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GERIS 2000 AND MANUAL EXAM SENSITIVITY FOR RPV WELD EXAMINATIONS AT DUANE ARNOLD ENERGY CENTER

GENE 955-009-0197

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The purpose of this report is to address the examination sensitivity used for the Reactor Pressure Vessel (RPV) weld inspections at the Duane Arnold Energy Center (DAEC) during the 1996 examinations. Sensitivity concerns have been expressed due to the design of the DAEC calibration blocks.

The DAEC calibration blocks are not of the standard ASME Section XI configuration. The side-drilled holes (SDH) are 1.50" deep, rather than the 3.00" minimum depth required by later Editions of the Code. There is some concern that examination sensitivity could be adversely affected by the "edge effect" from the search unit being placed so close to the edge of the block during system calibrations.

Dynamic calibration methods were used on DAEC block IE-30. The calibration scanner duplicates the scanning motion of the scanners used for RPV weld examinations. A dynamic calibration is required by USNRC Regulatory Guide 1.150, unless a correction factor is used to account for differences between static calibration and dynamic scanning. Dynamic methods were demonstrated to DAEC and their ANII. It was noted that the calibrations exhibited no adverse effect from block configuration.

The procedure demonstrated to the ANII on December 12, 1995 was GE-UT-702V0. The procedure used at DAEC during the weld examinations was UT-DAC-702V0. There were differences between the procedures, but no essential variables were changed. The procedure used for the examinations contains site specific requirements that do not affect the essential variables of the procedure.

The calibration technique for GERIS 2000 examinations was developed during GE's work to prepare for the pending implementation of ASME Section XI, Appendix VIII requirements. Examinations of GE owned blocks containing Appendix VIII size flaws showed the calibration method was adequate for flaw detection.

Manual exams were performed using a Performance Demonstration Initiative (PDI) generic procedure for RPV weld examination. The PDI procedure has been proven adequate by demonstration in accordance with the PDI protocol.

The discussion of examination sensitivity for the RPV is pertinent to both the GERIS 2000 and manual examinations performed at DAEC.

Plants are required to perform examinations in accordance with the Code Edition and Addenda in effect at their site, as modified by the requirements of USNRC Regulatory Guide 1.150. RPV weld examinations at DAEC were performed in accordance with ASME Section XI. Either the 1980 Edition with Addenda through Winter 1981 or the 1989 Edition without Addenda was applicable depending on the weld being examined.

Factors that could have affected examination sensitivity, for the RPV welds at Duane Arnold, are discussed below:

Edge Effect - Theoretical

Edge effect is caused by the ultrasonic beam being reflected at a boundary edge of a part. Depending on the test parameters, the beam may be reflected back to the search unit or misdirected away from the search unit. Either case can affect the results of an examination.

As described in the Nondestructive Testing Handbook[1] , edge effect can be the cause of false indications during a test. Since there were no false indications detected during GERIS 2000 system calibrations, it is unlikely that a significant amount of sound was reflected directly back to the search unit. The discussion that follows will, therefore, concentrate on the possibility of misdirected sound affecting sensitivity.

The following discussion of edge effect is based on the GERIS 2000 angle beam (45° and 60°) and straight beam (0°) examinations at Duane Arnold, however, with minor variations they can also be applied to manual examinations.

The angle beam search units used with the GERIS 2000 contain 1.0 MHz transducers with an elliptical shape. They produce 45° and 60° shear waves in the component. The 45° transducers are 0.866" wide by 1.260" long and the 60° transducers are 0.709" wide by 1.260" long. They produce a slightly distorted elliptical beam within the component. The beam shape was shown to be effective at detecting flaws, during GE's Appendix VIII development work.

The straight beam search units used with the GERIS 2000 contain 2.25 MHz transducers with a circular shape. They produce 0° longitudinal waves in the component. The transducers are 1.00" in diameter. They produce a slightly distorted circular beam within the component.

The concern with edge effect is whether there could have been an artificial reinforcement of the reflection amplitude from the 1.50" deep holes in the DAEC calibration block. Figure 1 shows the 60° transducer placed on the block at 0.78" from the edge, as demonstrated to the ANII.

It is important to remember that only the portion of a sound beam that actually returns to the active element of a search unit contributes to an indication on the test system. [1,2] The remaining ultrasound is either extinguished within the part due to attenuation or causes false indications if it is somehow directed back to the search unit's active element.

Figure 1 is an end view of the calibration block, looking toward the search unit. It was created from a full sized AutoCad drawing of Calibration Block IE-30. The block is 5.50" thick with 1.50" deep side-drilled holes. Figure 1 illustrates the effect of the block edge on calibration sensitivity. The beam spread was calculated for the actual metal paths to the holes, then shown in depth on the sketch. Theoretically, the 0.709" 1.0 MHz search unit (60°) is the bounding condition, since the beam spread with the other search units is less.

The area where the beam can affect the active element is shown as a hatched cylinder. Only the ultrasound that returns to, or is reflected into the cylinder at the search unit's active element can cause an indication on the system.

Figure 1 is based on a mathematical approximation of the sound beam produced by an elliptical transducer with a >30% bandwidth.

As shown, in Figure 1, sound beam impinges the edge of the block near the 1/2T hole and is reflected towards the 3/4T hole. Approximately 25% of the beam misses the hole completely due to beam spread.

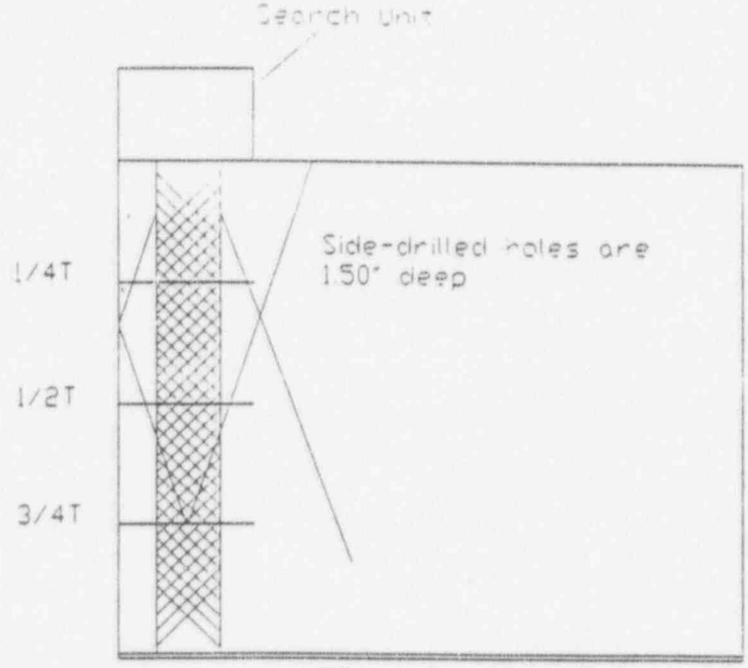

Figure 1

The sound beam is depicted as a single ray traced at the centerline of the beam. Actually, the beam is three dimensional with either an elliptical or circular cross section. The ray trace method is adequate for predicting reflections at part boundaries and internal discontinuities such as side-drilled holes. Beam cross section is used for predicting the amplitude returned from a reflector.[3]

The beam reflected from the edge of the block at the 1/2T area arrives at the 3/4T hole at a later time than the main beam. This is likely to make it "out of phase" with the direct beam. The beam also changes phase due to the reflection from the block edge. Positive phase becomes negative and vice versa upon reflection from a boundary. The main beam, however, changes phase only upon reflecting from the 3/4T hole.

If one assumes that the beam reflected from the edge returns to the transducer, which does not appear to be the case, there would still be a destructive interference upon arrival. This would tend to lower the amplitude response from the hole, rather than reinforcing it [1,4].

The misdirected beam from the block edge appears to cross the beam that is reflected from the hole. Theoretically, this would cancel out some of the reflected energy, lowering the amplitude response from the 3/4T hole.

Either way, there does not appear to be any negative effect on examination sensitivity due to edge effect and 1.50″ deep side-drilled holes, since both cases should result in a slightly lower response from the hole.

To illustrate that DAEC block IE-30 would not cause lower calibration sensitivity than ASME standard 3.00″ deep side-drilled holes, the same size search unit was placed on a drawing containing 3.00″ deep holes. The results of this exercise are shown in Figure 2 below. As before, the area where the beam can affect the active element is shown as a hatched cylinder. Figure 2 is based on the same mathematical approximation of the sound beam used in Figure 1 for 1.50″ deep holes.

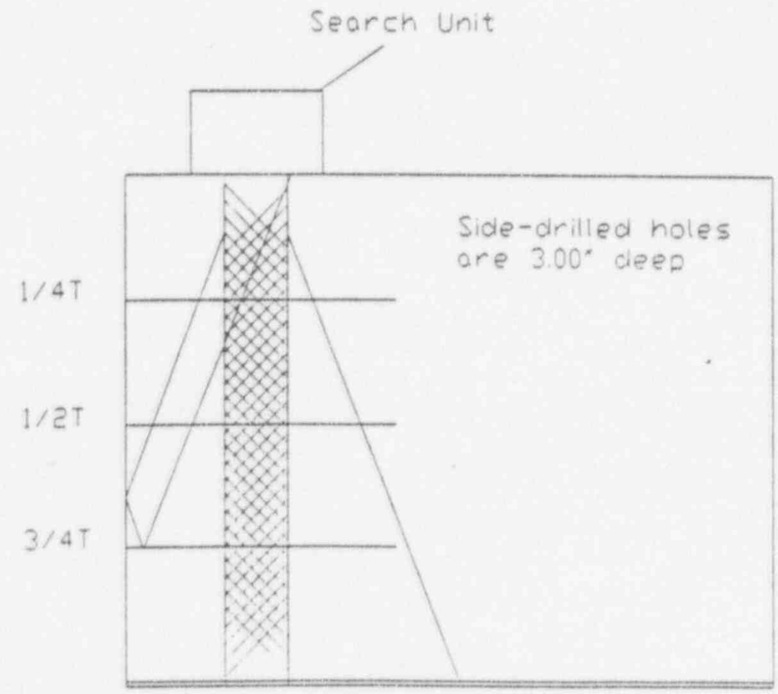

Figure 2

As in Figure 1, only a single ray was plotted for each extremity of the beam to simplify the sketches. The beam is actually three dimensional and much more effect is caused by misdirected sound than is apparent in the sketches.

As shown, the 3/4T hole is completely illuminated by the sound beam. There is a destructive interference from the portion of the beam that is reflected near the hole. The entire active element of the search unit is illuminated with sound directly reflected from the 3/4T hole, but the misdirected beam should lower the amplitude slightly. It is expected that the amplitude from this reflection would still be measurably higher than that from the 3/4T hole in the IE-30 block.

The ASME 3.00″ deep holes appear to yield a slightly lower examination sensitivity, compared with that offered by the holes in block IE-30.

Edge Effect - Empirical Data

To confirm the theoretical results, data taken with the GERIS 2000 on a GE owned ASME standard configuration block was compared to data taken during the ANII demonstration using DAEC's IE-30 block. This comparison is discussed below:

Data was taken on the ASME block starting 0.25″ from the edge of the block and at 0.25″ increments along the length of the holes. Data taken at 1.50″ in from the edge of the block on the 3.00″ deep holes was then compared to data taken at 0.78″ in from the edge of block IE-30 during the ANII demonstration.

Data from the area near the block edge was also scrutinized for any sign that edge effect was causing lowered sensitivity. The data shows no apparent edge effect for angle beam examinations. There does seem to be a slight edge effect for straight beam search units located at 1.25″ from the edge of the block.

The GERIS 2000 is a fixed gain system with a logarithmic amplifier. Signals are measured using attenuation values with 0 dB being the maximum possible amplitude. A higher dB value indicates a smaller signal. For example, a signal analyzed at 30 dB attenuation has twice as much amplitude as one analyzed at 36 dB. For Distance Amplitude Curve (DAC) construction, a higher dB value indicates a lower signal amplitude. This yields a more sensitive DAC point. Figure 3 below is a GERIS 2000 screen showing the response from a 1/4T side-drilled hole in GE's ASME standard configuration block. Figure 3 illustrates signals measured in dB of attenuation:

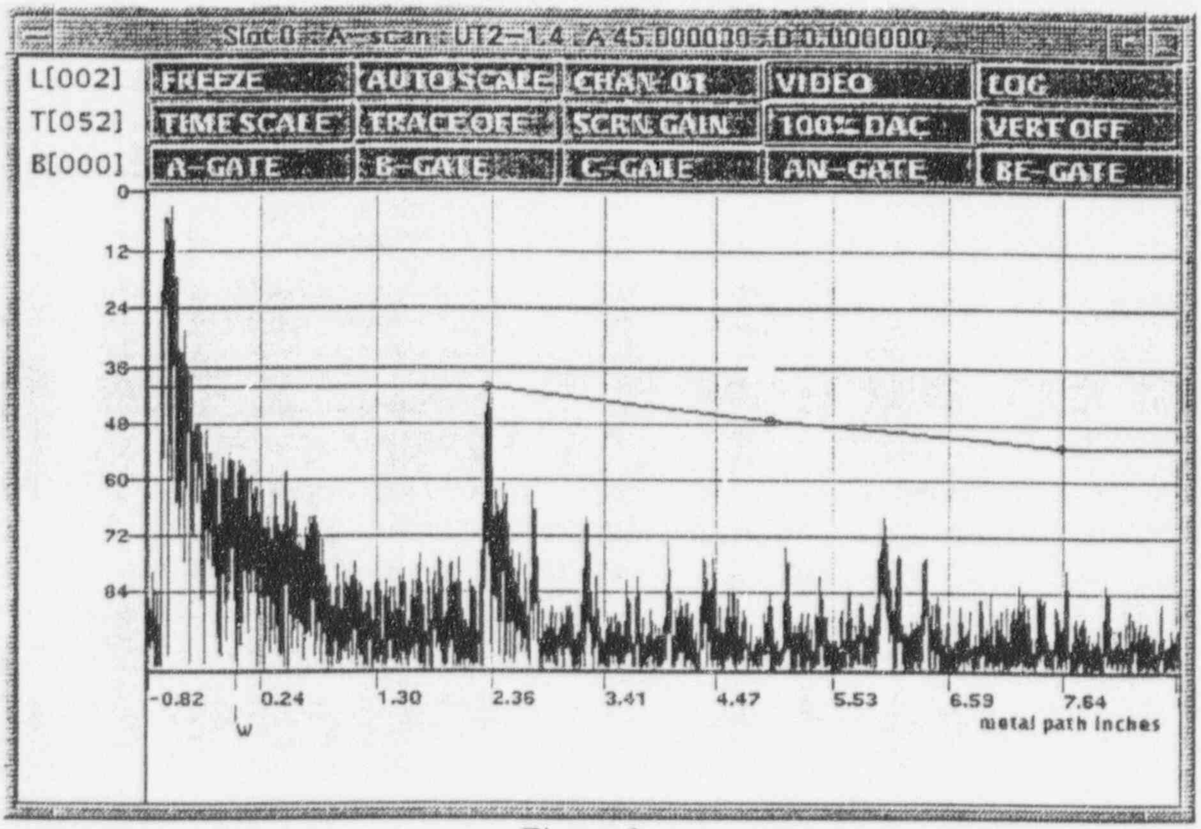

Figure 3

As shown in Figure 3, the full screen allows measurement of a reflector with a value ≅ 96 dB below the maximum possible value. The screen shows the signal response from a 1/4T side-drilled hole at a metal path of 2.36" with a dB value of 40. The position and amplitude of a 1/2T side-drilled hole is marked on the DAC at 5.05" with a dB value of 47.

When comparing these holes, the 1/2T hole is 7 dB down from the 1/4T hole so the amplitude of the 1/2T hole is a bit less than 50% of the 1/4T hole. While the logarithmic data is displayed differently, the actual amplitudes compare well with DAC values obtained using equipment with linear amplifiers. In RPV blocks, a 1/2T response on the order of 50% of that from the 1/4T hole is a normal value.

Figures 4, 5, and 6 below display data taken from the ASME standard configuration block. This block is 7.0" thick, whereas, the DAEC block IE-30 is 5.5" thick. To account for the difference in block thickness, the discussion of data compares the 1/2T hole in the ASME block to the 3/4T hole in block IE-30; which have equivalent metal paths (within 1.0").

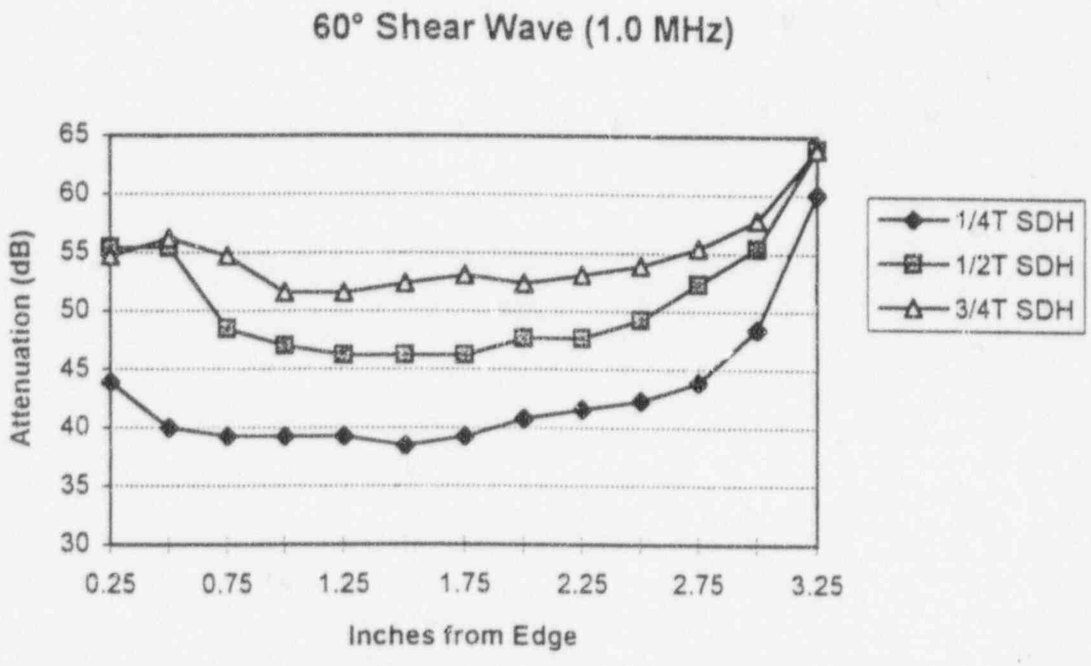

Figure 4

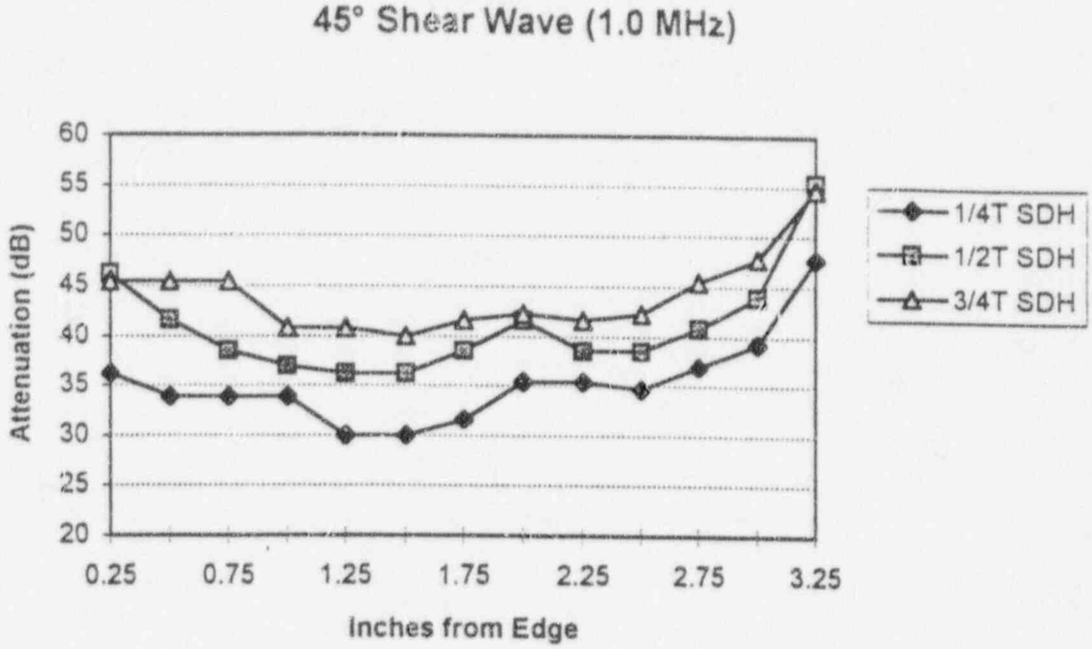

Figure 5

Shear Wave Data Comparison

The 60° shear wave data (Figure 4) from the ASME standard configuration block shows that the 1/2T side-drilled hole value is 46.2 dB measured at 1.50″ from the edge of the block. The 60° shear wave data from block IE-30 shows that the 3/4T side-drilled hole value is 51.3 dB measured at 0.78″ from the edge of the block. This indicates that the 60° DAC using block IE-30 is on the order of 5dB more sensitive than a DAC from the ASME standard configuration block.

The 45° shear wave data (Figure 5) from the ASME standard configuration block shows that the 1/2T side-drilled hole value is 36.2 dB measured at 1.50″ from the edge of the block. The 45° shear wave data from block IE-30 shows that the 3/4T side-drilled hole value is 37.9 dB measured at 0.78″ from the edge of the block. This indicates that the 45° DAC using block IE-30 is on the order of 1.7 dB more sensitive than a DAC from the ASME standard configuration block.

Longitudinal Wave Data Comparison

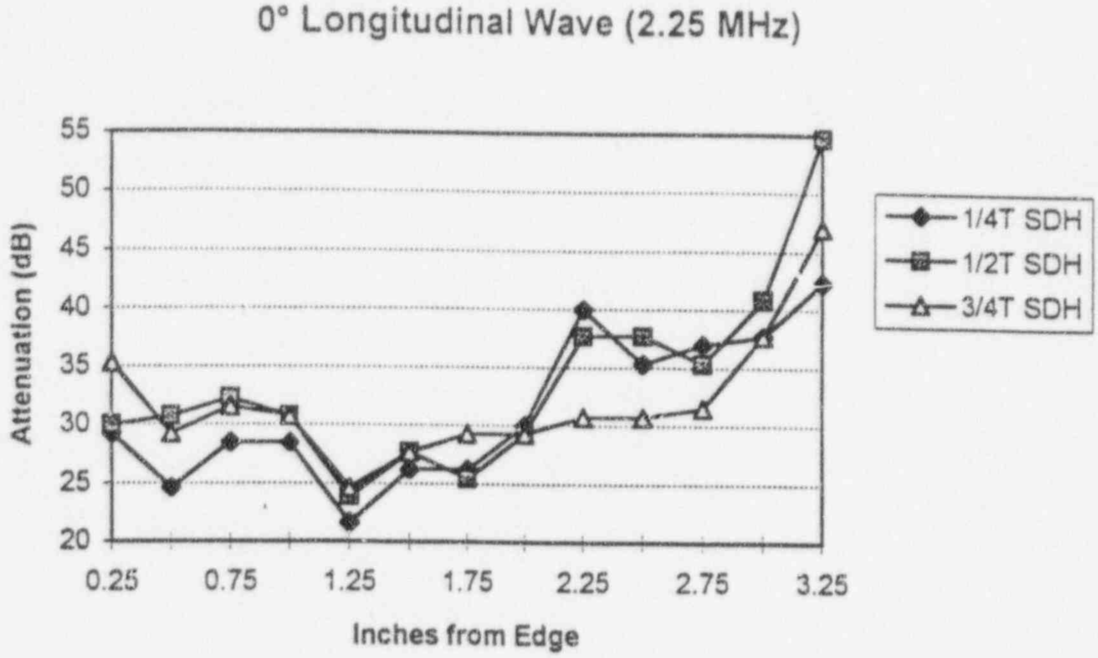

Figure 6

The 0° longitudinal wave data from the ASME standard configuration block shows that the 1/2T side-drilled hole value is 27.7 dB measured at 1.50″ from the edge of the block. The 0° longitudinal wave data from block IE-30 shows that the 3/4T side-drilled hole value is 48.1 dB measured at 0.78″ from the edge of the block. This indicates that the 0° DAC using block IE-30 is about 20.4 dB more sensitive than a DAC from the ASME standard configuration block, however, this does not appear to be the case. The actual difference appears to be more on the order of 14 dB. The apparent difference could be due to edge effect.

As shown in Figure 6, there does appear to be an edge effect in the area near 1.25″ in from the edge of the block. This is shown by the decreased attenuation value (inflated amplitude) at that position.

A 1/4" movement of a transducer along a hole should not yield a 7 dB change unless the measurement is near the end of the hole, yet this happens between 1.00" and 1.25" in from the edge. The amplitude appears to be inflated by about 6 db. This is most likely caused by a side lobe from the transducer reflecting back to the active element.

Conclusions

GERIS 2000 and Manual RPV weld examinations at DAEC were slightly more sensitive when calibrated on blocks containing 1.50" deep side-drilled holes than they would have been using an ASME standard configuration block.

Manual RPV weld examinations using the PDI generic procedure would not be affected by the DAEC block configuration.

There was no detectable effect due to transducer placement near the edge of the block (edge effect) for angle beam examinations at DAEC. Calibration sensitivity using 1.50" deep side-drilled holes with the search unit placed at ≅0.75" from the block edge was slightly higher, from 1.7 dB (45°) to 5.0 dB (60°), than calibrations using 3.00" deep holes with the search unit placed at 1.50" from the edge.

There was an apparent edge effect on straight beam calibrations using 3.00" deep holes with the search unit about 1.25" from the edge. There appears to be a side lobe reinforcement of the amplitude from the 1/4T, 1/2T, and 3/4T holes. The effect is on the order of 6 dB. When this effect is considered, the calibration sensitivity using 1.50" deep side-drilled holes with the search unit placed at ≅0.75" from the block edge was about 14 dB higher than calibrations using 3.00" deep holes with the search unit placed 1.50" from the edge.

RPV weld examinations at DAEC met the sensitivity requirements of ASME Section XI, 1989 Edition with no Addenda and earlier Editions. Code requirements were modified in accordance with USNRC Regulatory Guide 1.150 requirements.

BIBLIOGRAPHY

1. "Nondestructive Testing Handbook, Second Edition Volume Seven, Ultrasonic Testing" American Society for Nondestructive Testing, 1991
2. "Nondestructive Testing, Second Edition" by Warren J. McGonnagle, 1975
3. "Determination of the size of defects by the ultrasonic impulse echo method" by Joseph Krautkramer British Journal of Applied Physics Volume 10, June 1959.
4. "Basic Physics in Diagnostic Ultrasound" by Joseph L. Rose and Barry B. Goldberg. John Wiley and Sons, 1979

Alternative Examination Number: NDE-R011

COMPONENT IDENTIFICATION

Code Classes: 1
References: IWA-2232
Appendix I, I-2100, Article 4 ASME Section V

Examination Categories: B-A, B-D
Item Numbers: B1.10, B1.20, B1.30, B1.40, B3.90, B3.100
Description: Use of Existing Calibration Blocks for Ultrasonic Examination of Pressure Retaining Welds in Reactor Vessel.
Component Numbers N/A

CODE REQUIREMENT

IWA-2232 states that ultrasonic examination shall be conducted in accordance with Appendix I.

Appendix I, I-2100 states that ultrasonic examination of vessel welds greater than 2 inches in thickness shall be conducted in accordance with Article 4 of Section V, as supplemented by Appendix Supplements identified in table I-2000-1.

Article 4 ASME Section V states that the calibration block fabrication and material shall be one of the following; (1) a nozzle dropout, (2) a component prolongation or; (3) material of the same material specification product form, and heat treatment condition as one of the materials being joined.

Appendix I, Supplement 4 states the alternative calibration block design of fig. I-S4 may be used in lieu of blocks fabricated in accordance with Articles 4 and 5 of Section V provided the block meets Supplement 1 of Article 4 and 5 of Section V.

BASIS FOR ALTERNATIVE EXAMINATION

The RPV calibration blocks currently being used at DAEC, when reviewed against 1989 ASME Section XI and Section V, were identified as marginal in certain block design characteristics. This is because the requirements and examination techniques existing at the time of their fabrication were significantly different then those employed today. The current block dimensions, while in compliance with the original fabrication

requirements, satisfy all but two of the side drilled hole dimensional requirements of the 1989 Section XI Code for calibration standards. Calibration reflectors (side-drilled holes), though they do not meet the 1989 Code requirements, have been proven adequate during the last two inspection intervals. Any alterations to the existing calibration standards would be undesirable since the potential is high that the alterations may affect comparison of past and future calibration and examination results. Compliance with ASME Section XI requirements to detect service induced flaws requires traceability to previous examination results, which is available using these existing calibration blocks. This view is supported by Regulatory Guide 1.150, Position C.2, which states in part "Where possible, the same calibration block should be used for successive inservice examinations of the same RPV." It would be impractical to fabricate a new set of calibration blocks and establish new baseline examination values for those affected examinations in order to satisfy current block dimensional requirements. A demonstration of the potential "edge effect" was performed on an ASME standard block (block with 3" deep holes), and compared with the results of the DAEC block. The results showed that the examinations conducted using the DAEC block were slightly more sensitive. Based on the above, DAEC requests alternate examination from ASME Section XI, Appendix I requirements for calibration block design, fabrication requirements and, material specifications (material of the calibration blocks has been verified to meet the material requirements of Article 4 ASME Section V), in order to allow the continued use of the existing calibration blocks in the following table:

Cal Blk #	Nominal Pipe Size	Pipe Schedule	Thickness (inches)	Heat No.	Cal Blk Dwg. No.
IE-30	PLATE	N/A	5.5	B0402	LMT-SK
IE-31	PLATE	N/A	6.625	P2112	SK-4-7-78
IE-32	PLATE	N/A	6.625	P2130	SK-4-7-78
IE-33	PLATE	N/A	6.625	T1937	SK-4-7-78
IE-34	PLATE	N/A	6.625	P2076	SK-4-7-78
IE-35	PLATE	N/A	4.0	B0390	SK-4-7-78

ALTERNATE EXAMINATION

Future calibration blocks will meet the design, fabrication, and material specification requirements of ASME Section XI, Appendix I, III, and Article 4 and 5 of ASME Section V, and will be provided with the documentation necessary to demonstrate compliance with these requirements. Additionally, when using existing calibration blocks that lack certain design requirements or appropriate documentation, action will be taken to provide adequate assurance that the blocks will establish the proper ultrasonic calibration and

sensitivity, and a comparison will be made between the attenuation of the calibration block and the material being examined.

A demonstration was conducted to verify that the vessel calibration block (IE-30) is compatible with the ultrasonic equipment that will be utilized for the vessel examination. The results were found to be acceptable under the 1989 Section XI requirements and will be documented under IWA-2240 requirements. A comparison with the sensitivity obtained from an ASME standard block and the DAEC IE-30 block showed that the DAEC calibration was slightly more sensitive.

10CFR50.55a(3)(i) allows the use of alternative examinations if shown to be comparable in levels of safety and quality to that of the ASME Section XI Code requirements.

APPLICABLE TIME PERIOD

Alternative Examination is requested for the third ten-year interval of the Inservice Inspection Program for DAEC as allowed by 10CFR50.55a(3)(i).

IES Utilities Inc.
Duane Arnold Energy Center
2nd 10-Year Interval
Alternative Examination Number: NDE-020

I SYSTEM/COMPONENT(S) FOR WHICH ALTERNATIVE EXAMINATION IS REQUESTED

Reactor Vessel Welds Inspection Program

EXAMINATION CATEGORY B-A, B-D
ITEM(S) B1.10, B1.20, B1.30, B1.40, B3.90, B3.100

II CODE REQUIREMENT
ITEM B1.10

10CFR50.55a(g)(6)(ii)(A)(2) requires all licensees to augment their reactor vessel examination by implementing once, as part of the Inservice Inspection Interval in effect on September 8, 1992, the examination requirements for reactor vessel shell welds specified in Item B1.10 of Examination Category B-A in the 1989 Edition of ASME Section XI.

Section XI (1989), IWA-2232 states that ultrasonic examination shall be conducted in accordance with Appendix I.

Appendix I, I-2100 states that ultrasonic examination of vessel welds greater than 2 inches in thickness shall be conducted in accordance with Article 4 of Section V, as supplemented by Appendix Supplements identified in table I-2000-1.

Appendix I, Supplement 4 (1989) states the alternative calibration block design of fig. I-S4 may be used in lieu of blocks fabricated in accordance with Articles 4 and 5 of Section V provided the block meets Supplement 1 of Article 4 and 5 of Section V.

Article 4 of ASME Section V (1989) states that the calibration block fabrication and material shall be one of the following; (1) a nozzle dropout, (2) a component prolongation, (3) material of the same material specification product form, and heat treatment condition as one of the materials being joined.

Article 4 (1989) Fig. T-441.1 shows 3″ deep side-drilled holes required.

ITEM NUMBERS B1.20, B1.30, B1.40, B3.90, B3.100

Section XI (1980 W81), IWA-2232 states that ultrasonic examination for Class 1 vessel welds in ferritic material greater than 2 inches in thickness shall be conducted in accordance with Article 4 of Section V.

Article 4 of ASME Section V (1980 W81) states that the calibration block fabrication and material shall be one of the following; (1) a nozzle dropout, (2) a component prolongation; (3) material of the same material specification product form, and heat treatment condition as one of the materials being joined.

Article 4 (1980 W81) Fig. T-434.1 shows 3" deep side-drilled holes required.

III CODE REQUIREMENT FROM WHICH ALTERNATIVE EXAMINATION IS REQUESTED

Alternative Examination is requested from ASME Section XI 1989 Edition, Appendix I requirements for calibration block design, fabrication requirements and, material specifications as specified in the augmented reactor vessel inspection program in 10CFR 50.55a.

Alternative Examination is also requested from ASME Section XI 1980 W81 Edition, IWA-2232 for calibration block design, fabrication requirements, and material specifications.

IV BASIS FOR ALTERNATIVE EXAMINATION

The RPV calibration blocks currently being used at DAEC, when reviewed against the 1980 with winter 1981 addenda and the 1989 edition of ASME Sections XI and V, were identified as marginal in certain block design characteristics. This is because the requirements and examination techniques existing at the time of their fabrication were significantly different then those employed today. The current block dimensions, while in compliance with the original fabrication requirements, satisfy all but two of the side-drilled hole dimensional requirements of the 1980 with winter 1981 and 1989 Section XI Code for calibration standards. Calibration reflectors (side-drilled holes), though they do not meet the 1980 with winter 1981 and 1989 Code requirements, have been proven adequate during previous inspections. Any alterations to the existing calibration standards would be undesirable since the potential is high that the alterations may affect comparisons of past and future calibration and examination

results. Compliance with ASME Section XI requirements to detect service induced flaws requires traceability to previous examination results which is available using the existing calibration blocks. This view is supported by Regulatory Guide 1.150, Position C.2, which states in part, "Where possible, the same calibration block should be used for successive inservice examination of the same RPV."

A demonstration of the potential "edge effect" was performed on an ASME standard block (block with 3" deep holes) and compared with the results of the DAEC block. The results showed that the examinations conducted using the DAEC block were slightly more sensitive.

Based on the above, DAEC requests alternative examination from ASME Section XI, (1980 W81 and 1989) requirements for calibration block design, fabrication requirements, and material specifications (material of the calibration blocks has been verified to meet the material requirements of both Article 4 of ASME Section V (1989), and Article 4 of ASME Section V (1980 W81)), in order to allow the continued use of the existing calibration blocks in the following table:

Cal Blk#	Nominal Pipe Size	Pipe Schedule	Thickness (inches)	Heat No.	Cal Blk Dwg. No.
IE-30	PLATE	N/A	5.5	B0402	SK-4-7-78
IE-31	PLATE	N/A	6.625	P2112	SK-4-7-78
IE-32	PLATE	N/A	6.625	P2130	SK-4-7-78
IE-33	PLATE	N/A	6.625	T1937	SK-4-7-78
IE-34	PLATE	N/A	6.625	P2076	SK-4-7-78
IE-35	PLATE	N/A	4.0	B0390	SK-4-7-78

V ALTERNATE EXAMINATIONS

All future calibration blocks will meet the design, fabrication, and material specification requirements of ASME Section XI Appendix I, III, and Article 4 of ASME Section V, and will be provided with the documentation necessary to demonstrate compliance with these requirements. A demonstration was conducted to verify that the vessel calibration block IE-30 is compatible with

ultrasonic equipment that will be utilized for the vessel examination. The results were found to be acceptable under the 1989 Section XI (edition which will be used for the Third Ten Year Interval ISI program) requirements and will be documented under IWA-2240 requirements. In addition a comparison with the sensitivity obtained from an ASME standard block and the DAEC IE-30 block showed that the DAEC calibration was slightly more sensitive.

VI <u>JUSTIFICATION FOR THE GRANTING OF ALTERNATIVE EXAMINATION</u>

The fabrication of new calibration blocks to meet the requirements of ASME Section XI and Section V, Article 4 would only have a small potential of increasing plant safety margins and a very disproportionate impact on expenditures of plant manpower. In order to maintain the ability to compare results of previous examination results, the current calibration blocks will be utilized during the Second Ten Year ISI Program Interval.

A demonstration using the DAEC calibration block IE-30 was conducted and compared with the data obtained from an ASME standard block. The results showed that the weld examinations performed using the DAEC calibration block were slightly more sensitive.

10CFR50.55a(3)(i) allows the use of alternative examinations if shown to be comparable in levels of safety and quality to that of the ASME Section XI Code requirements.

VII <u>IMPLEMENTATION SCHEDULE</u>

This alternative examination will be implemented during the 2nd Ten Year Interval as allowed by 10CFR50.55a(3)(i).