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SUBJECT: Provides addl info in support of modified relief request submitted by 970708 ltr.

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November 21, 1997 AEP:NRC:0969BH

Docket No.: 50-316

U.S. Nuclear Regulatory Commission
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Gentlemen:

Donald C. Cook Nuclear Plant Unit 2
REACTOR VESSEL NOZZLE WELDS
MODIFIED REQUEST FOR ASME CODE RELIEF
REQUEST FOR ADDITIONAL INFORMATION

Reference: Letter AEP:NRC:0969BB, "Donald C. Cook Nuclear Plant Unit 2, Modified Request for ASME Code Relief - Reactor Vessel Nozzle Welds and Response to Request for Additional Information, dated July 8, 1997

The purpose of this letter is to provide additional information in support of the modified relief request that was submitted by the referenced letter.

Following the examination of the reactor vessel nozzle welds during the unit 2 1996 refueling outage, it was found that the gain setting of the instrument used to obtain the nozzle weld data was incorrect. The data from the test were enhanced, and an evaluation of the enhanced data led to the conclusion that all observed indications were within code acceptable limits. During discussions with your staff and Idaho Nuclear Engineering Laboratory consultants, five indications were questioned. It was agreed that we would obtain more data during the current refueling outage to resolve the issue.

During the current unit 2 refueling outage, accessible regions of the nozzle welds were ultrasonically examined from the outside of the vessel, and data for two of the previously identified indications were obtained. The attachment to this letter contains an evaluation of these data, providing confirmation that the previously identified indications were either false calls or were within the code acceptance criteria.

Sincerely

E E Fitzpatrick

E. E. Fitzpatrick
Vice President

/vlb

Attachment

1/1
A047

c: A. A. Blind
A. B. Beach
MDEQ - DW & RPD
NRC Resident Inspector
J. A. Abramson

ATTACHMENT TO AEP:NRC:0969BH

EVALUATION OF NOZZLE WELD ULTRASONIC DATA

On November 2, 1997, Southwest Research Institute (SwRI) and Cook Nuclear Plant inservice inspection (ISI) personnel conducted an ultrasonic examination (UT) of the unit 2 reactor pressure vessel (RPV) nozzle welds from the outside surface to meet the intent of our commitments in our submittal AEP:NRC:0969BB, dated July 8, 1997. This document reports our findings, supplements our code relief request submitted in AEP:NRC:0969BB, and establishes the basis of acceptance for these examinations.

In 1996, during the unit 2 refueling outage, the second ten-year interval vessel examination was performed to comply with ASME Section XI code requirements. Vessel shell welds and nozzle-to-vessel shell welds were examined using automatic UT equipment. Shortly after the examination was complete and the equipment removed from the RPV, we discovered that the nozzle-to-shell welds were examined at a lower than required gain setting. A computer-enhanced review, using the results of the 1996 UT was conducted and six indications were conservatively identified as exceeding code allowables. One of the six identified indications was previously located and manually sized from the outside diameter (OD) during previous examinations, and again in the 1996 examination. This indication, 50rr-1, was subsequently determined to be a code acceptable slag inclusion that was stable based on comparison with previous examinations. Indication 50rr-1 was larger in signal amplitude than the other five indications. A code relief request was submitted in AEP:NRC:0969AX, dated September 10, 1996. This submittal requested the NRC accept the 1996 RPV nozzle-to-shell weld examination and the subsequent ultrasonic enhanced data analysis, based on the condition that there were no other indications found that were larger or equal in size than the code acceptable 50rr-1 indication.

Subsequently, a request for additional information (RAI) was received from the NRC. After conferring with our ISI vendor, the NRC, and the Idaho National Engineering Laboratory (INEL), we decided to modify our original code relief request, AEP:NRC:0969AX. In our submittal AEP:NRC:0969BB, we committed to the manual examination of the five indications that were found during the computer enhanced ultrasonic data analysis, providing that they were reasonably accessible from the OD of the nozzle. During the 1997 examination, we were unable to obtain access to all indications because of the presence of a concrete structure that did not allow removal of the insulation. Consequently, two of five indications were examined, and it is noted that these two indications had the highest signal amplitude.

The results of the 1997 ASME code UT revealed no recordable indications on the two accessible indications. In addition to the code examination conducted at code sensitivities, we also increased the sensitivity (gain) and again scanned for these indications, finding none in the weld region. This indicates that these two indications found during the computer enhancement review of unit 2 nozzle-to-shell weld second ten-year interval ISI data, are non-relevant indications or false calls, presumably caused by transducer shoe lift-off. Figures 1 and 2 illustrate the UT coverage and insulation removal for each manual examination.

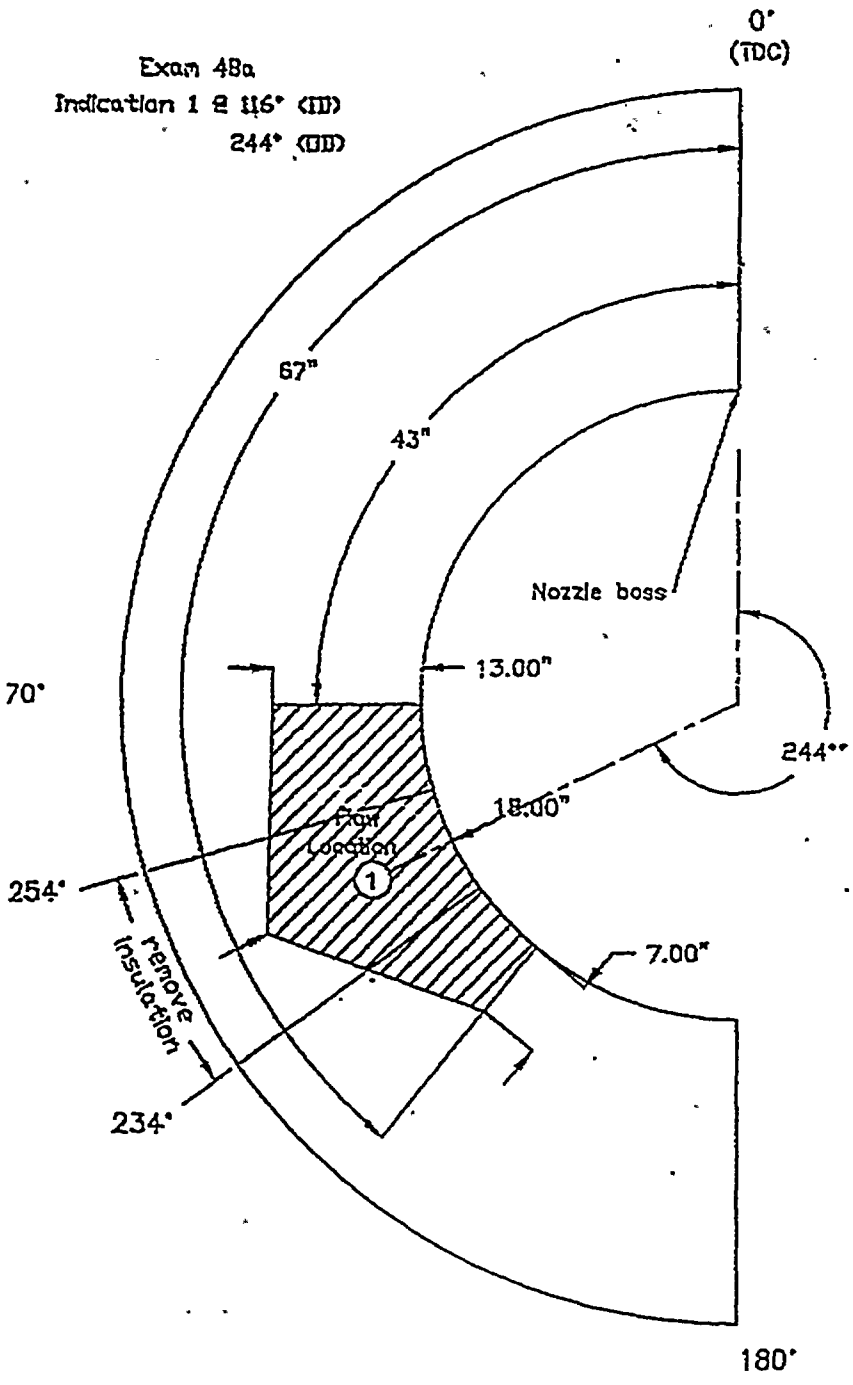
Table 1 summarizes the information previously reported on the five indications that we planned to examine and the data obtained in the November 2, 1997, examinations. Information on indication 50rr-1 (a known flaw), which was detected and sized prior to the 1996

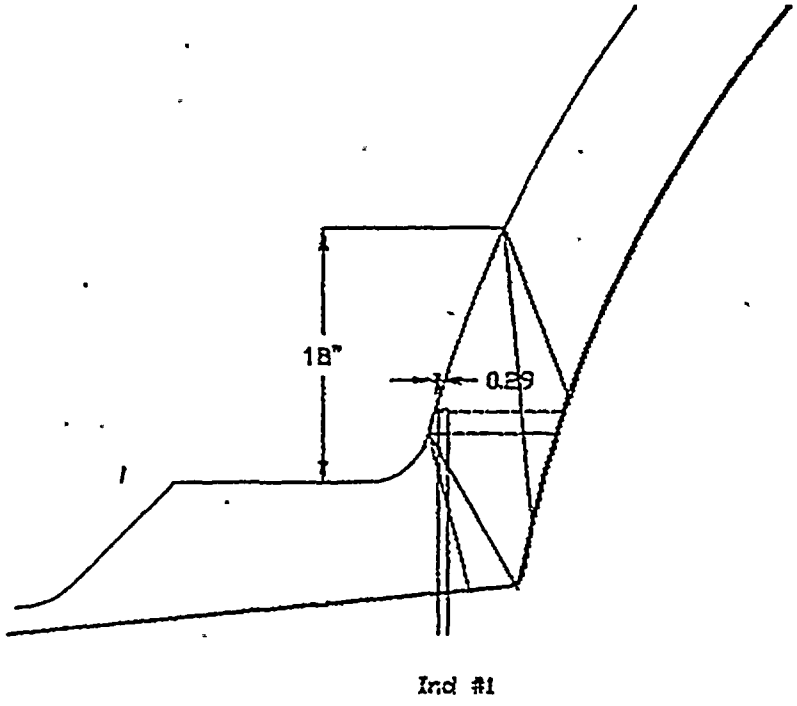
examination, is also included. The table contains two categories of indications, those that had been observed on previous code compliant examinations, and those that had not.

Of the five indications scheduled for OD examination in the 1997 outage, four (44-1, 48a-1, 48a-2, and 48a-3) were not seen previously on code compliant examinations. During this outage, the two with the highest amplitude, 48a-1 and 48a-2, were accessible. The results of the ASME code UT indicated no recordable indications. In addition to the examination conducted at code sensitivities, we also increased the sensitivity (gain) and re-scanned the areas for these indications. No evidence of a flaw was found in either area. These results, along with the fact that neither indication was observed during previous examinations, allow us to conclude that these two indications are non-relevant false calls, caused by transducer shoe lift-off often encountered during automated examinations over cladded surfaces. Based on the similarities of the four indications in this category, we also conclude that the remaining two lower amplitude indications, 44-1 and 48a-3 are non-relevant as well. There are no industry reports of failure, or instances of crack propagation, that occurred as a result of flaws that exist in the mid to outer region of the weld where all these indications would be located if they were not false calls.

Indications 49rr-1 and 50rr-1 were observed prior to the 1996 examination, and were also both observed using the enhanced 1996 data. Supplemental detection and sizing of 50rr-1 from the outside surface in 1988, 1990, and 1996 confirmed that the indication is acceptable and stable, and is most likely a slag inclusion, because slag inclusions were documented on this vessel during construction. Of the two, the enhanced data shows 50rr-1 to be 179% greater in signal amplitude and 261% greater in a/t% than 49rr-1. Based on the similarities of these two indications, and the comparison obtained from the 1996 enhanced data, we conclude that 49rr-1 is also acceptable and most likely a slag inclusion.

Based on the above, we have reasonable assurance that there are no safety or structural integrity concerns that have not been addressed. We are confident the alternative defined and provided in previous NRC correspondence, and supplemented by this document, provides an acceptable level of quality and safety.



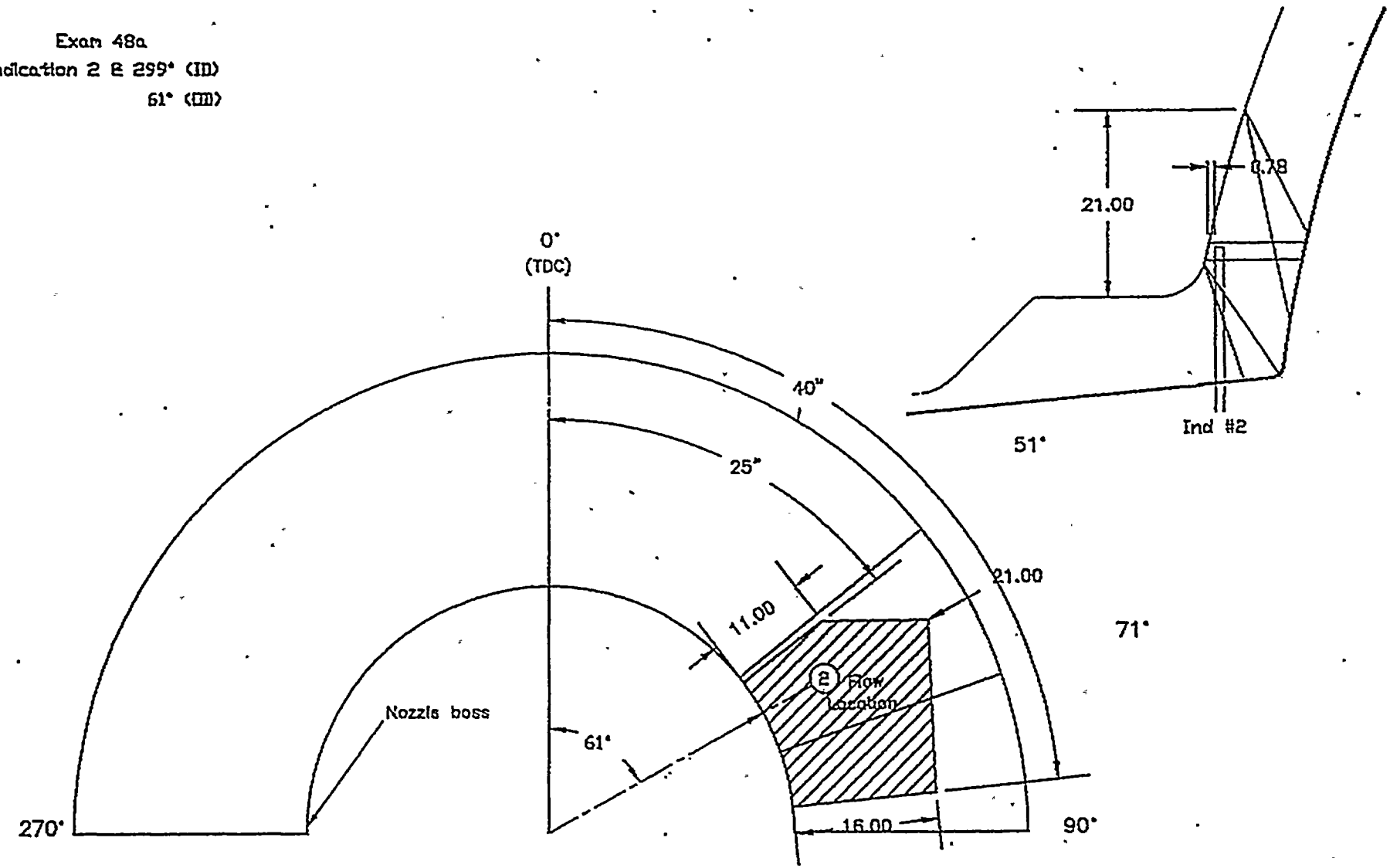


Insulation Removal and UT Coverage for
Inlet Nozzle 2-N4-I, Indication 1

Figure 1

D. C. Cook Unit 2
2-N4-I @ 67°
Nov 97
48A-116

Exam 48a
Indication 2 @ 299° (ID)
61° (ID)



Insulation Removal and UT Coverage for
Inlet Nozzle 2-N4-I, Indication 2

Figure 2

D. C. Cook Unit 2
2-N4-I @ 67°
Nov 97
48A_299

Exam #	44	48a	48a	48a	49rr	50rr
Indication #	1	1	2	3	1	1
Indication Azimuth on nozzle (deg)	334	116	299	352	1	293
a/t (%) *	6.2	14.8	5.2	6.7	6.2	16.2
Amplitude (% DAC) *	80	114	96	67	80	143
Seen in previous code exams? (year)	N	N	N	N	Y (1977 and 1988)	Y (1977, 1988, 1990 and 1996)
OD exam results	N/A	No recordable indication (false call)	No recordable indication (false call)	N/A	N/A	Code Allowable slag inclusion sized in 1988, 1990 and 1996
Final Disposition	False Call	False Call	False Call	False Call	Acceptable	Acceptable
Basis for Disposition	False call based on not seen during previous code exams and similarity to Indications 1 & 2, Exam 48a	Based on 1997 manual exam	Based on 1997 manual exam	False call based on not seen during previous code exams and similarity to Indications 1 & 2, Exam 48a	Slag inclusion is similar but less in amplitude and a/t than 50rr	Slag inclusion was sized less than code allowables

Table 1 - Ultrasonic Test Data and Final Disposition for the Unit 2 Nozzle to Shell Welds

* This ultrasonic data was obtained from the electronic enhancement of unit 2 nozzle to shell welds generated during the 2nd 10-year interval RPV exam and reported in SwRI report dated August 1996, Tables A & B