

April 25, 1973

U. S. Atomic Energy Commission  
Division of Regulatory Standards  
Washington, D. C. 20545

Attention: Mr. Gunter Arndt

Dear Gunter:

Per our telephone conversation of April 23, 1973, Mr. Bob Smith and I would appreciate an audience with representatives from the following divisions within the U. S. AEC: Regulatory Standards, Reactor Licensing and Regulatory Operations. Our purpose is to seek a more detailed interpretation of several points contained in Regulatory Guide 1.10.

As manufacturer of the CADWELD Rebar Splice, we are constantly consulted on establishing field splice specifications which are expected to be in complete compliance with the U. S. AEC Regulatory position. We seek your official view as presently there exists a divergence of interpretation among A&E's doing nuclear power plant design.

To properly establish a format and advance preparation, the following questions are presented regarding the interpretation of identified sections in Regulatory Guide 1.10.

#### SECTION C. REGULATORY POSITION

1. Since there may be a year or more time lapse between splicing in the horizontal position in the containment slab and the vertical and diagonal positions in the containment wall, is it necessary to qualify all splicers in all of the positions to be used at the time of initial qualification?
2. Is it still acceptable to prepare the two qualification splices for each of the splice positions using the largest bar size to be used in that position?
3. Can the qualification for each splice position be postponed until that position becomes necessary for production?
4. Is it necessary to requalify a splicer if the specific splice position has not been used for a period of 3 months or more even though his splices will pass visual inspection and his production samples pass the tensile test requirements?
5. Since there will be periodic rejections due to visual inspection, should not the subject of requalification be based on consistent visual failures rather than on any one visual reject?
6. The subject of periodic tensile test failures is discussed under SECTION B. DISCUSSION and Sub-Section 5. Procedure for Substandard Tensile Test Results under SECTION C. REGULATORY POSITION. Therefore, should not the basis of requalification depend upon consistent tensile test failures?
7. Is it mandatory that the splicer requalify for all positions or the specific splice position?

#### 2. VISUAL INSPECTION

8. Is it the intent that each splice be inspected for adequate preparations by an inspector or by the splicer? If it is intended to be an inspector duty, it would require the presence of an inspector for each splicer whenever production splices are being made.
9. The items suggested for inclusion in the specifications are covered in the manufacturer's published procedural and inspection instructions. Is the published information adequate for inclusion in the specifications?

#### 3. TENSILE TESTING

10. Is it also possible to substitute sister splices for production test samples at construction openings and repair areas where the dowels are not sufficiently exposed for removal of a production splice?

**INTERPRETATION OF REGULATORY GUIDE 1.10**  
The following is a letter written by Erico on April 25, 1973, to the Nuclear Regulatory Commission, seeking a more detailed interpretation of several points contained in Regulatory Guide 1.10. Following this letter is a memo listing the Nuclear Regulatory Commission's response.

11. Is it the intent of Regulatory Guide 1.10 to leave the sampling frequency for shop welded anchorages open for submittal by the designer and/or owner? If this is the intent, can the sampling frequency be based on the additional conservatism in the structure splice due to the excessive bar engagement and the number of anchorages involved in production?
12. Since the bar lengths, spacing and staggering sequence are already noted on detailed placing drawings, would it be sufficient to add a general note stating all bars of certain sizes shall be butt spliced with CADWELD Rebar Splices? This will locate all production splices on the detailed drawings in the same manner as lap splices are detailed. The location of production test samples and replacement splices could then be entered on the detailed drawings at the time they are removed from the structure. Would the word "indicating" be acceptable as a replacement for the word "showing" in the last sentence under Section 3.?
13. Would referral to the proper detailed placing drawing satisfy the splice location requirement?

#### 4. TENSILE TEST FREQUENCY

14. We would like to discuss a reduced tensile test frequency that will still insure an adequate check on the total population of splices in the structure. We believe that it is important to consider "the degree of criticality" involved. There is a requirement for only 2% radiographic inspection of liner welds and the inspection rate for CADWELD Splices exceeds this. As there is enormous redundancy via stress redistribution in the rebar matrix of the containment slab, walls and dome, the degree of criticality is much less for rebar splices than for liner welds. We attach a computer printout from some 23 nuclear jobs (nearly 6000 tests) which shows that the fidelity of the splice after it has been visually approved is as good as the rebar to which it is being applied.

#### 5. PROCEDURE FOR SUBSTANDARD TENSILE TEST RESULTS

15. Is the reference to "each 15 consecutive test samples" restricted to the work of each splicer or can it pertain to the total output of all splicers?
16. Suppose a splicer is unable to complete a group of 100 production splices for a particular position and bar size prior to placing concrete in the containment mat. Sometime later he completes the balance of the 100 production splices in the containment wall. For some reason, 2 out of 15 consecutive test samples fail to meet the strength requirements. In addition, it is impossible to obtain additional splices distributed uniformly throughout the 100 production splices. Since the production splices for all of the splicing crews is typically intermingled (i.e. rarely does any one particular crew complete 100 production splices in the same area), would it not be logical and acceptable to sample the adjacent splices in order to examine the strength of the production splices in the particular area of the structure? If there is some reason for the inspector to question the splicer's ability, he can require requalification of that splicer. It would be impossible to obtain sample splices uniformly distributed throughout the balance of the 100 production splices under investigation without damaging the structure by chipping abundant amounts of concrete and repairing all of the neighboring bars that would be damaged in the process. Those splices which have been inbedded in concrete have already been approved by tensile test samples.
17. If the average tensile strength of 15 consecutive samples is restricted to the output of each splicer for a particular splice position and/or bar size, the splice distribution may very well extend from the containment mat into the containment dome. Thus the designer of the structure and the licensee would have to evaluate and assess the acceptability of a reduced average tensile strength throughout the structure. Would 15 consecutive samples representing the output of all splicers be acceptable? This would permit the possibility of obtaining 15 consecutive samples from a common location within the structure.

It is understandable that we may not be able to cover all of the points mentioned above during one session. However, we would appreciate any assistance that might lead to a common acceptable interpretation of Regulatory Guide 1.10.

I am sending additional copies of this correspondence for your use.

Sincerely yours,

ERICO PRODUCTS, INC.

James E. Barry

JEB:gep