William J. Cahill, Jr.
Vice President

Consolidated Edison Company of New York, Inc.
4 Irving Place, New York, N Y 10003
Telephone (212) 460-3819

November 9, 1970

Re Indian Point Unit No. 2
Docket No. 50-247

Dr. Peter A. Morris, Director
Division of Reactor Licensing
U.S. Atomic Energy Commission
Washington, D.C.

Dear Dr. Morris

Your letter of October 21, 1970 requested a report of our analysis of various ultrasonic tests recently performed on the Indian Point Unit 2 Pressurizer. As you know, Con Edison had voluntarily committed to perform inspections on the Indian Point Unit 2 plant in accordance with the recently issued 1970 ASME Section XI Code "Inservice Inspection of Nuclear Reactor Coolant Systems" consistent with plant design limitations. The field tests performed on the pressurizer and discussed herein are a result of that commitment.

This letter summarizes the various inspections performed on the pressurizer, concludes that the pressurizer is adequate for its intended service and provides a commitment for continuing assurance via periodic tests.

Table IS-261 of ASME Section XI requires a visual and volumetric inspection of pressurizer longitudinal and circumferential welds during the plant lifetime. The intent of this inspection is to verify that the pressurizer welds are maintained throughout the plant lifetime in a condition which is consistent with original inspection acceptance standards. An additional benefit of this inspection is that early changes in weld material could be detected. These changes could be indicative of conditions which would warrant further evaluation.

Paragraph IS-213.2 of ASME Section XI references ASME Section III Appendix IX, paragraph IX-340 for the appropriate ultrasonic inspection techniques to be utilized.

3840

Paragraph IX-342 requires an angle beam inspection of the welds as described in paragraph IX-345. Paragraph IX-344 requires that prior to performing the inspection of the weld the adjacent plate base material be ultrasonically scanned with a straight beam method as delineated in paragraph IX-346.

The intent of this straight beam method is simply to ascertain whether or not the base plate material may contain reflectors which have to be considered in the interpretation of the angle beam insection of the weld. The detection of base plate material reflectors is not a basis for rejection of the base plate material. These guidelines are clearly specified in paragraph IX-344 of ASME Section III.

In accordance with the specified code requirements a straight beam ultrasonic scan was accomplished on accessible pressurizer horizontal and vertical welds.

The cylindrical portion of the pressurizer was fabricated from four smaller cylindrical sections. Each cylindrical plate section consists of $4\frac{1}{4}$" thick SA 302 grade B steel. The original plate dimensions prior to rolling were $129\frac{1}{2}$" by $281\frac{1}{2}$". Each plate is cut to size, rolled, the weld end preparation machined, and the two opposite sides are welded to form a cylindrical section. The cylindrical sections are in turn welded end to end to form the cylindrical portion of the pressurizer. During the fabrication sequence 3/16" thick stainless steel cladding is applied to the inside surface of the pressurizer. There are therefore four vertical weld seams formed in the cylindrical portion.

During the base plate ultrasonic scan of the second vertical weld seam from the bottom head of the pressurizer some areas were recorded as producing a 100% loss of back reflection amplitude. The largest continuous connected area consisted of approximately 25 square inches at apparently the same plane encompassed in a 40 square inch rectangle whose largest dimensions were 10 inches by 4 inches. The center of the area was located approximately 90 inches from the lower weld of this cylindrical section. Other readings along the weld seam on the same side of the weld indicated areas where 50% to 100% loss of back reflection occurred for about 10 inches along the plate. Beyond the 10 inch width the back reflection was again present to full calibrated screen height. These readings within the 10 inch width would have affected the interpretation of the angle beam weld inspection.

This same plate was inspected on the opposite plate edge on the other side of the weld and along the accessible horizontal plate edge. No other indications were found which would affect the interpretation of the weld inspection.

A review of ASME Section III requirements regarding plate ultrasonic inspection standards was made. The 1968 Section III in paragraph N-321.1 specifies that continuous total loss of back reflection accompanied by indications on the same plane that cannot be encompassed by a 3 inch or greater diameter circle is unacceptable.

It was not obvious therefore at this time that the base plate material met applicable code and specification requirements. A review of available records and additional ultrasonic tests was then accomplished to clarify the issue further.

The plate was manufactured in accordance with ASME Section III. The requirement for ultrasonic testing the plate was specified in Westinghouse Specification NP-UT-1 which was based on ASME code case 1338-2. The code case 1338-2 by referencing ASTM SA-435 requires that the plate be ultrasonically scanned along 12 inch grids and a 3 inch wide path along each edge. The Westinghouse specification exceeded the ASME code requirements by specifying a 100% surface scan. The criteria for rejection was based on 100% loss of back reflection in a 3 inch diameter circle consistent with code case 1338-2.

The records of the original plate ultrasonic inspection were reviewed. This plate inspection was performed on the flat, unrolled, unclad plate. The test performed on the plate at this stage of manufacture met applicable code requirements. These records indicate that the plate did not contain any areas with 100% loss of back reflection and therefore met applicable code requirements. The specification NP-UT-1 consistent with code requirements did not require recording of all ultrasonic indications. However, the UT records did indicate two areas where loss of back reflection did occur and which were recorded. These readings are in the general vicinity of the 25 square inch area discussed previously. The readings indicate only a 30% and 10% back reflection amplitude which meets code requirements but which indicates that the plate contained some reflectors.

Additional ultrasonic tests were conducted in the field to clarify the conditions within the plate and to determine whether or not the plate was consistent with code requirements. One test was intended to demonstrate the effect of cladding on back reflection reductions. The other test was intended to clarify whether the indications were in fact one continuous lamination or discrete indications at various levels.

The ultrasonic equipment was calibrated per the straight beam technique of Paragraph N-320 of the ASME Section III 1968 code. The calibration block utilized was a flat block of the same material and thickness as the pressurizer plate except that it did not contain any cladding. The transducer was then placed on the clad and rolled pressurizer in a number of areas which were known not to contain any intermediate reflectors. The amplitude of the back reflection was decreased when the transducer was placed on the pressurizer to 1/3 of its amplitude on the flat unclad calibration block.

This test demonstrated that cladding and rolling by itself disperses the sound waves sufficiently to reduce the back reflection by about 2/3 of its amplitude. A small back reflection prior to cladding could therefore be reduced to insignificant back reflection after cladding. The combined dispersal effects of cladding, rolling and intermediate reflectors would reduce back reflections further. There is therefore no inconsistency between the 100% loss of back reflection reported in field tests and the plate ultrasonic test records which indicate areas less than 100% loss of back reflection. The available records demonstrate that original code requirements were met.

Another ultrasonic test utilized a 5 MHZ transducer. This higher frequency transducer facilitated a clearer definition of the intermediate reflectors which were originally recorded as located on approximately the same plane. Scanning the pressurizer with the 5 MHZ transducer and a straight beam technique demonstrated that the reflectors were short, separated from one another and at different depths within an approximate 3/4" band in the center of the plate. This test demonstrated that the pressurizer plate material did not contain continuous indications in the same plane and therefore the plate material is consistent with the present ASME Section III requirements related to this area.

A third ultrasonic test was performed for informational purposes, using both a 45° and 60° angle beam. The intermediate reflectors were easily seen with the beam perpendicular to the rolling direction but were practically invisible with the beam directed parallel to the rolling direction. These results confirmed earlier conclusions that a number of very short stringer type reflectors rather than a continuous laminar reflector were the source of ultrasonic indications. There was no evidence of through-wall components indicative of "linking up" of smaller inclusions.

Finally the original radiographs of the weld joint adjoining this plate edge were reviewed. The radiographs were taken prior to and after cladding of the plate. There was no evidence of any discontinuities in the base plate material. In addition the weld joints met applicable ASME Section III requirements.

Westinghouse indicates that the stringer type indications are probably maganese sulphides that occur regularly in plate material as a result of the solidification mechanics in the ingot and subsequent rolling mill operations. These inclusions are parallel with the plate surface and do not have a non parallel component. Our consultants, Southwest Research, agree with this conclusion and conclude that there should be no concern about the serviceability of the pressurizer.

In summary, Con Edison's investigations have shown that the Indian Point Unit 2 pressurizer meets the applicable ASME code requirements and is therefore adequate for its intended service. However, to provide continuing assurance in this regard we will provide removable insulation in this area for the specific purpose of periodic ultrasonic monitoring to detect potential changes in ultrasonic indications during the plant lifetime.

Very truly yours

William J. Cahill, Jr.
Vice President

gw.cw

CC: Messrs. H. G. Woodbury
T. A. Griffin
A. E. Upton

FROM: Consolid[illegible]d Edison Company New York, [illegible].Y. 10003 William J. Cahill Jr.	DATE OF DOCUMENT: 11-9-70		DATE RECEIVED: 11-12-70		NO.: 3640
	LTR.: X	MEMO:	R[illegible]T:		OTHER:
TO: Dr. Peter A. Morris	ORIG.: 1	CC: 22	OTHER:		
	ACTION NECESSARY ☐ NO ACTION NECESSARY ☐		CONCURRENCE ☐ COMMENT ☐		DATE ANSWERED: BY:
CLASSIF: U POST OFFICE REG. NO:	FILE CODE: 50-247 - miss Applic.				

DESCRIPTION: (Must Be Unclassified)

Ltr re our 10-21-70 ltr.... submitting summary of various inspections performed on pressurizer for Indian Point Unit #2 re 1970 ASME

ENCLOSURES: Sec. XI Code, Inservice Inspection of Nuclear Reactor Coolant Systems...

REFERRED TO	DATE	RECEIVED BY	DATE
Muller w/9 cys for ACTION	11-12-70		
DISTRIBUTION:			
Regulatory File			
AEC PDR			
OGC-RM P 506A			
Compliance (2 cys)			
H. Price & Staff			
D. Thompson			
Morris/Schroeder		DO NOT REMOVE	
Skovholt			
DeYoung		ACKNOWLEDGED	
Boyd			
DTIE(Laughlin)			
NSIC(Buchanan)		3640	dhl

REMARKS:

U.S. ATOMIC ENERGY COMMISSION

MAIL CONTROL FORM FORM AEC-326S (8-60)

☆ U.S. GOVERNMENT PRINTING OFFICE: 1970-382-148