	28.57	0.649	0	
AA	28.67	0.649	0	
AB	28.77	0.649	0	
AC	28.87	0.649	0	
AD	28.97	0.649	0	
AE	29.07	0.649	0	
AF	29.17	0.649	0	
AG	29.27	0.649	0	
AH	29.37	0.649	0	
AI	29.47	0.549	0.1	
AJ	29.57	0.529	0.12	
AK	29.67	0.509	0.14	
AL	29.77	0.439	0.21	
AM	29.87	0.249	0.4	

Crack Profile for Nozzle 3, Flaw #4



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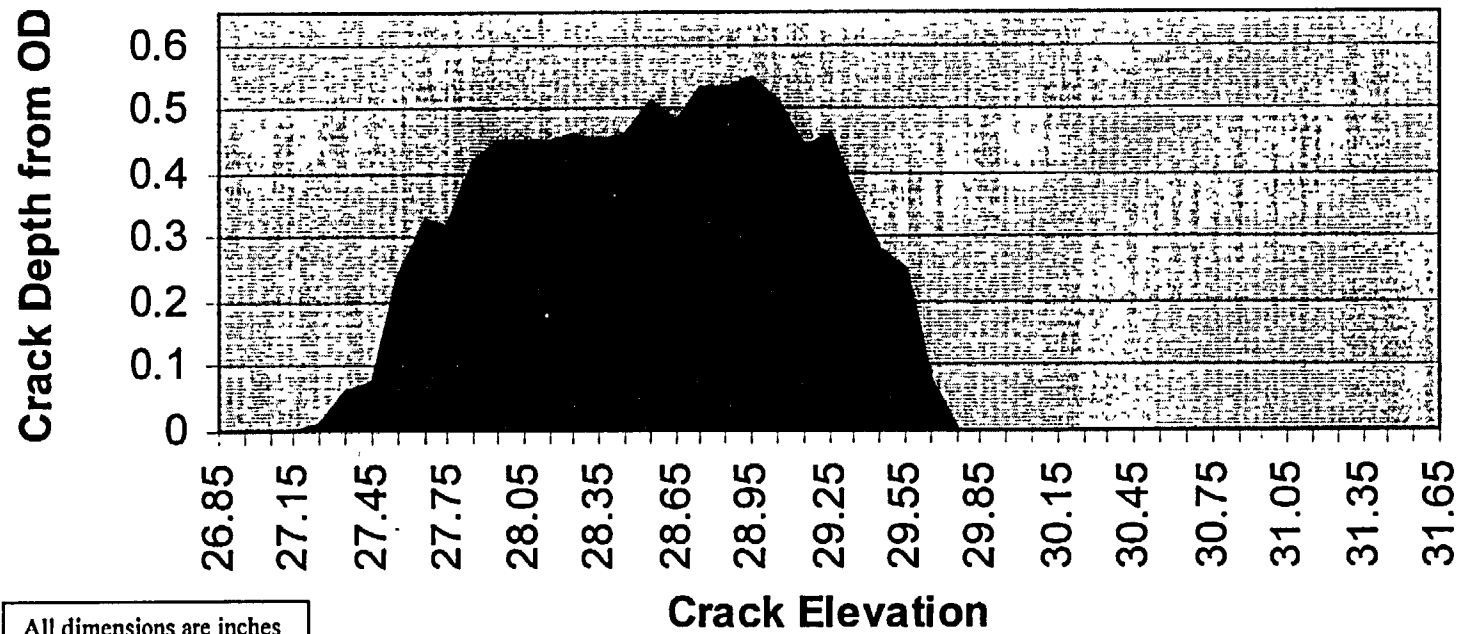
Nozzle 2

Flaw #1

Wall Tk.	0.649 in.
	Elevation
Crack Start	27.25 in.
Crack End	29.51 in.
Upper Weld Edge	27.8 in.
Lower Weld Edge	29.1 in.
End of Nozzle	30.78 in.

Meas. Location	Elevation	Depth from Tube OD	UT Depth from ID
A	27.25	0.009	0.64
B	27.35	0.059	0.59
C	27.45	0.079	0.57
D	27.55	0.239	0.41
E	27.65	0.329	0.32
F	27.75	0.319	0.33
G	27.85	0.419	0.23
H	27.95	0.449	0.2
I	28.05	0.449	0.2
J	28.15	0.449	0.2
K	28.25	0.459	0.19
L	28.35	0.449	0.2
M	28.45	0.459	0.19
N	28.55	0.509	0.14
O	28.65	0.479	0.17
P	28.75	0.529	0.12
Q	28.85	0.529	0.12
R	28.95	0.549	0.1
S	29.05	0.509	0.14
T	29.15	0.439	0.21
U	29.25	0.459	0.19
V	29.35	0.369	0.28
W	29.45	0.279	0.37
X	29.55	0.249	0.4
Y	29.65	0.079	0.57
Z	29.75	0	0.649

Crack Profile for Nozzle 2, Flaw #1



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Nozzle 2

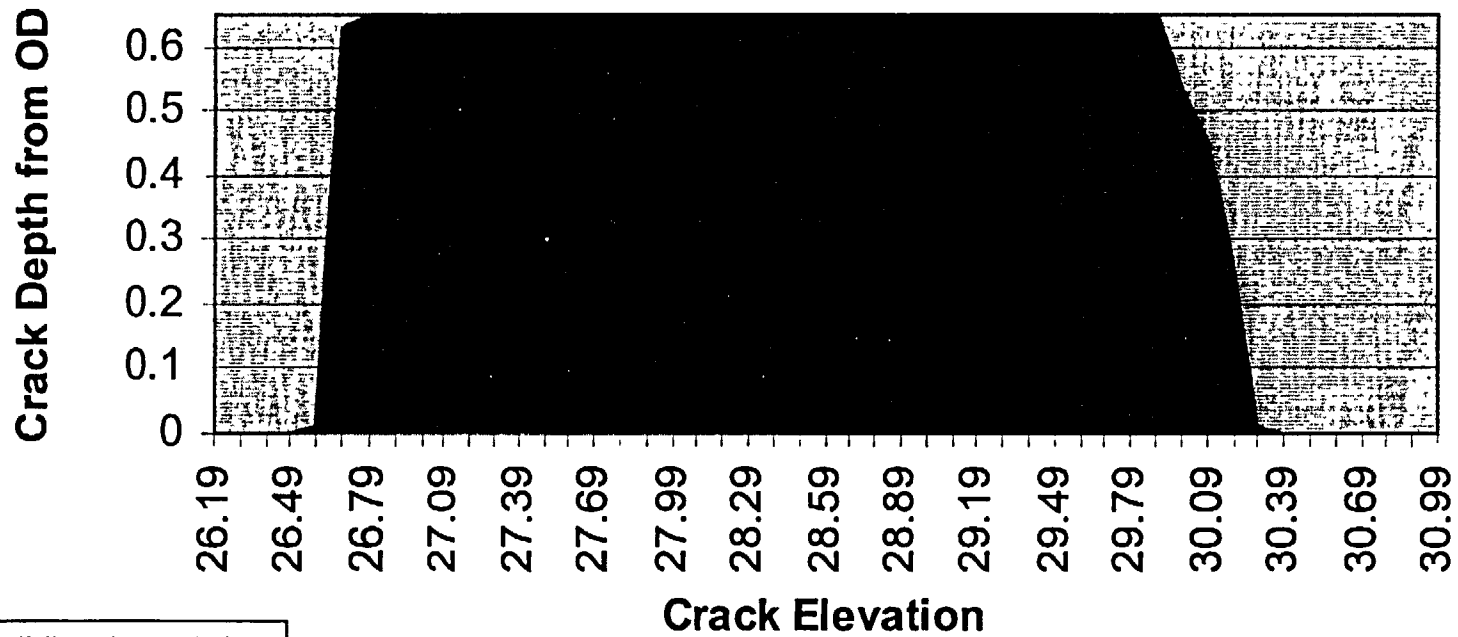
Flaw #2

Wall Tk.	0.649 in.
	Elevation
Crack Start	26.59 in.
Crack End	30.37 in.
Upper Weld Edge	27.4 in.
Lower Weld Edge	29 in.
End of Nozzle	30.78 in.

Meas. Location	Elevation	Depth from Tube OD	UT Depth from ID
A	26.59	0.009	0.64
B	26.69	0.629	0.02
C	26.79	0.649	0
D	26.89	0.649	0
E	26.99	0.649	0
F	27.09	0.649	0
G	27.19	0.649	0
H	27.29	0.649	0
I	27.39	0.649	0
J	27.49	0.649	0
K	27.59	0.649	0
L	27.69	0.649	0
M	27.79	0.649	0
N	27.89	0.649	0
O	27.99	0.649	0
P	28.09	0.649	0
Q	28.19	0.649	0
R	28.29	0.649	0
S	28.39	0.649	0
T	28.49	0.649	0
U	28.59	0.649	0
V	28.69	0.649	0
W	28.79	0.649	0
X	28.89	0.649	0
Y	28.99	0.649	0
Z	29.09	0.649	0
AA	29.19	0.649	0
AB	29.29	0.649	0
AC	29.39	0.649	0
AD	29.49	0.649	0
AE	29.59	0.649	0
AF	29.69	0.649	0
AG	29.79	0.649	0
AH	29.89	0.649	0
AI	29.99	0.529	0.12
AJ	30.09	0.449	0.2
AK	30.19	0.239	0.41
AL	30.29	0.009	0.64

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Crack Profile for Nozzle 2, Flaw #2



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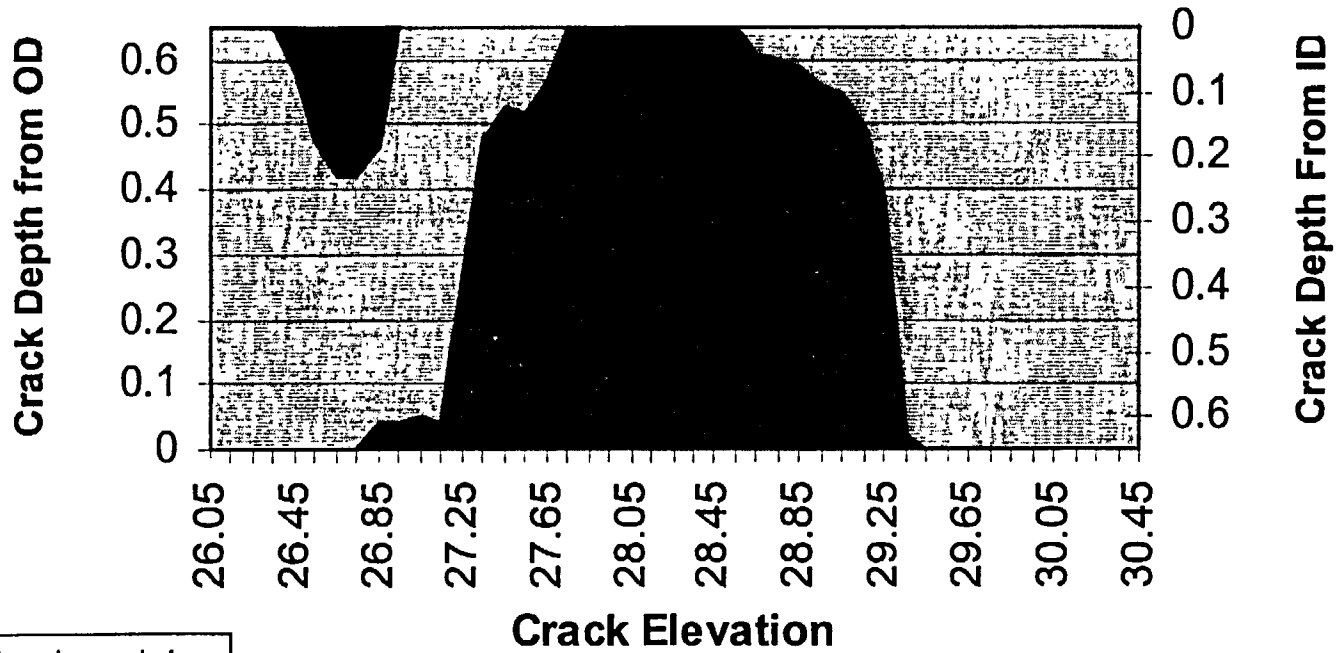
Nozzle 2

Flaw #4

Wall Tk.	0.649 in.
	Elevation
Crack Start	26.45 in.
Crack End	29.39 in.
Upper Weld Edge	27.2 in.
Lower Weld Edge	28.95 in.
End of Nozzle	30.78 in.

Meas. Location	Elevation	Depth from Tube OD	OD Connected Portion	ID Connected Portion
			UT Depth from ID	UT Depth from ID
A	26.45			0.07
B	26.55			0.17
C	26.65			0.23
D	26.75			0.23
E	26.85	0.039	0.61	0.18
F	26.95	0.039	0.61	
G	27.05	0.049	0.60	
H	27.15	0.039	0.61	
I	27.25	0.269	0.38	
J	27.35	0.479	0.17	
K	27.45	0.529	0.12	
L	27.55	0.519	0.13	
M	27.65	0.569	0.08	
N	27.75	0.649	0.00	
O	27.85	0.649	0.00	
P	27.95	0.649	0.00	
Q	28.05	0.649	0.00	
R	28.15	0.649	0.00	
S	28.25	0.649	0.00	
T	28.35	0.649	0.00	
U	28.45	0.649	0.00	
V	28.55	0.649	0.00	
W	28.65	0.609	0.04	
X	28.75	0.599	0.05	
Y	28.85	0.589	0.06	
Z	28.95	0.559	0.09	
AA	29.05	0.549	0.10	
AB	29.15	0.499	0.15	
AC	29.25	0.389	0.26	
AD	29.35	0.019	0.63	

Crack Profile for Nozzle 2, Flaw #4



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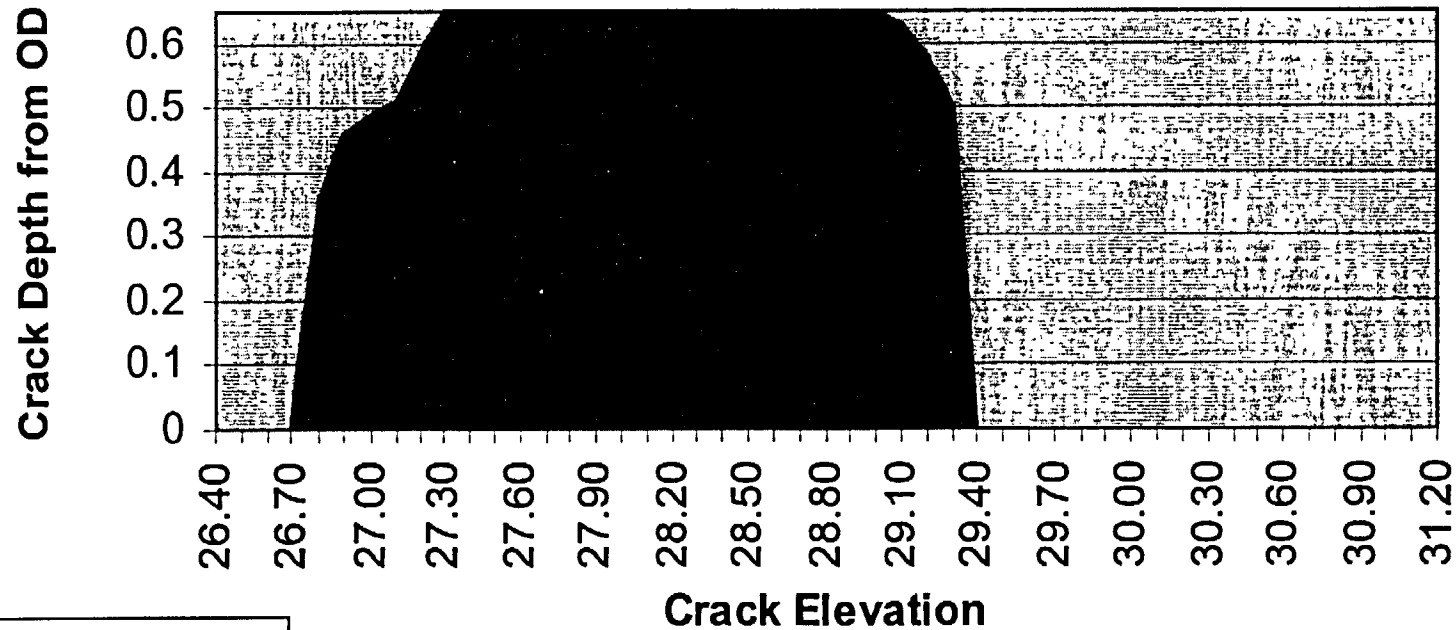
Nozzle 2

Flaw #6

Wall Tk.	0.649 in.
	Elevation
Crack Start	26.8 in.
Crack End	29.36 in.
Upper Weld Edge	27.4 in.
Lower Weld Edge	28.75 in.
End of Nozzle	30.78 in.

Meas. Location	Elevation	Depth from Tube OD	UT Depth from ID
A	26.80	0.359	0.29
B	26.90	0.459	0.19
C	27.00	0.489	0.16
D	27.10	0.509	0.14
E	27.20	0.589	0.06
F	27.30	0.649	0
G	27.40	0.649	0
H	27.50	0.649	0
I	27.60	0.649	0
J	27.70	0.649	0
K	27.80	0.649	0
L	27.90	0.649	0
M	28.00	0.649	0
N	28.10	0.649	0
O	28.20	0.649	0
P	28.30	0.649	0
Q	28.40	0.649	0
R	28.50	0.649	0
S	28.60	0.649	0
T	28.70	0.649	0
U	28.80	0.649	0
V	28.90	0.649	0
W	29.00	0.649	0
X	29.10	0.629	0.02
Y	29.20	0.579	0.07
Z	29.30	0.499	0.15

Crack Profile for Nozzle 2, Flaw #6



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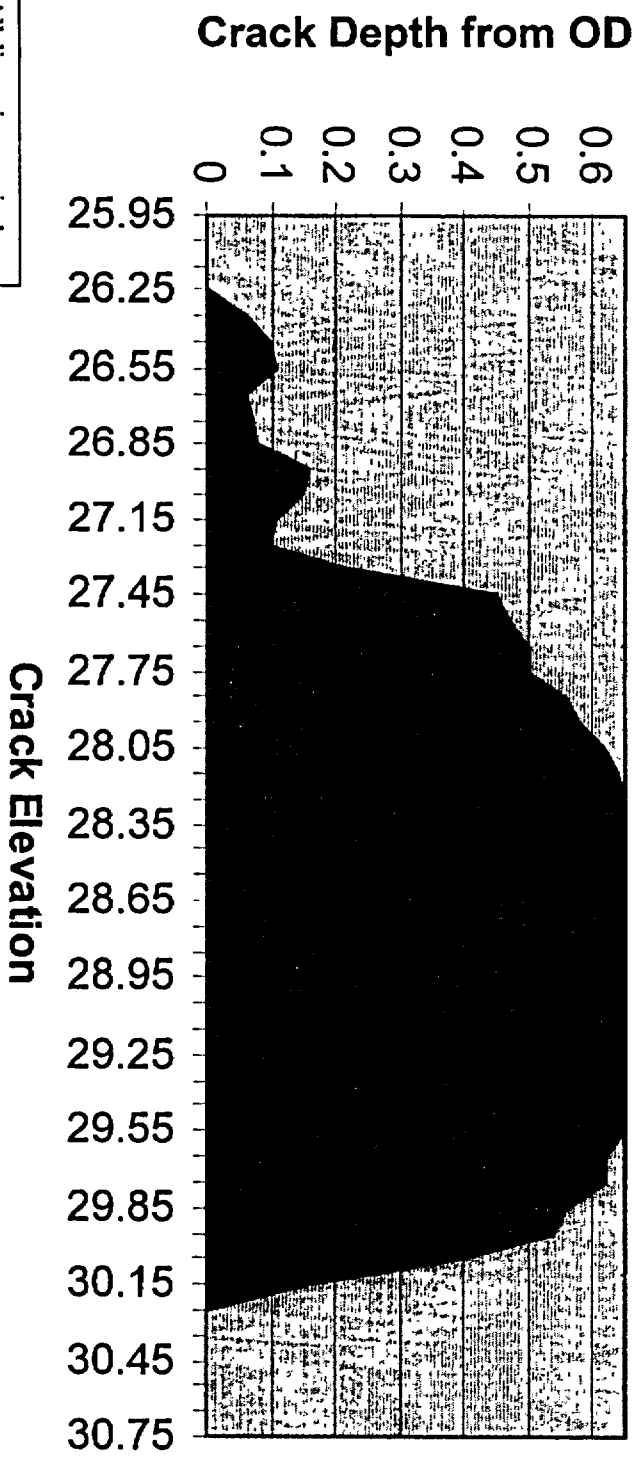
Nozzle 2

Flaw #8

Wall Tk.	0.649 in
	Elevation
Crack Start	26.35 in.
Crack End	30.16 in.
Upper Weld Edge	27.45 in.
Lower Weld Edge	28.9 in.
End of Nozzle	30.78 in.

Meas. Location	Elevation	Depth from Tube OD	UT Depth from ID
A	26.35	0.059	0.59
B	26.45	0.099	0.55
C	26.55	0.109	0.54
D	26.65	0.059	0.59
E	26.75	0.069	0.58
F	26.85	0.079	0.57
G	26.95	0.159	0.49
H	27.05	0.149	0.5
I	27.15	0.109	0.54
J	27.25	0.099	0.55
K	27.35	0.209	0.44
L	27.45	0.449	0.2
M	27.55	0.469	0.18
N	27.65	0.499	0.15
O	27.75	0.499	0.15
P	27.85	0.559	0.09
Q	27.95	0.579	0.07
R	28.05	0.619	0.03
S	28.15	0.639	0.01
T	28.25	0.649	0
U	28.35	0.649	0
V	28.45	0.649	0
W	28.55	0.649	0
X	28.65	0.649	0
Y	28.75	0.649	0
Z	28.85	0.649	0
AA	28.95	0.649	0
AB	29.05	0.649	0
AC	29.15	0.649	0
AD	29.25	0.649	0
AE	29.35	0.649	0
AF	29.45	0.649	0
AG	29.55	0.649	0
AH	29.65	0.619	0.03
AI	29.75	0.619	0.03
AJ	29.85	0.559	0.09
AK	29.95	0.539	0.11
AL	30.05	0.399	0.25
AM	30.15	0.159	0.49

Crack Profile for Nozzle 2, Flaw #8



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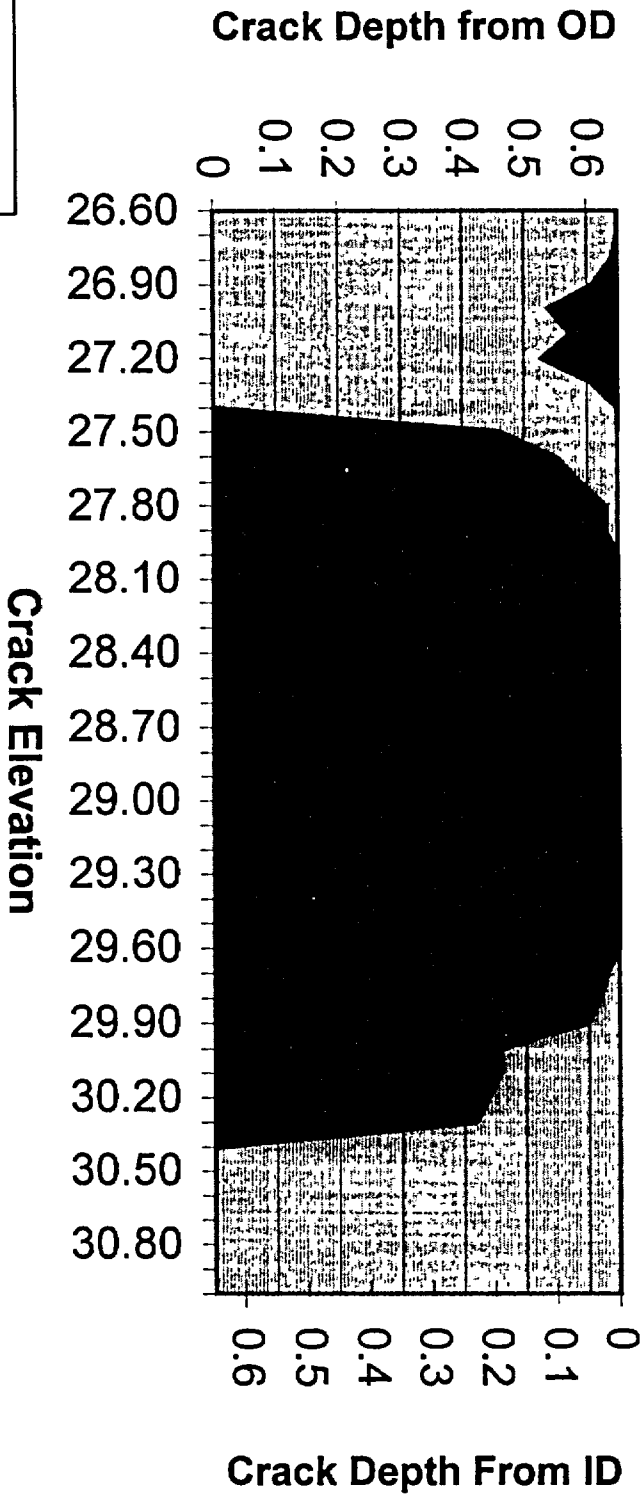
Nozzle 2

Flaw #10

Wall Tk.	0.649 in.
	Elevation
Crack Start	26.8 in.
Crack End	30.35 in.
Upper Weld Edge	27.4 in
Lower Weld Edge	29 in
End of Nozzle	30.78 in.

Meas. Location	Elevation	Depth from Tube OD	OD Connected Portion	ID Connected Portion
			UT Depth from ID	UT Depth from ID
A	26.80			0.01
B	26.90			0.04
C	27.00			0.11
D	27.10			0.076
E	27.20			0.12
F	27.30			0.04
G	27.40			
H	27.50	0.459	0.19	
I	27.60	0.549	0.1	
J	27.70	0.589	0.06	
K	27.80	0.629	0.02	
L	27.90	0.629	0.02	
M	28.00	0.649	0	
N	28.10	0.649	0	
O	28.20	0.649	0	
P	28.30	0.649	0	
Q	28.40	0.649	0	
R	28.50	0.649	0	
S	28.60	0.649	0	
T	28.70	0.649	0	
U	28.80	0.649	0	
V	28.90	0.649	0	
W	29.00	0.649	0	
X	29.10	0.649	0	
Y	29.20	0.649	0	
Z	29.30	0.649	0	
AA	29.40	0.649	0	
AB	29.50	0.649	0	
AC	29.60	0.649	0	
AD	29.70	0.629	0.02	
AE	29.80	0.619	0.03	
AF	29.90	0.599	0.05	
AG	30.00	0.459	0.19	
AH	30.10	0.459	0.19	
AI	30.20	0.439	0.21	
AJ	30.30	0.419	0.23	

Crack Profile for Nozzle 2, Flaw #10



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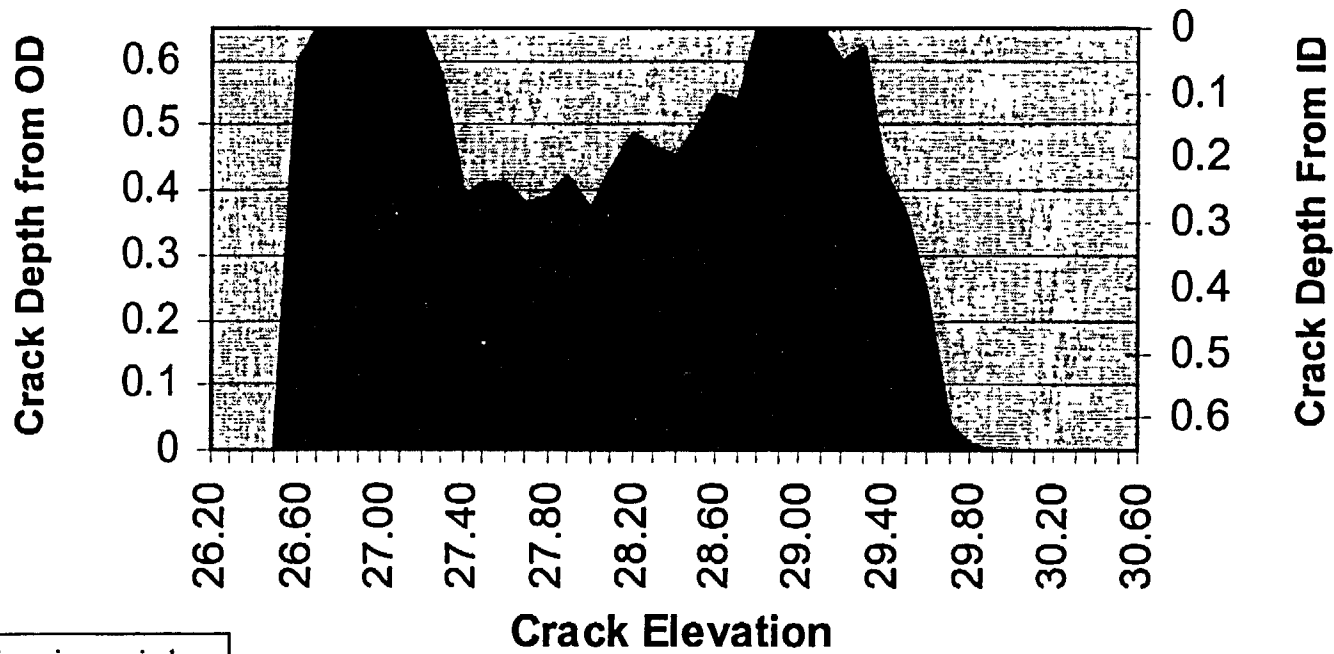
Nozzle 2

Flaw #13

Wall Tk.	0.649 in.
	Elevation
Crack Start	26.6 in.
Crack End	29.81 in.
Upper Weld Edge	27.4 in.
Lower Weld Edge	28.7 in.
End of Nozzle	30.78 in.

Meas. Location	Elevation	Depth from Tube OD	OD Connected Portion
			UT Depth from ID
A	26.60	0.599	0.05
B	26.70	0.649	0.00
C	26.80	0.649	0.00
D	26.90	0.649	0.00
E	27.00	0.649	0.00
F	27.10	0.649	0.00
G	27.20	0.649	0.00
H	27.30	0.579	0.07
I	27.40	0.389	0.26
J	27.50	0.409	0.24
K	27.60	0.409	0.24
L	27.70	0.379	0.27
M	27.80	0.389	0.26
N	27.90	0.419	0.23
O	28.00	0.369	0.28
P	28.10	0.429	0.22
Q	28.20	0.489	0.16
R	28.30	0.469	0.18
S	28.40	0.449	0.20
T	28.50	0.499	0.15
U	28.60	0.549	0.10
V	28.70	0.539	0.11
W	28.80	0.649	0.00
X	28.90	0.649	0.00
Y	29.00	0.649	0.00
Z	29.10	0.649	0.00
AA	29.20	0.599	0.05
AB	29.30	0.619	0.03
AC	29.40	0.429	0.22
AD	29.50	0.359	0.29
AE	29.60	0.239	0.41
AF	29.70	0.039	0.61
AG	29.80	0.009	0.64

Crack Profile for Nozzle 2, Flaw #13



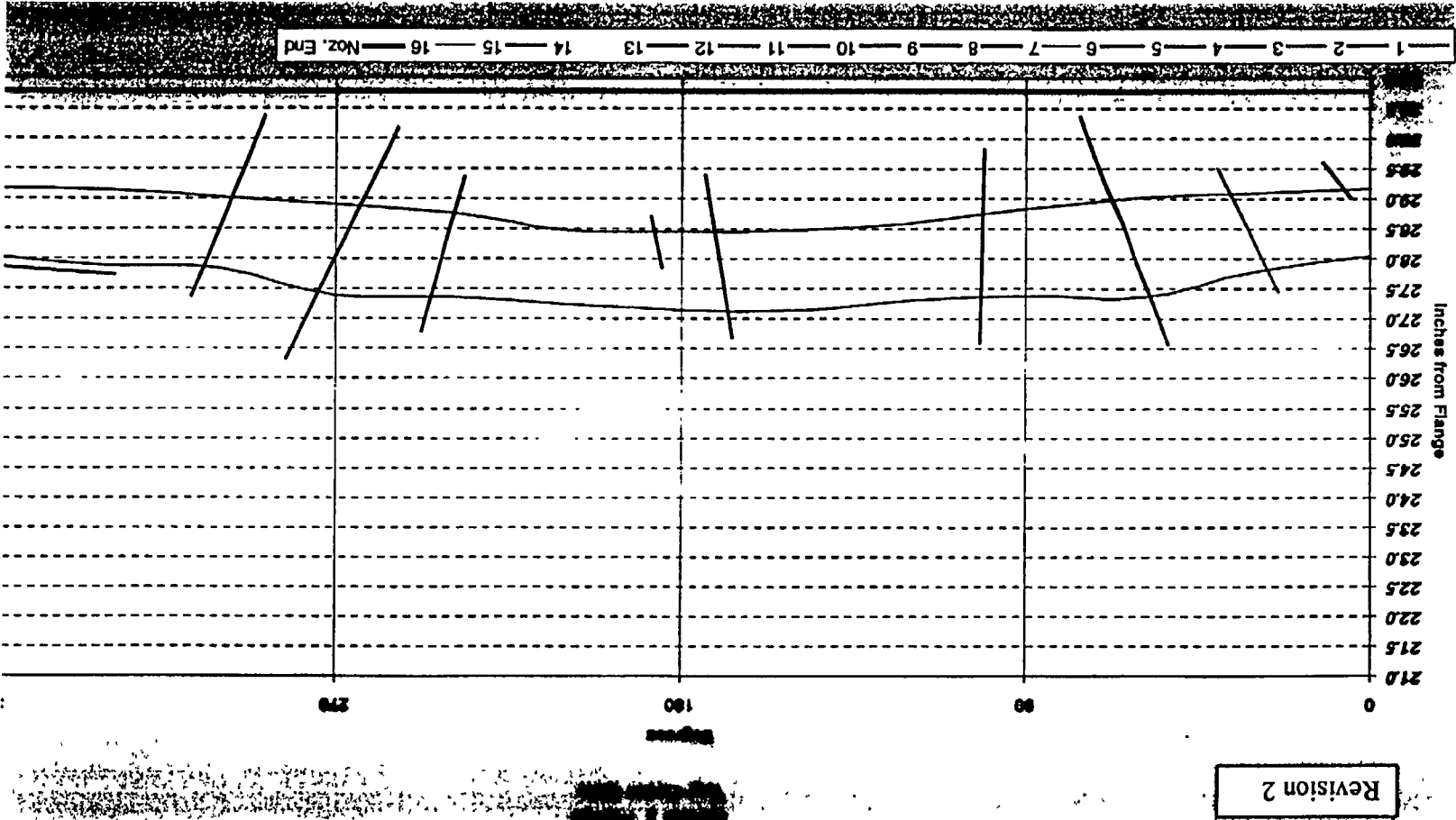
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Table 2. Nozzle 2 NDE Examination Results

FRAMATOME ANP CRDM Nozzle Ultrasonic Examination Data Sheet																	
Customer: FENOC			Plant: Davis Besse				Unit: N/A			Nozzle: 2							
Procedure: 54-ISI-100-08		CA. FRA-02-002, DB-02-012		Nozzle Dimensions: (In.)				ID: 2.765		OD: 4.06		Thickness: 0.649					
Downhill Side of Nozzle (deg.): 315			End of Noz. (In.): 30 78			Probe Serial No 's		Ch 1 2078-01002-0L		Ch 6 21GB-01002-45L							
Axial Scan Start: -5, 16 1			Stop: 360, 30 77			Setup: 1		Ch 2 21GF-01004-30L		Ch 7 21GC-01001-55L							
Files: T2061_09.12.19							Ch 3 21GA-01004-45L		Ch 8 22CD-01001-65L								
Circ. Scan Start: 0, 18 95			Stop: 360, 29 52			Setup: 2		Ch 4 2623-01002-60S		Ch 9 2624-01005-60S							
Files: T2061_07.25.10							Ch 5 2623-01002-60S		Ch 10 2624-01005-60S								
Flaw No.	Surface (ID/OD)	Depth to Flaw Tip	End Point 1		End Point 2		Axial Total (In.)	Adjusted Circ. Extent			Flaw Length (In.)	Flaw Angle (deg.)	Flaw TWD (In.)	Flaw Aspect Ratio	Flaw Orientation	Weld Location @ Flaw	
			Min (In)	Min (deg.)	Max (In)	Max (deg.)		Min (deg.)	Max (deg.)	Total (In.)						Min	Max
1	OD	0.236	27.46	291.0	29.51	275.0	2.05	24.0	40.0	-0.57	2.13	165	0.41	0.19	AXIAL	In Weld Region	
2	OD	TW	28.59	262.0	30.37	240.0	3.78	53.0	75.0	-0.78	3.88	168	0.65	0.17	AXIAL	In Weld Region	
3													0.65				
4	OD	TW	28.69	148.0	29.39	141.0	2.70	167.0	174.0	-0.25	2.71	175	0.65	0.24	AXIAL	In Weld Region	
5	OD	0.33	27.87	130.0	28.7	127.0	0.83	185.0	188.0	-0.11	0.84	173	0.32	0.38	AXIAL	In Weld Region	
6	OD	TW	26.8	67	29.36	78	2.56	248.0	237.0	0.39	2.59	9	0.65	0.25	AXIAL	In Weld Region	
7																	
8	OD	TW	28.35	32	30.16	61	3.81	283.0	254.0	1.03	3.95	15	0.65	0.16	AXIAL	In Weld Region	
9																	
10	OD	TW	27.39	7	30.35	26	2.96	308.0	289.0	0.67	3.04	13	0.65	0.21	AXIAL	In Weld Region	
11	OD	0.344	27.9	314	27.75	347	0.15	361.0	328.0	1.17	1.18	83	0.31	0.26	CIRC.	0.1	0.1
12	OD	0.572	29.02	320	29.6	327	0.58	5.0	12.0	0.25	0.63	23	0.08	0.12	AXIAL	In Weld Region	
13	OD	TW	26.6	259.0	29.81	258.1	3.21	101.9	101.0	-0.03	3.21	179	0.65	0.20	AXIAL	In Weld Region	
14																	
15																	
16																	
17																	
Revision 2 5/4/02																	
WELD PROFILE	Data Loc	315	345	15	45	75	105	135	165	195	225	255	285	315	Degrees		
	Noz. Loc.	0	30	60	90	120	150	180	210	240	270	300	330	360	Degrees		
	Noz. End	30 78	30 78	30 78	30 78	30 78	30 78	30 78	30 78	30 78	30 78	30 78	30 78	30 78	Inches		
	MAX.	29.17	29.09	29.02	28.84	28.61	28.49	28.46	28.49	28.76	28.92	29.04	29.14	29.17	Inches		
	MIN.	28.06	27.79	27.36	27.39	27.31	27.16	27.16	27.24	27.36	27.39	27.84	27.89	28.06	Inches		
Notes: Adjusted Circ. Extent is relative to downhill side of nozzle, clockwise looking down TWD is Through-Wall Dimension																	
Comments: Data was encoded with positive Theta going counterclockwise Adjusted circ. positions have corrected the position to read clockwise looking down																	
Flaws #3, 7, and 9 were identified as axial flaws using the circ. blade probe but are not confirmed with the rotating UT. Therefore, flaws #3, 7, and 9 are not relevant.																	
Analyzed by: KC Gebetsberger Date: 3/5/2002 Analyzed by: M G Hacker Date: 3/5/2002																	

Figure 9. Nozzle 2 Crack Locations and Sizing



Docket Number 50-346
License Number NPF-3
Serial Number 1-1274
Attachment
Page 1 of 1

COMMITMENT LIST

The following list identifies those actions committed to by the Davis-Besse Nuclear Power Station (DBNPS) in this document. Any other actions discussed in the submittal represent intended or planned actions by the DBNPS. They are described only for information and are not regulatory commitments. Please notify the Manager - Regulatory Affairs (419-321-8450) at the DBNPS of any questions regarding this document or associated regulatory commitments.

COMMITMENTS

DUE DATE

None