Florida
Power
CORPORATION

March 14, 1983
3F-0383-17

Mr. H. R. Denton, Director
Office of Nuclear Reactor Regulation
Attn: Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Subject: Crystal River Unit 3
Docket No. 50-302
Operating License No. DPR-72
Relief from ASME Section XI, Article IWB-2000

Dear Mr. Denton:

The current Inservice Inspection Program at Crystal River Unit 3 is based upon ASME Section XI, 1974 Edition through Summer 1975 Addenda.

This letter requests relief from Article IWB-2000, Table IWB-2500, Item B-D, "Full Penetration Welds of Nozzles in Vessels" of ASME Section XI, 1974 Edition. This Item requires a volumetric examination of the welds of nozzles in the reactor vessel. The 1974 Edition, paragraph IWB-2411, requires at least 25% of the nozzle inspections be completed by 3 1/3 years following the initial startup and 50% of the inspections be completed by 6 2/3 years.

In 1978, two of the six reactor vessel nozzles were thoroughly examined as described in the enclosed June 22, 1978, letter. This extensive examination revealed no rejectable defects. Thus, the required 25% of the nozzles have been inspected as required by the code. Continued compliance with the 1974 Edition requirements would require Florida Power to lease very costly ($75,000 to $100,000) ultrasonic equipment to perform two reactor vessel nozzle inspections. This inspection would also require significant personnel exposure (approximately 20 man rem). Finally, inclusion of this inspection into the Refuel IV schedule is expected to increase the total outage by several days. With due consideration given to the fact that Florida Power will be inspecting all remaining nozzles at the completion of the 10 year inspection interval and to the cost of performing these inspections twice (economically and radiologically), this requirement is considered overly restrictive. Thus, Florida Power requests that the remaining reactor vessel nozzle inspections be deferred until the end of the 10 year inspection interval. A001

Florida Power Corporation does plan to perform a visual inspection of the interior vessel cladding which includes the interior of the nozzle to vessel weld in accordance with ASME Section XI during the upcoming refueling outage.

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This relief request supersedes our relief request dated February 21, 1983. Florida Power asks that your response to this relief request be included with respect to previous Inservice Inspection relief request responses scheduled to be issued by your staff on or about April 29, 1983.

Florida Power Corporation has determined that this relief request involves a Class III amendment, per 10CFR120.22, in that it involves a single safety issue. Accordingly, the fee of four thousand dollars ($4,000.00) will be forwarded under separate cover letter.

Sincerely,

G. R. Westafer

G. R. Westafer
Manager
Nuclear Licensing and Fuel Management

PGH/caw

Enclosure

cc: Mr. J. P. O'Reilly, Regional Administrator
Office of Inspection & Enforcement
U. S. Nuclear Regulatory Commission
101 Marietta St. N.W., Suite 2900
Atlanta, GA 30303

Babcock & Wilcox

B&W Construction Company

Copley, Ohio 44321

Telephone: (216) 666-8841

June 22, 1978

Mr. Guy P. Beatty
Nuclear Plant Superintendent
Florida Power Corporation
P. O. Box 1228
Crystal River, FL 32629

Attention: S.W. Johnson REF: 192-072-007

SUBJECT: Reactor Vessel Inlet Nozzle Examination

Dear Mr. Beatty:

In performing the examinations on two inlet nozzle-to-vessel welds on the Crystal River 3 reactor vessel, the examination plan called for only a single scan of this weld from the bore of the nozzle. This scan called for the ultrasonic beam to be normal to the bore interface over the length of taper between the inside and outside surfaces of the vessel. This was chosen based on performing the examination at another facility which has a low angle taper in the bore and a different nozzle-to-vessel weld design. What was an exception became the standard.

The baseline examination on the Crystal River 3 vessel had revealed indications in one of the inlet nozzles. The baseline examination had been performed with the ultrasonic beam essentially normal to the weld axis. This was accomplished by providing a slight angle of incidence to the wall of the nozzle to refract the beam normal to the weld. The original inservice examination was off this angle by the angle of the bore (15°). Sufficient energy was not returned by any of the reflectors to detect the indications.

Upon investigation of the reasons for not detecting the reflectors, it was discovered that neither examination fully covered the entire examination volume due to the curvature of the vessel at the 3 and 9 O'clock positions and between these points on the nozzles. The normal illustrations used to represent the nozzle-to-vessel weld usually show the intersection at 12 and 6 O'clock positions where vessel curvature is not a problem.

The examinations from the bore should have included the two prior described angles as well as a 30° angle to the weld to pick up the remaining volume. This is illustrated in Figure 1 where the angles are shown for an outlet and inlet nozzle. All three angles are needed to completely scan the examination volume. At Crystal River, the initial evaluation showed that a sufficient beam path might not be available to calibrate to the depth of the examination volume from inside the bore for the 30 degree angle. It was decided to cover this area by using 45 and 60 degree beams from inside the vessel-normal to the weld using the nozzle belt vessel calibration block.

The examinations subsequently performed on two (2) inlet nozzles include four separate scans of the nozzle-to-vessel weld. The originally planned examinations included a normal scan to the nozzle taper which results in a beam intersecting the weld at 15 degrees off the weld centerline plane due to the nozzle taper. This examination was determined to be insufficient to cover the inlet nozzle-to-vessel weld since the inside radius of the nozzle screens the internal wall portion of this weld. The reexamination of this weld included a longitudinal beam directed normal to weld centerline plane plus a 45 and 60 degree angle beam directed at the weld centerline plane from inside the surface of the vessel. These latter examinations cover the portion of the weld missed in the normal to nozzle taper examination.

The results of the original examination at a 15 degree angle to the weld did not reveal any of the three (3) indications originally found in the baseline examination of the inlet nozzle-to-vessel weld between the Z-W axes of the vessel. The subsequent examination with the normal to weld beam revealed two (2) indications which exceeded 50 percent of reference level and seven (7) other indications which exceeded 20 percent of the reference level. The three (3) baseline indications exceeded the reference level with the largest being 125 percent. All indication defect dimensions are acceptable to the defect standards of the 1974 Section XI Edition including addenda through Summer 1975.

The indication locations from the baseline are plotted in Figure 2. The reference system used in the first automated system (ARIS-I) for nozzles had 0 degrees at the top of the nozzle and proceeded clockwise to 360° at the zero position. The three (3) indications were located at 13.3, 247.9, and 284.0 degrees as shown in Figure 2. The calibration block used for these examinations was 40705, a block mounted adjacent to the nozzle arm.

For the update to the 75 Summer Addenda, a new calibration block was fabricated. This block (40757) was from a heat of A 508-64 Class 2 material (nozzle dropouts) while the base-line block was plate material. This calibration block had longer beam paths for calibrations from the nozzle bore and vessel flange and was the same material as in the vessel.

The nine indication locations on the nozzle for the inservice examinations are shown in Figure 2 for the reference system used on the second generation automated inspection device, ARIS-II. This system uses a different reference system with 0 degrees at the bottom of the nozzle and clockwise rotation being degrees positive and counterclockwise being degrees negative; 180 degrees positive and negative are the same point on the top of the nozzle. The nine (9) indications detected are plotted in Figure 2 along with a smaller indication. The location of the indications exceeding 20% DAC are -167.9; -130.1, -124.3, -87, -47, +47.4, +70.4, +85.8, and 130.3 degrees with a 15% DAC indication at 104 degrees. This latter indication was found after the 20% indications were plotted and no indications appeared corresponding to this reference location. Although the reference level of the indications vary from baseline to inservice, the locations of baseline indications are confirmed with indications located which correspond to the same positions. However, the inservice indications do not correspond in amplitude with the baseline readings. Indications on the baseline and inservice inspections are located in depth near the root of the weld near the mid plane. Figure 1 illustrates the weld preparation.

In the operation of the nozzle arm on the ARIS-I device, no provision was available for maximizing the beam angularity perpendicular with the calibration holes. This provides the possibility of the examination to be overly sensitive, but on the conservative side. The feature to maximize the calibration hole indication on the ARIS-II device is included. We believe that this feature accounts for the difference in sensitivity between the baseline and inservice examinations.

The 45 and 60 degree subsequent inservice examinations to cover the inner portion of the weld are illustrated in Figure 3. Only one small indication was detected with these angle beams and it was acceptable.

All indications were calculated to be within the acceptance standards of Section XI. In addition, 20% to 20% DAC lengths and through-wall dimensions of the indications were used in calculating acceptability and these dimensions were also acceptable.

The changes in calibration blocks and equipment have resulted in the differences observed.

If you have any questions, please contact me.

Sincerely yours,

Frank J. Sattler, Manager
Inservice Inspection

FJS:ems
Enclosures

cc: R.L. Allison
C.R. Honeycutt
C.D. Thompson

bcc: M.D. Anderson
E.G. Blackstone
T.F. McDermott
R.A. Michalski
L.W. Syverson
G.A. Terning
F.G. Whytsell

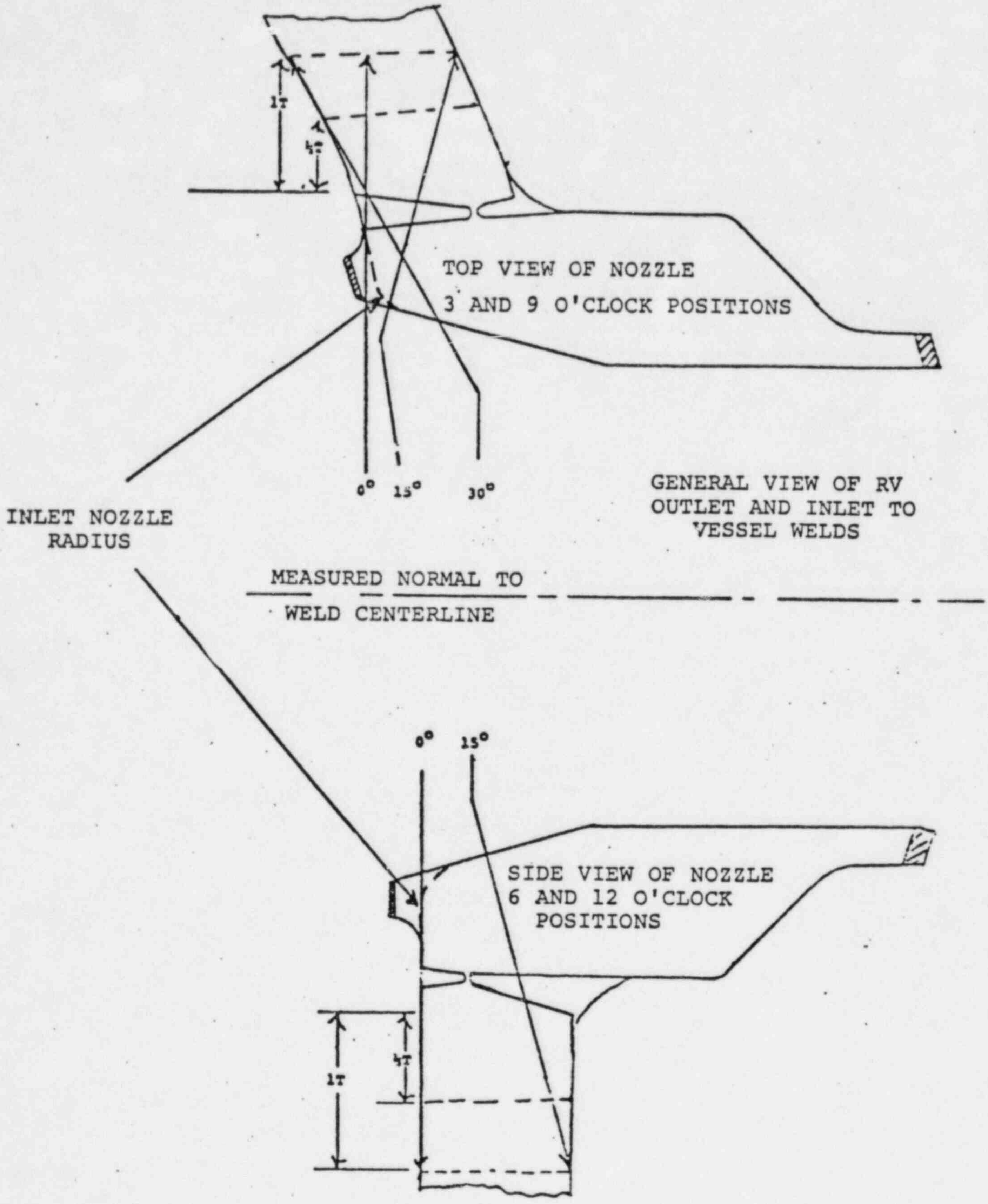
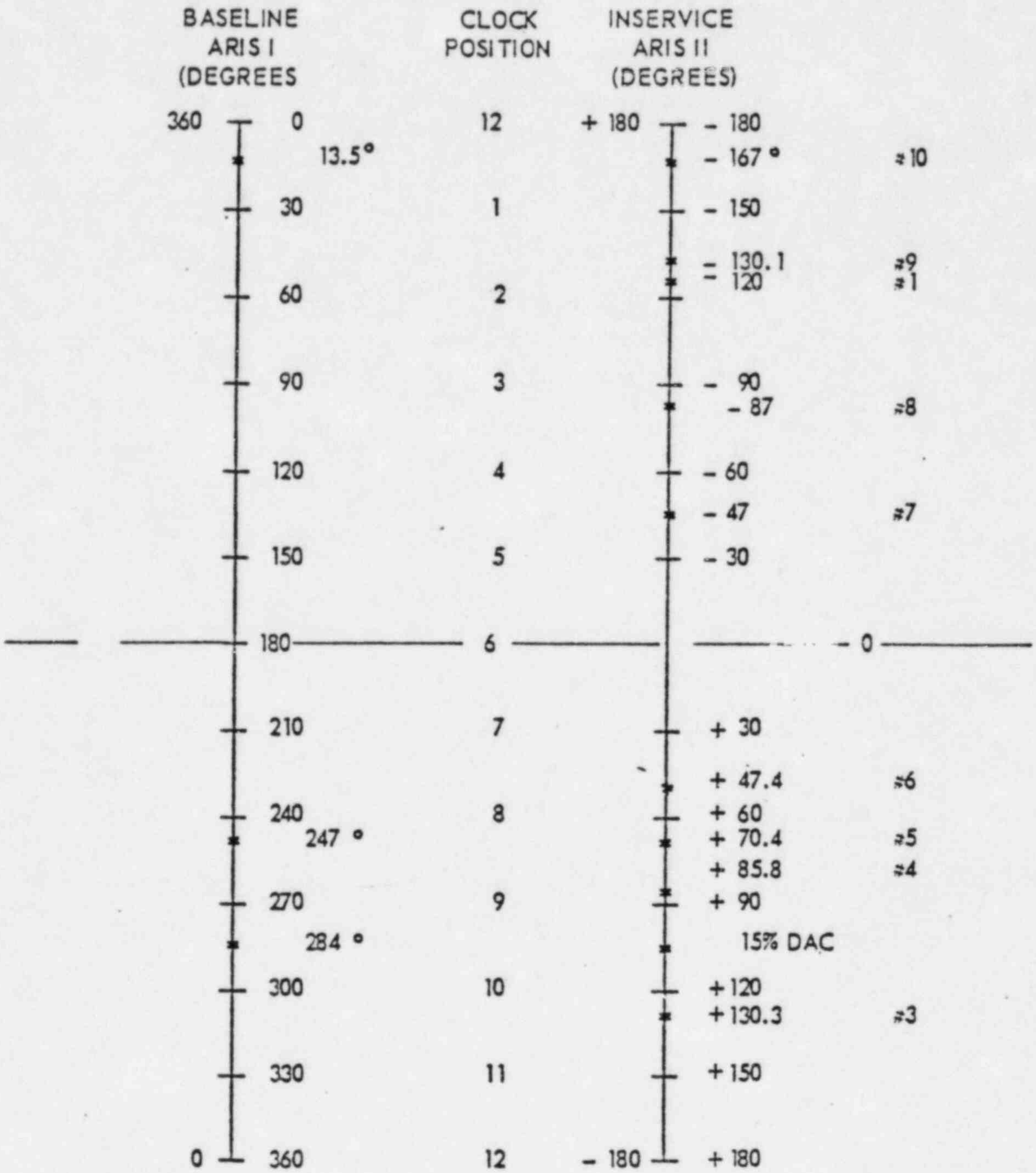


FIGURE 1 - ILLUSTRATION SHOWING ANGLES NEEDED TO COVER NOZZLE-TO-VESSEL WELD ON B&W 177FA VESSELS



COMPARISON OF BASELINE AND INSERVICE INDICATIONS FOR THEIR RELATIVE CLOCK POSITIONS IN INLET NOZZLE BETWEEN Z-W AXES.

FIGURE 2

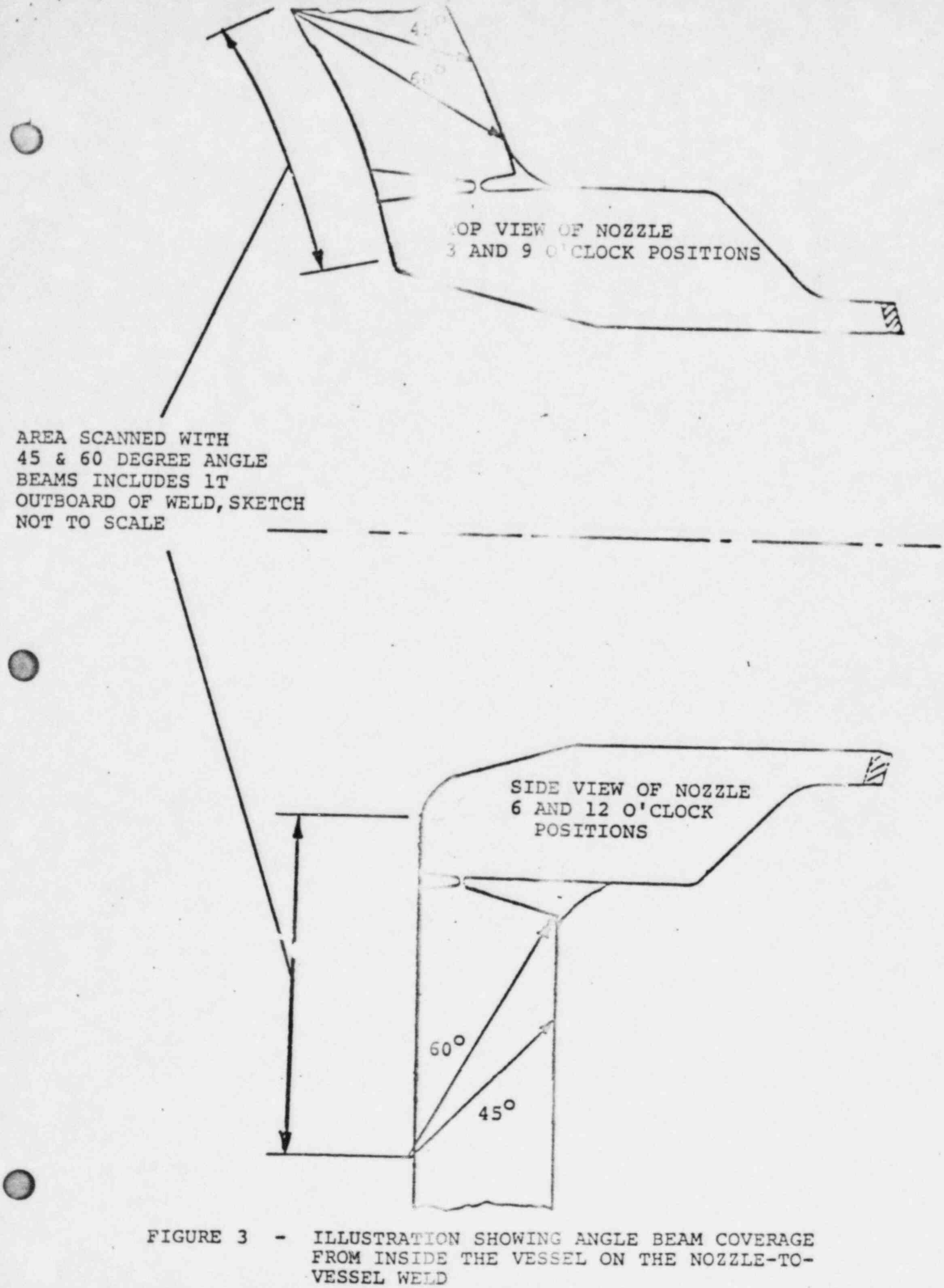


FIGURE 3 - ILLUSTRATION SHOWING ANGLE BEAM COVERAGE FROM INSIDE THE VESSEL ON THE NOZZLE-TO-VESSEL WELD