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BECO Ltr. #96-010

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

Docket No. 50-293
License No. DPR-35

Supplementary Information on
Augmented Examination of Reactor Pressure Vessel Shell Welds Conducted
Pursuant to 10 CFR 50.55a(g)(6)(ii)(A)(2)

The attachment to this letter provides our supplementary information on Pilgrim Reactor Pressure Vessel Augmented Examination requested by the NRC in a telephone conversation on December 7, 1995.



L. J. Olivier

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Attachment: Supplementary Information on Augmented Examination of RPV Shell Welds
Enclosure: Application of ASME Section V, Article 4 and NRC R.G. 1.150, Rev. 1 (2/83)
Figure: Dwg. PLG-V3-C, Rev. 0

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ATTACHMENT

Supplementary Information on Augmented Examination of RPV Shell Welds

Boston Edison Company (BECo) conducted an augmented examination of RPV shell welds during Refueling Outage 10, pursuant to 10 CFR 50.55a(g)(6)(ii)(A)(2). BECo submitted the results to the NRC by letter #95-099, dated September 20, 1995. Since the required 90% examination volume coverage was not attained for all shell welds, BECo requested relief from the 90% examination volume coverage requirement pursuant to 10 CFR 50.55a(g)(6)(ii)(A)(5). As requested by the NRC during a telecon on December 7, 1995, BECo provides the following supplementary information.

Augmented Examination Method:

The augmented examination of RPV shell welds was conducted using GERIS 2000 in accordance with examination procedures developed by General Electric (GE). The procedures, GERIS 2000 equipment and personnel who detect or size flaws were qualified by the "Performance Demonstration Initiative" (PDI) Qualification Session No. 61-02 in accordance with 1992 Edition 1993 Addenda of ASME Section XI, Appendix VIII requirements.

The results of the PDI demonstration are equivalent to or superior to those of the code specified methods based upon the applicability of ASME Section XI, Subarticles IWA-2230, IWA-2240, IWB-2500 and R. G. 1.150, Rev. 1, as presented in Enclosure 2 of BECo letter #95-099 and further explained in the Enclosure to this attachment. Accordingly, GE's procedure qualified as an alternative examination permitted by ASME Section XI, Subarticle IWA-2240.

Percentage of Examination Volume Coverage and Relief Request:

BECo's relief request applies to all shell welds that did not achieve 90% volume coverage as identified by "Yes" in Column 3 of Table 1 to BECo letter #95-099, dated September 20, 1995. The volume coverage of less than 90% was due to interference of RPV internal components, as specified in the "Limitations" column.

Welds RPV-L-2-339A and RPV-L-1-339B have access restrictions caused by welded guide rods at vessel azimuth 0° and 180° (see attached figure). The guide rod is directly over the RPV-L-1-339B weld and affords no access for scanning, thus coverage is specified as "0". The RPV-L-2-333A weld has restrictions caused by feedwater spargers and core spray piping, and is offset from the guide rod by 4°; so a small portion of the weld is accessible for examination. The coverage as calculated by the examination contractor (GE) was 3% of the total volume required. The RPV-L-1-338C weld achieved 34.7% volume coverage due to jet pump riser and surveillance specimen brackets interference, with no interference from guide rods.

During the telephone call on December 7, 1995, NRC requested BECo to explore ways of taking credit for examinations conducted for other purposes (e.g., nozzle weld examinations) to improve the coverage results of the shell welds.

The existing shell weld coverage values already reflect credit taken for examinations conducted for other reasons (e.g., nozzle penetrations accessed through the biological shield) during RFO 10. However, a search was conducted to determine whether coverage might be improved using the nozzle to vessel and nozzle inner radius ultrasonic examination records that might have included shell welds in the examination volume. Our review found that no additional shell weld coverage was available through the above mentioned examinations. We did achieve some manual coverage of welds RPV-L-2-338B, RPV-L-2-339C, and the lower

head to shell weld RPV-9-338. However, this additional manual coverage does not increase the shell weld percent coverage. Therefore, BECo requests relief from 90% volume coverage requirements for all the welds specified in Table 1 of BECo letter #95-099, that did not meet the 90% volume coverage.

Proposed Alternative and Request for NRC Authorization:

BECo proposes acceptance of the current results as an alternative to conducting additional examination of the welds that did not meet the 90% volume coverage requirement. The augmented examination of RPV shell welds already conducted confirmed no flaws in the vessel. All of the RPV beltline welds were examined. Performing additional examinations to achieve the 90% coverage presents hardship, produces unnecessary radiological exposure and/or requires RPV or RPV biological shield wall disassembly. Since the augmented examination was conducted to the extent practical and results confirmed no flaws, the underlying objectives of the NRC have been met. Therefore, BECo hereby requests NRC authorization not to conduct an additional examination of the welds that did not meet the 90% volume coverage requirement.

ENCLOSURE

Application of ASME Section V, Article 4 and NRC R.G. 1.150, Rev. 1 (2/1983)

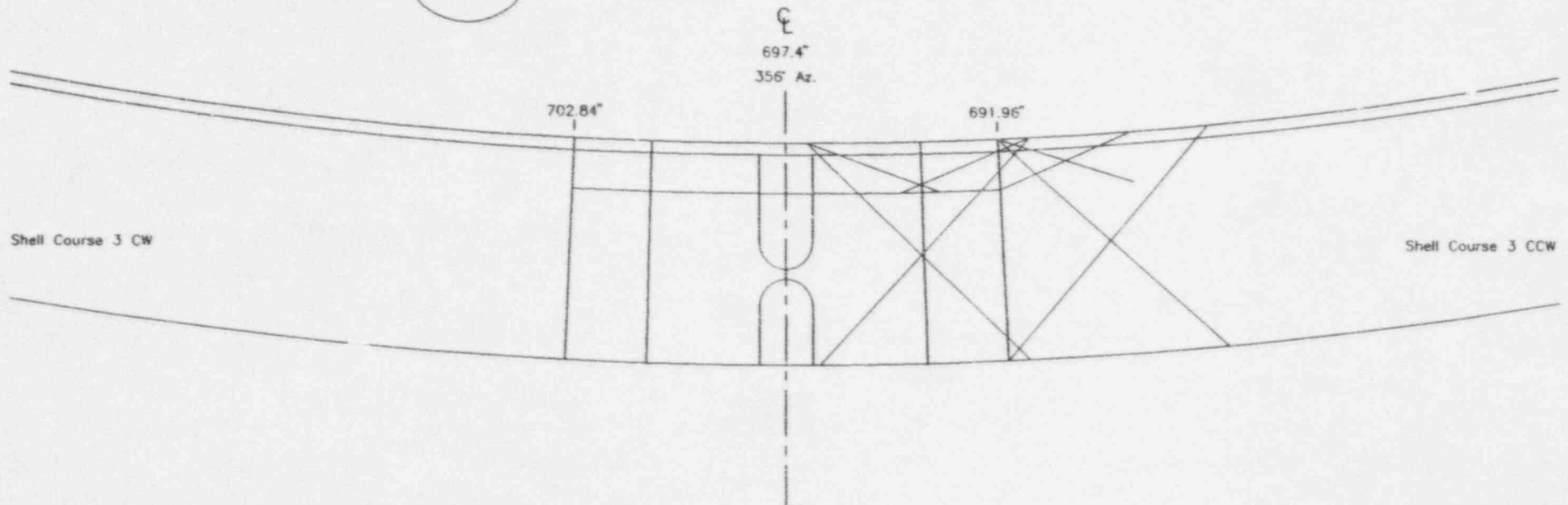
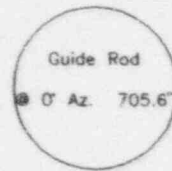
This Enclosure provides additional information regarding the application of ASME Section V, Article 4 and R.G. 1.150 for the alternate method of examination.

1. A comparison between the ASME Section V based ultrasonic methods and procedures developed to satisfy the Performance Demonstration Initiative can best be described as a comparison between a compliance procedure (ASME Section V) and a results procedure (PDI). A typical ASME Section V procedure derives the examination sensitivity and methods to size flaws based on the amplitude obtained from a known reflector. This method achieved a standardization of examination from one contractor to another and was easily specified in documents. This ultrasonic method was, however, established independently from the acceptance standards for flaw size found in ASME Section XI and provided a sizing method which is now recognized as inaccurate for the application.

The PDI process, rather than specifying the way the examination will be performed, specifies the results of the examination. Simply stated, a group of samples which contain actual cracks and machined flaws are provided for demonstration of a procedure. The samples contain engineered flaws which provide a distribution and size which validate the acceptable flaw sizes in ASME Section XI. The Pilgrim reactor pressure vessel examination contractor reports that a typical compliance procedure would have great difficulty in detecting the flaws presented during their PDI demonstration, since the amplitudes are very small. They believe this is because the PDI process requires the detection of diffracted signals whereas the compliance procedures rely on the larger specular reflectors.

2. Regulatory Guide 1.150 "Ultrasonic Testing of Reactor Vessel Welds during Pre-service and Inservice Examinations" started to change the ultrasonic procedures to a results basis. Included in the regulatory guide are the concepts of demonstration for both detection and sizing. The guide did not, however, provide the structure for the demonstration and as such allowed for different interpretations. Based only on cost, it would be prohibitive for a utility or ultrasonic contractor to "demonstrate" procedures as well as the PDI process. The regulatory guide did not provide for the number of samples, a blind test, or an acceptable level of performance, all of which are provided in the PDI process. As an example, the contractor at Pilgrim had to pass qualification examination, which required correctly locating 18 flaws out of 20 presented samples. The regulatory guide allows demonstration on one sample (possibly the calibration block) with total knowledge of the sample. A similar scenario exists for sizing capability where PDI requires 20 samples to be sized, with a predetermined tolerance for acceptability. The regulatory guide only requires an estimate of capability.

Coverage Patch 01



Nominal Clad T = 5/16"
 Shell Course 3 T Min = 5 17/32"
 Vessel Diameter at Flange = 224 1/2"
 Vessel Azimuths = 1.959 inches / degree

Cross Sectional Coverage

Supplement 4 Total 6.9"
 Supplement 6 Total 32.25"
 Supplement 4 P-Scan 0.0"
 Supplement 4 T-Scan 0.9"
 Supplement 6 P-Scan 0.0"
 Supplement 6 T-Scan 5.5"

CH.	ANGLE	DIR.	MIN X	MAX X
1	0 W	0	691.96	702.84
2	0 W	90	691.96	702.84
3	70 UP	0	691.96	702.84
4	70 CW	90	688.54	702.84
5	70 DN	180	691.96	702.84
6	70 CCW	270	691.96	706.26
7	45 UP	0	691.96	702.84
8	45 CW	90	686.54	702.84
9	45 DN	180	691.96	702.84
10	45 CCW	270	691.96	708.26
11	60 UP	0	691.96	702.84
12	60 CW	90	686.54	702.84
13	60 DN	180	691.96	702.84
14	60 CCW	270	691.96	708.26