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Comments to Draft Regulatory Guide DG-1221 – Control of Stainless Steel Weld Cladding of Low-Alloy Steel Components

There is no doubt that the current revision (Regulatory Guide 1.43) of Control of Stainless Steel Weld Cladding of Low-Alloy Steel Components issued in May 1973 needed revised. Since that time there have been dramatic improvements in base materials, welding processes used for overlay cladding, and NDE examination techniques. But I must say that as a professional engineer engaged in both the commercial nuclear and naval nuclear programs that I was disappointed in DG-1221.

For a Regulatory Guide to achieve its intent it is imperative that it be clear, concise and recognize the current state of the nuclear fabrication industry. DG-1221 does not meet these objectives and is just a minor tweak of Regulatory Guide 1.43. DG-1221 is too vague and as such can easily lead to misinterpretation by the end user and therefore result in unintended outcomes from its use.

Specific Comments:

- 1) SA-508 Class 2 and 3 are sited various times, yet in the current revision of the ASTM A-508-05b these alloys no longer exist. SA-508 Class 2 and 3 are no longer included as permitted base materials in the ASME B&PV Code and thus cannot be used for new construction therefore their reference in DG-1221 is outdated and meaningless. In addition, the lead-in paragraph in Section C leaves it up to the end user to determine "any grade of material that has a know susceptibility to underclad cracking". The vast majority of the industry is currently using fine grain SA-508 Type II Class1 which is much less prone to underclad cracking and this needs recognized in DG-1221.
- 2) DG-1221 sites references from 1971, 1972 and 2000. While these references supported and further validated the May 1973 revision, they are outdated today and newer references should be sited that address today's base materials and welding techniques and what has been learned in the last 10 years.
- 3) DG-1221 discussed "wide strip" SAW cladding and 6 wire SAW cladding but does not even mention other welding processes such as ESW (Electro Slag Welding) strip, ESO (Extended Stick Out ESW and SAW Strip Welding) and multi wire GMAW, just to name a few. The industry today considers strip wider than 60mm to be wide so most welding engineers reading DG-1221 would consider DG-1221 to not apply when using strip of 60mm width or less regardless of the welding process in use.
- 4) DG-1221 implies that ultrasonic inspection cannot locate underclad cracking. While this was true in May 1973, it is not today. Enhanced ultrasonic inspection techniques are used in the nuclear industry today that can easily locate underclad cracking. The use of

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these enhanced “near zone” ultrasonic techniques needs to be recognized and encouraged in DG-1221.

- 5) Section C, 1. can easily be interpreted to say that Section C and therefore DG-1221, ONLY apply when welding on SA-508 Grade 2 coarse grain forgings regardless of welding process or heat input in use. I doubt that is the intent but that is what the words say.
- 6) In the second paragraph of Discussion, a discussion is included where cold cracking was observed when subsequent weld layers of stainless steel cladding were deposited without preheat. These occurrences have nothing to do with underclad clacking and should be removed from DG-1221. A good technical discussion of cold cracking and its prevention is already presented in Regulatory Guide 1.50.
- 7) Section C, 3. should be removed or revised . This statement has little meaning because no means of establishing limitations on essential variables established by procedure qualification has been specified in Section C, 2. DG-1221 should require, as a minimum, that the rules of the ASME B&PV Code be applied to define the limitations of essential variables for cladding procedures qualified in accordance with Section C, 2.

In summary, DG-1221 needs to be further revised to make it clear and concise so there is no room for incorrect interpretation by the end user. In particular the following need clearly addressed: 1) exactly what base metals alloys it applies to, 2) a definition of “high heat input cladding process” which recognizes the currently used industry cladding processes (SAW and ESW strip, multiwire SAW and GMAW), 3) current NDE ultrasonic techniques that examine the “near zone” for very small indications, 4) clarify - does DG-1221 even apply if “fine grain” material is being clad plus a clear, industry recognized, definition of “fine grain”.

A final suggestion is that Draft NRC Regulatory Guidelines be subjected to a peer review by organizations such as EPRI, EWI and CNF and possibly industry companies such as Westinghouse, AREVA and Babcock and Wilcox before the draft guideline is released for public comment. This would lead to draft guidelines being in alignment with the current industry knowledge base and fabrication practices.

Sincerely,

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