# ACCELERATED DOCUMENT DISTRIBUTION SYSTEM

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9307290020 DOC.DATE: 93/07/19 NOTARIZED: NO DOCKET #
FACIL:50-438 Bellefonte Nuclear Plant, Unit 1, Tennessee Valley Au 05000438
50-439 Bellefonte Nuclear Plant, Unit 2, Tennessee Valley Au 05000439
AUTH.NAME AUTHOR AFFILIATION
MCCLUSKEY,H.F. Tennessee Valley Authority
RECIP.NAME RECIPIENT AFFILIATION
Document Control Branch (Document Control Desk)

SUBJECT: Final deficiency rept re failure of ASME Class 1 & 2 piping welds to meet design requirements.Caused by subjective nature of weld quality attribute evaluation on radiographic film.Rework/repair of welds will be initiated.

DISTRIBUTION CODE: IE27D COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 10
TITLE: 50.55(e) Construction Deficiency Report

NOTES:

| | RECIPIENT ID CODE/NAME | | COPIES LTTR | COPIES ENCL | RECIPIENT ID CODE/NAME | COPIES LTTR | COPIES ENCL |
|---|---|---|---|---|---|---|---|
| | PD2-4 | | 1 | 1 | THADANI,M | 1 | 1 |
| INTERNAL: | ACRS | | 16 | 16 | DEDRO | 1 | 1 |
| | NRR/DORS/OEAB | | 1 | 1 | NRR/DRIL/RPEB | 1 | 1 |
| | NRR/DRIL/RVIB | | 1 | 1 | OGC/HDS1 | 1 | 1 |
| | REG FILE | 02 | 1 | 1 | RES/DSIR/EIB | 1 | 1 |
| | RGN2 FILE | 01 | 1 | 1 | | | |
| EXTERNAL: | NRC PDR | | 1 | 1 | NSIC SILVER | 1 | 1 |

NOTE TO ALL "RIDS" RECIPIENTS:

PLEASE HELP US TO REDUCE WASTE! CONTACT THE DOCUMENT CONTROL DESK, ROOM P1-37 (EXT. 504-2065) TO ELIMINATE YOUR NAME FROM DISTRIBUTION LISTS FOR DOCUMENTS YOU DON'T NEED!

TOTAL NUMBER OF COPIES REQUIRED: LTTR 28 ENCL 28

RIDS/ADDS RIDS/ADDS

Tennessee Valley Authority, Post Office Box 2000, Hollywood, Alabama 35752

H. Fred McCluskey
Site Vice President, Bellefonte Nuclear Plant

JUL 19 1993

BLRD-50-438/93-05
BLRD-50-439/93-05

10 CFR 50.55(e)

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

Gentlemen:

| | |
|---|---|
| In the Matter of the Application of ) | Docket Nos. 50-438 |
| Tennessee Valley Authority ) | 50-439 |

BELLEFONTE NUCLEAR PLANT (BLN) - FAILURE OF AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) CLASS 1 AND CLASS 2 PIPING WELDS TO MEET DESIGN REQUIREMENTS - BLRD-50-438/93-05 AND BLRD-50-439/93-05 - FINAL REPORT

The subject deficiency was reported to the NRC Operations Center on June 23, 1993 in accordance with 10 CFR 50.55(e)(3) as Significant Corrective Action Report (SCAR) BLSCA930005. Enclosed is TVA's final report on this subject.

Should there be any questions regarding this information, please telephone Greg Pierce, BLN Site Licensing Manager, at (205) 574-8058.

Fred McCluskey
H. Fred McCluskey

Enclosures

260098

9307290020 930719
PDR ADOCK 05000438
S PDR

IE27

cc (Enclosures):
NRC Resident Inspector
Bellefonte Nuclear Plant
P. O. Box 2000
Hollywood, Alabama 35752

Mr. M. C. Thadani, Project Manager
U.S. Nuclear Regulatory Commission
One White Flint, North
11555 Rockville Pike
Rockville, Maryland 20852

Mr. R. V. Crlenjak
U.S. Nuclear Regulatory Commission
Region II
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30323

**ENCLOSURE 1**
BELLEFONTE NUCLEAR PLANT (BLN) UNITS 1 AND 2
FAILURE OF AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) CLASS 1 AND CLASS 2 PIPING WELDS TO MEET DESIGN REQUIREMENTS - SIGNIFICANT CORRECTIVE ACTION REPORT (SCAR) BLSCA930005
BLRD-50-438/93-05 AND BLRD-50-439/93-05

FINAL REPORT

DESCRIPTION OF DEFICIENCY

BLN is conducting a Level III radiographic review of all piping radiographs (ASME Class 1 and 2, and ANSI B31.1). This review has determined that as of July 12, 1993, 14 ASME Class 1, 85 ASME Class 2, and 17 ANSI B31.1 welds had been identified that do not meet the weld quality acceptance criteria for radiographic examinations. These welds are listed in the attachment. These welds represent approximately two percent (2%) of the reviewed population. Approximately 83% of the radiographs have been reviewed for Unit 1 and common.

SAFETY IMPLICATIONS

The ASME Class 1 and 2 welds identified as not meeting the weld quality acceptance criteria are located in a variety of ASME systems. Some of the welds are integral to the Reactor Coolant System, the Decay Heat Removal System, the Core Flood System, and the Makeup and Purification System. Should any of these weld indications propagate and lead to fracture of the associated piping, inadequate core cooling could result.

CAUSE

The cause of this inadequacy is attributed to:

- the subjective nature of weld quality attribute evaluation on radiographic film
- no program or procedure existed which required independent reviews
- the evolution of industry standard practices and expectations for the review of radiographic film to a more conservative interpretation of radiographic acceptance criteria.

CORRECTIVE ACTIONS

The Level III review of all piping radiographs will be completed for both units. Welds which do not meet the weld quality acceptance criteria as defined by design documents will be identified. Rework/repair of the welds will be done to bring these welds into compliance

with the requirements of the design documents and BLN's Code of Record (1974 Edition through Summer 1974 Addenda of the ASME Section III Code).

Current procedures require 100% second-party final acceptance by a Level III radiographer on all piping radiographs. Therefore, procedural controls are in place to preclude recurrence.

These corrective actions will be completed prior to transfer of the final ASME system for each unit.

# ATTACHMENT

BELLEFONTE NUCLEAR PLANT (BLN) UNITS 1 AND 2
FAILURE OF AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) CLASS 1 AND CLASS 2 PIPING WELDS TO MEET DESIGN REQUIREMENTS - SIGNIFICANT CORRECTIVE ACTION REPORT (SCAR) BLSCA930005
BLRD-50-438/93-05 AND BLRD-50-439/93-05

| | # WELDS IN SYSTEM | CLASS | WELD NUMBER | PIPE DIAMETER | WELD LENGTH INCHES | REJECT INCHES | COMMENTS |
|---|---|---|---|---|---|---|---|
| 1 | 2 | ASME 2 | 0NB00474 | 1.50 | 4.71 | 0.125 | LACK OF FUSION |
| 2 | | | 0NB00643B | 1.50 | 4.71 | 0.100 | ROUNDED |
| 3 | 18 | B31.1 | 1CF00002 R2 | 22.00 | 69.12 | 1.690 | ROUND & ELONGATED |
| 4 | | | 1CF00004 R1 | 22.00 | 69.12 | 1.125 | ELONGATED |
| 5 | | | 1CF00008 | 22.00 | 69.12 | 1.400 | ROUND |
| 6 | | | 1CF00010 R1 | 22.00 | 69.12 | 0.700 | ELONGATED INDICATIONS |
| 7 | | | 1CF00027 R1 | 28.00 | 87.98 | 4.650 | ELONGATED INDICATIONS |
| 8 | | | 1CF00031 R1 | 28.00 | 87.98 | 2.910 | ROUND & ELONGATED |
| 9 | | | 1CF00032 R1 | 28.00 | 87.98 | 0.250 | LACK OF PENETRATION |
| 10 | | | 1CF00037 | 22.00 | 69.12 | 0.300 | ROUND |
| 11 | | | 1CF00042 | 20.00 | 62.84 | 1.250 | LACK OF PENETRATION & LACK OF FUSION |
| 12 | | | 1CF00077 R1 | 22.00 | 69.12 | 1.100 | ROUND & ELONGATED |
| 13 | | | 1CF00079 | 22.00 | 69.12 | 2.600 | LACK OF FUSION |
| 14 | | | 1CF00080 | 22.00 | 69.12 | 0.150 | ROUND |
| 15 | | | 1CF00088 | 22.00 | 69.12 | 2.350 | ROUND & ELONGATED |
| 16 | | ASME 2 | 1CF00316 R1 | 8.00 | 25.14 | 0.500 | ELONGATED |
| 17 | | | 1CF00322 R1 | 20.00 | 62.84 | 0.350 | ROUND |
| 18 | | | 1CF00383 | 6.00 | 18.85 | 0.625 | ELONGATED |
| 19 | | | 1CF00400 | 20.00 | 62.84 | 0.500 | ROUND |
| 20 | | | 1CF00415 | 16.00 | 50.27 | 2.500 | ELONGATED |
| 21 | 9 | ASME 2 | 1CR00171 R6 | 8.00 | 25.14 | 0.500 | LACK OF FUSION |
| 22 | | | 1CR00177A S1 | 8.00 | 25.14 | 1.530 | ROUND & ELONGATED |
| 23 | | | 1CR00393 | 4.00 | 12.57 | 0.094 | LACK OF FUSION |
| 24 | | | 1CR00398 | 4.00 | 12.57 | 2.375 | LACK OF FUSION |

| | # WELDS IN SYSTEM | CLASS | WELD NUMBER | PIPE DIAMETER | WELD LENGTH INCHES | REJECT INCHES | COMMENTS |
|---|---|---|---|---|---|---|---|
| 25 | | | 1CR00458 S1 | 8.00 | 25.14 | 0.550 | LACK OF FUSION |
| 26 | | | 1CR00565 | 4.00 | 12.57 | 0.500 | LACK OF FUSION |
| 27 | | | 1CR00565C | 4.00 | 12.57 | 0.450 | ROUND |
| 28 | | | 1CR00616 | 4.00 | 12.57 | 2.000 | ROUND |
| 29 | | | 1CR00642 S1 | 4.00 | 12.57 | 2.000 | ROUND |
| 30 | 1 | ASME 2 | 1IO00754H | 0.38 | 1.19 | 0.219 | LACK OF PENETRATION |
| 31 | | | 1KE03928 | 16.00 | 50.27 | 0.300 | LACK OF FUSION |
| 32 | | | 1KE03967 S2 | 12.00 | 37.70 | 0.555 | ROUND & LACK OF FUSION |
| 33 | | | 1KE03972A | 12.00 | 37.70 | 2.150 | LACK OF FUSION & LACK OF PENETRATION |
| 34 | | | 1KE04148A S1 | 6.00 | 18.85 | 1.040 | ROUND & LACK OF FUSION |
| 35 | | | 1KE04197 | 12.00 | 37.70 | 0.500 | LACK OF FUSION |
| 36 | 12 | ASME 2 | 1KE04212 S1 | 12.00 | 37.70 | 0.750 | ROUND & LACK OF FUSION |
| 37 | | | 1KE04222 S3 | 16.00 | 50.27 | 6.150 | ROUND & LACK OF FUSION |
| 38 | | | 1KE04246 | 6.00 | 18.85 | 0.140 | ROUND |
| 39 | | | 1KE04258 | 12.00 | 37.70 | 0.963 | ROUND & ELONGATED |
| 40 | | | 1KE04272 | 12.00 | 37.70 | 0.425 | ROUND |
| 41 | | | 1KE04309 R3 | 16.00 | 50.27 | 0.250 | LACK OF FUSION |
| 42 | | | 1KE04336A S1 | 6.00 | 18.85 | 2.750 | ROUND |
| 43 | | | 1NC00001 R2 | 28.00 | 87.98 | 13.500 | ROUND & ELONGATED |
| 44 | | | 1NC00007 R2 | 28.00 | 87.98 | 0.200 | ROUND |
| 45 | | | 1NC00009 R3 | 32.00 | 100.54 | 23.785 | ROUND & ELONGATED |
| 46 | 9 | ASME 1 | 1NC00015 R2 | 28.00 | 87.98 | 2.150 | ROUND & ELONGATED |
| 47 | | | 1NC00016D | 0.75 | 2.36 | 0.125 | ELONGATED |
| 48 | | | 1NC00019 R3 | 32.00 | 100.54 | 1.125 | ELONGATED |
| 49 | | | 1NC00020 R1 | 32.00 | 100.54 | 0.300 | ELONGATED |
| 50 | | | 1NC00022 R2 | 32.00 | 100.54 | 0.450 | ROUND |
| 51 | | | 1NC00037 | 4.00 | 12.57 | 0.280 | ELONGATED |

| | # WELDS IN SYSTEM | CLASS | WELD NUMBER | PIPE DIAMETER | WELD LENGTH INCHES | REJECT INCHES | COMMENTS |
|---|---|---|---|---|---|---|---|
| 52 | | | 1ND00002 | 24.00 | 75.41 | 0.100 | ROUND |
| 53 | | | 1ND00004D | 18.00 | 56.56 | 0.725 | ROUND & LACK OF FUSION |
| 54 | | | 1ND00009B U1 | 24.00 | 75.41 | 0.150 | LACK OF FUSION |
| 55 | | | 1ND00033 | 18.00 | 56.56 | 12.000 | LACK OF PENETRATION |
| 56 | | | 1ND00038 R1 | 18.00 | 56.56 | 1.375 | ROUND |
| 57 | | | 1ND00064 T3 | 14.00 | 43.99 | 1.255 | LACK OF PENETRATION |
| 58 | | | 1ND00066 S1 | 14.00 | 43.99 | 1.755 | ROUND & ELONGATED |
| 59 | | | 1ND00068 | 10.00 | 31.42 | 0.150 | LACK OF FUSION |
| 60 | | ASME 2 | 1ND00093 | 10.00 | 31.42 | 0.250 | LACK OF PENETRATION |
| 61 | | | 1ND00093D | 1.00 | 3.14 | 0.750 | LACK OF PENETRATION |
| 62 | | | 1ND00102L | 0.50 | 1.57 | 0.300 | LACK OF PENETRATION |
| 63 | 26 | | 1ND00127 S2 | 10.00 | 31.42 | 0.500 | ROUND & LACK OF FUSION |
| 64 | | | 1ND00162B | 1.50 | 4.71 | 0.060 | TUNGSTEN INCLUSION |
| 65 | | | 1ND00220 | 1.00 | 3.14 | 0.187 | LACK OF FUSION |
| 66 | | | 1ND00244A | 12.00 | 37.70 | 0.875 | ELONGATED |
| 67 | | | 1ND00255 R7 | 12.00 | 37.70 | 1.150 | ELONGATED |
| 68 | | | 1ND00267 R5 | 14.00 | 43.99 | 0.750 | LACK OF FUSION |
| 69 | | | 1ND00268 R3 | 14.00 | 43.99 | 4.550 | LACK OF FUSION |
| 70 | | ASME 1 | 1ND00273 | 14.00 | 43.99 | 2.500 | LACK OF FUSION |
| 71 | | | 1ND00304 V1 | 14.00 | 43.99 | 2.200 | LACK OF FUSION |
| 72 | | | 1ND00309 R2 | 14.00 | 43.99 | 0.125 | LACK OF FUSION |
| 73 | | | 1ND00387 | 2.00 | 6.28 | 0.200 | LACK OF FUSION |
| 74 | | ASME 2 | 1ND00423M S1 | 0.38 | 1.19 | 0.025 | ROUND |
| 75 | | | 1ND00518 S1 | 2.00 | 6.28 | 0.700 | LACK OF FUSION |
| 76 | | | 1ND00581 S1 | 2.00 | 6.28 | 0.140 | ROUND |
| 77 | | | 1ND00667 T1 | 1.50 | 4.71 | 0.390 | ROUND & LACK OF FUSION |
| 78 | 1 | ASME 2 | 1NK00027 | 0.75 | 2.36 | 0.045 | TUNGSTEN |

| | # WELDS IN SYSTEM | CLASS | WELD NUMBER | PIPE DIAMETER | WELD LENGTH INCHES | REJECT INCHES | COMMENTS |
|---|---|---|---|---|---|---|---|
| 79 | 5 | ASME 2 | 1NL00012 | 14.00 | 43.99 | 1.475 | LACK OF FUSION & LACK OF PENETRATION |
| 80 | | ASME 1 | 1NL00016 | 14.00 | 43.99 | 4.750 | LACK OF PENETRATION |
| 81 | | | 1NL00020 | 14.00 | 43.99 | 4.500 | LACK OF PENETRATION |
| 82 | | | 1NL00021B | 14.00 | 43.99 | 0.900 | ELONGATED |
| 83 | | ASME 2 | 1NL00179B | 0.38 | 1.19 | 0.375 | LACK OF PENETRATION |
| 84 | 6 | ASME 2 | 1NM00075 | 12.00 | 37.70 | 1.500 | LACK OF FUSION |
| 85 | | | 1NM00078A | 0.75 | 2.36 | 0.250 | LACK OF PENETRATION |
| 86 | | | 1NM00086 R3 | 12.00 | 37.70 | 0.700 | LACK OF FUSION |
| 87 | | | 1NM00102 | 4.00 | 12.57 | 0.080 | ROUND |
| 88 | | | 1NM00102A S1 | 4.00 | 12.57 | 0.500 | CONVEX |
| 89 | | | 1NM00107 | 4.00 | 12.57 | 0.200 | LACK OF FUSION |
| 90 | 10 | ASME 2 | 1NS00128C S3 | 12.00 | 37.70 | 0.500 | LACK OF PENETRATION |
| 91 | | | 1NS00129A | 12.00 | 37.70 | 5.000 | LACK OF FUSION |
| 92 | | | 1NS00130 R4 | 12.00 | 37.70 | 0.800 | LACK OF FUSION |
| 93 | | | 1NS00267 | 8.00 | 25.14 | 3.000 | CONCAVE |
| 94 | | | 1NS00270 R2 | 8.00 | 25.14 | 0.375 | LACK OF FUSION |
| 95 | | | 1NS00271A R1 | 8.00 | 25.14 | 0.375 | LACK OF FUSION |
| 96 | | | 1NS00468A R1 | 6.00 | 18.85 | 0.125 | ROUND |
| 97 | | | 1NS00470 | 8.00 | 25.14 | 0.500 | LACK OF FUSION |
| 98 | | | 1NS00472 | 8.00 | 25.14 | 0.250 | LACK OF FUSION |
| 99 | | | 1NS00487 R1 | 8.00 | 25.14 | 0.500 | LACK OF PENETRATION |
| 100 | 4 | ASME 2 | 1NV00464 | 4.00 | 12.57 | 0.250 | LACK OF FUSION |
| 101 | | | 1NV00548 | 4.00 | 12.57 | 0.350 | LACK OF PENETRATION |
| 102 | | ASME I | 1NV00663 U1 | 2.50 | 7.86 | 0.215 | ROUND |
| 103 | | ASME 2 | 1NV00713 | 6.00 | 18.85 | 0.300 | LACK OF PENETRATION |
| 104 | 12 | B31.1 | 1SM00010 R3 | 42.00 | 131.96 | 1.000 | ELONGATED |
| 105 | | ASME 2 | 1SM00061 R4 | 32.00 | 100.54 | 2.025 | ROUND & ELONGATED |

| | # WELDS IN SYSTEM | CLASS | WELD NUMBER | PIPE DIAMETER | WELD LENGTH INCHES | REJECT INCHES | COMMENTS |
|---|---|---|---|---|---|---|---|
| 106 | | | 1SM00073 | 32.00 | 100.54 | 3.780 | ELONGATED & LACK OF PENETRATION |
| 107 | | | 1SM00075A | 32.00 | 100.54 | 1.750 | ELONGATED |
| 108 | | | 1SM00103 T1 | 2.50 | 7.86 | 0.375 | LACK OF FUSION |
| 109 | | | 1SM00125 R5 | 32.00 | 100.54 | 1.750 | ROUND & ELONGATED |
| 110 | | | 1SM00166 R6 | 32.00 | 100.54 | 3.650 | ELONGATED & LACK OF PENETRATION |
| 111 | | | 1SM00286E | 4.00 | 12.57 | 1.000 | LACK OF FUSION |
| 112 | | | 1SM00305 R5 | 42.00 | 131.96 | 3.750 | LACK OF FUSION |
| 113 | | B31.1 | 1SM00307 | 32.00 | 100.54 | 0.375 | LACK OF PENETRATION |
| 114 | | | 1SM00312 R3 | 32.00 | 100.54 | 2.000 | LACK OF FUSION |
| 115 | | | 1SM00336 | 10.00 | 31.42 | 0.400 | ELONGATED |
| 116 | 1 | ASME 2 | 1SV00019B | 6.00 | 18.85 | 2.950 | LACK OF FUSION |

**ENCLOSURE 2**
BELLEFONTE NUCLEAR PLANT (BLN) UNITS 1 AND 2
BLRD-50-438/93-05 AND BLRD-50-439/93-05

COMMITMENTS

- The Level III review of all piping radiographs will be completed for both units. Welds which do not meet the weld quality acceptance criteria as defined by design documents will be identified.

- Rework/repair of the welds will be done to bring these welds into compliance with the requirements of the design documents and BLN's Code of Record (1974 Edition through Summer 1974 Addenda of the ASME Section III Code).

- These corrective actions will be completed prior to transfer of the final ASME system for each unit.