

**Southern Nuclear Operating Company**

**ND-21-0392**

**Enclosure 2**

**Vogtle Electric Generating Plant (VEGP) Unit 3**

**CB&I Procedure Qualification Record 14162**

**(VEGP 3-ALT-16)**

**(This Enclosure consists of 8 pages, including this cover page)**



PROCEDURE QUALIFICATION RECORD  
To A.S.M.E. Section IX  
ESSENTIAL VARIABLES

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PQR No. 14162  
Process SMAW Manual ☒ Machine ☐ Auto. ☐ Semiauto. ☐  
Material specification SA738 Gr. B to SA516 Gr. 60/70 Flux or Atmosphere  
ASME P No. 1, Gp. 3 To ASME P No. 1, Gp. 1/2 Flux trade name N/A  
Thickness (if pipe, dia and wall thick) 1.125" Inert gas composition N/A  
Filler metal group no. F 4 Flow rate N/A  
Weld metal analysis no. A 1 Preheat temperature range \*72°F - 264°F (IPT)  
ASME specification no. SFA 5.1 Postweld heat treatment None  
AWS specification no. A 5.1 Plate edge preparation Oxy Fuel burned

WELDING PROCEDURE

Single or multiple pass Multiple Single or multiple arc Single Position 2G

Mode of transfer for GMAW: Spray ☐ Globular ☐ Pulsating ☐ Short Circuit ☐

Filler Metal for GTAW or PAW N/A Filler metal diameter N/A

Electrode E7018 Electrode diameter 3/32"

Type of backing None Welding current Direct Current / Electrode Positive

Consult WELDING VARIABLES for joint dimensions and welding current settings. (Reverse Polarity)

TEST RESULTS

Reduced Section Tensile Results

| Specimen No. | Dimensions, in. |           | Area<br>in <sup>2</sup> | Ultimate<br>Total Load<br>Kips | Ultimate Unit<br>Stress |       | Character of Failure<br>and Location |
|--------------|-----------------|-----------|-------------------------|--------------------------------|-------------------------|-------|--------------------------------------|
|              | Width           | Thickness |                         |                                | ksi                     | MPa   |                                      |
| P23402 1     | 0.743           | 1.042     | 0.774                   | 61.9                           | 80.0                    | 551.6 | Ductile Weld Metal                   |
| P23402 2     | 0.741           | 1.044     | 0.774                   | 62                             | 80.2                    | 553.0 | Ductile Weld Metal                   |
| ---          | ---             | ---       | ---                     | ---                            | ---                     | ---   | ---                                  |
| ---          | ---             | ---       | ---                     | ---                            | ---                     | ---   | ---                                  |

Guided Bend Test

| Type                    | Result | Type | Result |
|-------------------------|--------|------|--------|
| 4 Transverse Side Bends | 4 OK   | ---- | ----   |

Welder's name Scott L. Kirman

Welder's symbol SLK

Welder's name ---

Welder's symbol ---

Who by virtue of these tests meets welder performance requirements.

Work Order (Orig. WPS) No. P23402 Rev. 1

We certify that the statements in this record are correct and that the test weld was prepared, welded and tested in accordance with the requirements of Section IX of the ASME code.

Signed CB&I

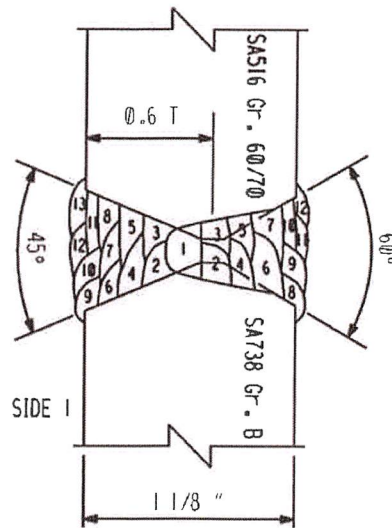
By Patrick Houghton Date May 13, 2021

Remarks:  
Excalibur 7018 MR (E7018) by Lincoln (Lot No. 1443Z)  
SA738 Gr. B heat treatment: Quenched & Tempered  
SA516 Gr. 60/70 heat treatment: Normalized  
This PQR is qualified using a material which is dual certified as SA516 Gr. 60 (P1,Gp.1) and  
SA516 Gr. 70 (P-1, Gp.2)  
\* No preheat applied



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Scale 1:1

Position 2G

Land: 1/8"

Gap: 1/8"

Technique: Stringer

| Side | Pass | Electrode |      |     | Amps | Volts | Travel Speed |        | Heat Input |       | Remarks |
|------|------|-----------|------|-----|------|-------|--------------|--------|------------|-------|---------|
|      |      | Type      | Size |     |      |       | in/min       | cm/min | KJ/in      | KJ/cm |         |
|      |      |           | in   | mm  |      |       |              |        |            |       |         |
| 1    | 1    | E7018     | 3/32 | 2.4 | 103  | 22.2  | 3.5          | 8.9    | 39.0       | 15.4  |         |
| 1    | 2    | E7018     | 3/32 | 2.4 | 103  | 21.5  | 8.1          | 20.5   | 16.5       | 6.5   |         |
| 1    | 3    | E7018     | 3/32 | 2.4 | 103  | 22.0  | 6.1          | 15.5   | 22.3       | 8.8   |         |
| 1    | 4    | E7018     | 3/32 | 2.4 | 101  | 23.1  | 6.8          | 17.2   | 20.7       | 8.1   |         |
| 1    | 5    | E7018     | 3/32 | 2.4 | 102  | 22.7  | 6.1          | 15.5   | 22.8       | 9.0   |         |
| 1    | 6    | E7018     | 3/32 | 2.4 | 102  | 23.2  | 6.3          | 15.9   | 22.7       | 8.9   |         |
| 1    | 7    | E7018     | 3/32 | 2.4 | 102  | 23.1  | 11.4         | 28.9   | 12.4       | 4.9   |         |
| 1    | 8    | E7018     | 3/32 | 2.4 | 103  | 23.6  | 7.8          | 19.8   | 18.7       | 7.4   |         |
| 1    | 9    | E7018     | 3/32 | 2.4 | 103  | 21.8  | 5.7          | 14.4   | 23.7       | 9.3   |         |
| 1    | 10   | E7018     | 3/32 | 2.4 | 102  | 23.1  | 5.1          | 13.0   | 27.7       | 10.9  |         |
| 1    | 11   | E7018     | 3/32 | 2.4 | 102  | 23.0  | 6.1          | 15.5   | 23.1       | 9.1   |         |
| 1    | 12   | E7018     | 3/32 | 2.4 | 103  | 22.2  | 6.9          | 17.6   | 19.8       | 7.8   |         |
| 1    | 13   | E7018     | 3/32 | 2.4 | 102  | 23.6  | ---          | ---    | ---        | ---   |         |

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By:

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PROCEDURE QUALIFICATION RECORD  
VICKERS HARDNESS REPORT  
( 10 Kg. LOAD)

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POSITION 2G

Side 1

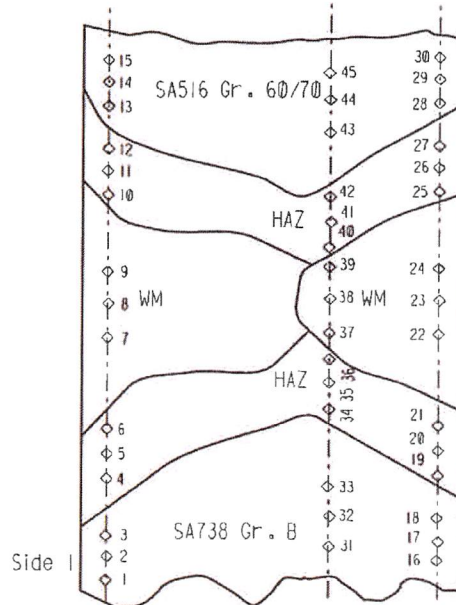
|         |     |
|---------|-----|
| 1. BM   | 208 |
| 2. BM   | 203 |
| 3. BM   | 206 |
| 4. HAZ  | 215 |
| 5. HAZ  | 256 |
| 6. HAZ  | 328 |
| 7. WM   | 234 |
| 8. WM   | 202 |
| 9. WM   | 222 |
| 10. HAZ | 347 |
| 11. HAZ | 202 |
| 12. HAZ | 168 |
| 13. BM  | 164 |
| 14. BM  | 166 |
| 15. BM  | 166 |

Side 2

|         |     |
|---------|-----|
| 16. BM  | 248 |
| 17. BM  | 250 |
| 18. BM  | 254 |
| 19. HAZ | 251 |
| 20. HAZ | 241 |
| 21. HAZ | 328 |
| 22. WM  | 228 |
| 23. WM  | 230 |
| 24. WM  | 204 |
| 25. HAZ | 388 |
| 26. HAZ | 246 |
| 27. HAZ | 174 |
| 28. BM  | 168 |
| 29. BM  | 164 |
| 30. BM  | 163 |

Root

|         |     |
|---------|-----|
| 31. BM  | 214 |
| 32. BM  | 221 |
| 33. BM  | 219 |
| 34. HAZ | 221 |
| 35. HAZ | 216 |
| 36. HAZ | 241 |
| 37. WM  | 230 |
| 38. WM  | 227 |
| 39. WM  | 223 |
| 40. HAZ | 219 |
| 41. HAZ | 188 |
| 42. HAZ | 184 |
| 43. BM  | 156 |
| 44. BM  | 150 |
| 45. BM  | 148 |



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PROCEDURE QUALIFICATION RECORD  
BRINELL SURFACE HARDNESS REPORT  
(3000 kg LOAD 10mm INDENTER)

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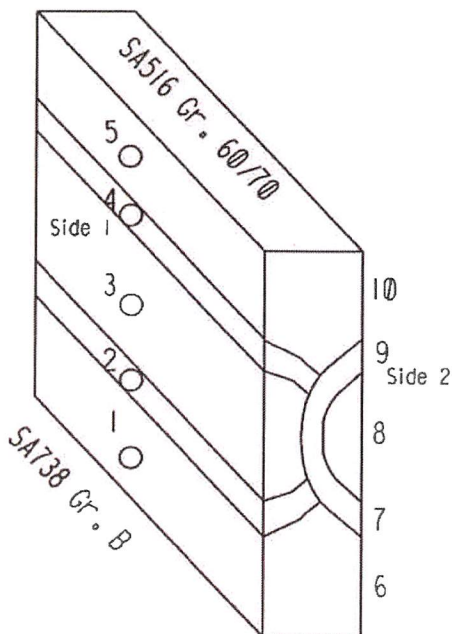
POSITION 2G

Side 1

|        |            |
|--------|------------|
| 1. BM  | <u>197</u> |
| 2. HAZ | <u>237</u> |
| 3. WM  | <u>211</u> |
| 4. HAZ | <u>193</u> |
| 5. BM  | <u>158</u> |

Side 2

|        |            |
|--------|------------|
| 6. BM  | <u>227</u> |
| 7. HAZ | <u>238</u> |
| 8. WM  | <u>208</u> |
| 9. HAZ | <u>225</u> |
| 10. BM | <u>157</u> |



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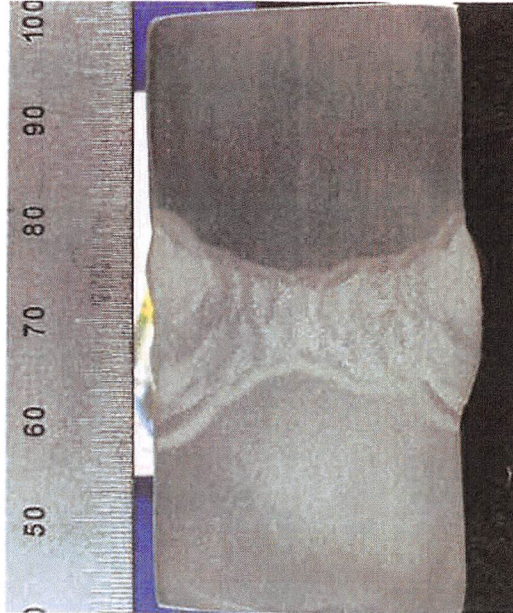
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PROCEDURE QUALIFICATION RECORD  
METALLOGRAPHY REPORT  
Macrograph

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SA516 Gr. 60/70



SA738 Gr. B

HAZ minimum width: 1.5mm  
HAZ maximum width: 3.75mm

Scale Increment: 0.5mm

Etchant: 5% Nital  
Finish: 1 micron  
Photomacrograph: Cross-section of an SMAW weld seam.

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