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General Offices: 212 West Michigan Avenue, Jackson, Michigan 49201 • Area Code 517 788-0550

October 2, 1975

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Division of Reactor Licensing
Nuclear Regulatory Commission
Washington, D. C. 20555

MIDLAND PROJECT
DOCKET NUMBERS 50-329, 50-330
REGULATORY GUIDE MEETINGS
FILE: 0505 SERIAL: 1823

Our letter of September 11, 1975 transmitted positions on the various Regulatory Guides relative to the Materials Engineering Regulatory Guide meeting which is scheduled with your staff. The attached October 1, 1975 revision of our position on Regulatory Guide 1.31, Control of Stainless Steel Welding, replaces the one submitted with our above referenced letter. Your review in preparation for the up-coming meeting should be based on this revised position.

Your cooperation in processing our revised position is appreciated.

R. C. Bauman
Project Engineer

RCB/fw

REGULATORY GUIDE 1.31

CONTROL OF STAINLESS STEEL WELDING
(Rev. 1 June 1973)

RESPONSE TO REGULATORY POSITION

The NRC's interim position on Regulatory Guide 1.31 as contained in Branch Technical Position MTEB 5-1 has been used as the current NRC requirement for Control of Stainless Steel Welding. The Midland Project construction of balance of plant components and installation of the NSS will comply with MTEB 5-1 except as noted below

(1) Paragraphs 1a, 1b and 1c of the Interim Regulatory Guide are complied with to the following extent:

a. The limits for Delta ferrite in austenitic stainless steel welding materials comply with Interim Regulatory Guide 1.31 since the upper limit of 20 percent Delta ferrite in the Interim Regulatory Guides does not apply for welds that are not heat treated after welding (Paragraph 3B), except for solution heat treatment. Solution heat treatment, although not required after [illegible]s permitted in order to avoid severe sensitization.

Austenitic stainless steel welding filler materials used in the fabrication and installation of ASME Section III, Class 1, 2 and 3 components are controlled to deposit from 8 to 25 percent Delta ferrite (8.5 Ferrite Number minimum), except for 309 and 309L welding filler materials which are controlled to deposit from 5 to 15 percent Delta ferrite (5 to 18 Ferrite Number) and are used only for welding carbon or low alloy steel to austenitic stainless steel. Use of 309L welding filler material is further limited to the overlay deposit on the carbon or low alloy steel component nozzles or connecting pipe when postweld heat treatment is required.

b. The procedure for determining the amount of Delta ferrite in each heat or lot of austenitic stainless steel welding material does not comply with the Interim Regulatory Guide. Determination of Delta ferrite is in accordance with ASME Section III, Division 1, Paragraph NB-2433.

(2) Regulatory Position C.2 is complied with for all tests and examinations required by the applicable edition of the ASME Code.

Revised
Oct. 1, 1975

(3) Paragraph 3a of the Interim Regulatory Guide is not complied with. Magnetic measurement of production welds for Delta ferrite is unnecessary when austenitic stainless steel welding materials are controlled to deposit 8 to 25 percent Delta ferrite (8.5 Ferrite Number minimum), based on chemistry, except for 309 and 309L welding materials which are controlled to deposit 5 to 15 percent Delta ferrite (5 to 18 Ferrite Number) based on chemistry.

Three Bechtel projects are committed to measuring production welds for Delta ferrite in order to collect data and demonstrate that the welding material controls described above are more than adequate for the purpose of avoiding microfissuring. The program for measuring production welds for Delta ferrite applies to shop fabricated components as well as field installation welds. Since this represents a sufficient number of welds for the purpose of collecting data, measurement of production welds for Delta ferrite on this project is not planned.

There is no justification for requiring measurement of production welds for Delta ferrite as a test of the welding filler metal control program since that is not the purpose of measuring production welds for Delta ferrite. For these reasons, measurement of production welds for Delta ferrite on the Midland Project is not planned.

(4) Paragraph 3b of the Interim Regulatory Guide is complied with, except that the upper limit of 20 percent Delta ferrite does not apply to welds that are solution heat treated as described in 1a above.

(5) Paragraph 4a, 4b and 4c are not complied with since measurement of production welds for Delta ferrite is not performed.

INTERIM REGULATORY GUIDE 1.31 (Cont'd)

For equipment in the B&W scope of supply, the degree of compliance with this Regulatory Guide is as follows:

This position applies to stainless steel reactor coolant system components, core flooding tanks, and reactor vessel internals all of which were built to the requirements of 1968 ASME III Code. Branch Technical Position MTEB 5-1 has been used as a guide in preparing the following position.

The chemistry of austenitic stainless steel weld filler material has been controlled so that predicted microstructure of the weld deposit minimizes the probability of microfissure cracking. Except for those weld metals that have demonstrated resistance to microfissuring (e.g. SFA-5.4 type 16-8-2 and filler used for weld cladding), all austenitic stainless steel weld metals will have a minimum of 5% delta ferrite.

Materials used on weld processes other than TIG and plasma are qualified using chemical analysis of an undiluted weld pad sample rather than a chemical analysis of the filler prior to welding. The undiluted weld deposit shall contain between 5 and 20 percent delta ferrite as determined using the Schaeffler diagram or by magnetic measurement.

Examination of production welds was not performed on deposited austenitic stainless steel weld metal. Production welding performed using the parameters of approved procedure qualifications and properly tested and certified welding materials render delta ferrite measurements on production welding unnecessary.

All pressure boundary welds were examined per the requirements of the 1968 ASME III Code w/addenda thru Summer 1968. Weld acceptance was based on the use of qualified materials, control of weld variables and the results of non-destructive examinations.

B&W Procured Components

In general, delta ferrite control of stainless steel welding was not specified for B&W procured equipment. The following specific information is available on B&W procured equipment:

Reactor Coolant Pumps

The reactor coolant pumps were manufactured in accordance with the 1971 ASME III Code. The ferritic content of all austenitic stainless steel welds were controlled between 5 and 15 percent with the chromium equivalent and nickel equivalent within the range specified in ASME II, Part C for SFA-5.4 material. Ferrite content was determined by comparing the chemical analysis with the Schaeffler diagram.

Makeup & Decay Heat Removal Pumps

These pumps were manufactured in accordance with the requirements of 1971 ASME Code w/addenda through Winter 71. Ferritic content of austenitic stainless steel welding was controlled between 5 and 15 percent by magnetic permeability measurement.

CRDM

Ferritic content of SS weld material controlled between 5 and 20 percent as measured by magnetic test.

Auxiliary Equipment

Delta ferrite limits were not specified for B&W procured tanks, heat exchanges, demineralizers, or valves. Components were manufactured in accordance with the ASME Code which did not require delta ferrite control of stainless steel welding.

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DESCRIPTION:

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ENCLOSURES:

Regulatory Guide 1.31 Control Of Stainless Steel Welding (Rev. 1 June 1973)

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PLANT NAME: Midland 1 & 2

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