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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

In the Matter of:

CONSOLIDATED EDISON COMPANY OF NEW YORK

INDIAN POINT NUCLEAR GENERATING PLANT, UNIT NO. 2

POTENTIAL IP-2 REACTOR VESSEL FLAWS

OPEN MEETING

Location: Bethesda, Md. Pages: 1 - 93

Date: Saturday, August 11, 1984

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

AUGUST 11, 1984

CONSOLIDATED EDISON COMPANY OF NEW YORK

INDIAN POINT NUCLEAR GENERATING PLANT

UNIT NO. 2 (IP-2)

DOCKET NO. 50-247

POTENTIAL IP-2 REACTOR VESSEL FLAWS

The attendees met, pursuant to notice, at 1:10 p.m.

Appearances

On Behalf of NRC

P. Polk
R. Vollmer
W. Johnston
G. Cainas
B. Liaw
W. Hazelton
J. Durr
K. Cook
W. Flach
W. Clayton
C. Cheng
S. Varga
J. Muscara
M. Humm
E. Sullivan

On Behalf of Westinghouse

D. Adamonis
B. Lefevre
D. Kurck
M. Weaver
W. Bamford
D. Meennis
T. Timmons

On Behalf of Consolidated Edison

R. Spring
J. O'Toole
C. Jackson
G. Wasilenko
S. Rothstein
G. Groscup
M. Marine
J. Fox
J. Houstcup

PROCEEDINGS

MR. VARGA: Good afternoon. My name is Steve Varga. The purpose of this meeting is to have Con Ed discuss with us their evaluation and, as appropriate, whatever conclusions they have come to regarding the vessel indication, reactor vessel indication that was discovered during their normal ten-year ISI inspection that was taking place.

This particular identification or indication, as I understand it, was identified like on August the sixth. So without any further introductions, unless someone else has an introductory statement, I'd like to turn the meeting over to John O'Toole from Con Ed.

MR. O'TOOLE: Thank you, Steve. We have with us today a team, as you've observed from going around the table, a team consisting of Westinghouse, Combustion Engineering, and Con Edison.

The Con Edison team is primarily representing the engineering Con Edison. Both Gary and I represent engineering.

We've got Charlie Jackson, who is the vice president of nuclear power, and it's his responsibility to run the plant.

So there are three officers of the company here who have a very vital interest in the matter to be

discussed. I want to thank Steve and the other members of this staff who have cooperated with us in our desire to bring you to a very short-notice meeting.

We naturally have a very great interest in moving on with the outage that we're in the middle of now, and that interest is to the tune of over $500,000 a day, more than $600,000 a day, which you always face when you have a nuclear unit out of service.

Nonetheless, we recognize your responsibility to your superiors to make sure that what we're going to tell you today is the right story and it's technically sound and will stand the light of day. We plan during the meeting to convince you of this.

Primarily what we hope to do is let Westinghouse, who has the contract holder responsibility for the in-service inspection of the reactor vessel, to tell the story.

To assist Westinghouse and to satisfy our curiosity for an independent and qualified check of what Westinghouse did, we've asked Combustion Engineering, who were the manufacturers of the reactor vessel, to independently assess the methodology they used and the results they obtained.

So we'll hear from them along with Westinghouse. Our role, Con Edison, will be primarily as discussers

and observers, like your role. We'd like to depend on Westinghouse and CE to carry the ball for us.

Now I think first of all, we might want to discuss briefly, Gary, why we came to the point of investigating this particular indication as opposed to other possible things to investigate during this inspection.

The only indication we obtained in the inspection was this, that you're going to hear about today. And I think that I'll let Gary introduce that for you.

MR. GROSCUP: Gary Groscup. The ISI investigation has been under way for some time. Westinghouse acting under contract to us, was conducting that investigation.

The initial phases of the investigation were conducted using the methodology and techniques that are of common practice in such an investigation.

And out of that investigation came an apparent indication. At that point, we did a number of things in parallel, one of which was to solicit the independent judgment of Combustion Engineering and to, one, give us an independent technical assessment of the technical correctness of the approach that Westinghouse was recommending to be used to further define the indication, and, secondly, to participate in any

additional thoughts or ideas or methodology that could be used to more accurately or correctly define what we had.

That was done. There was a more specific approach used, which helped us to further identify what it is we had.

And based on that technical approach, Westinghouse and Combustion jointed approved that we have a situation that is certainly well within the acceptable criteria.

And so we are at this point, feel that we have a disposition of the original indication based on more improved instrumentation utilization, and some independent testing.

I think we should move now quickly, and get into the specifics.

MR. VOLLMER: Let me ask one question first. Dick Vollmer. When did you bring Combustion into the process?

MR. GROSCUP: The date is...I don't remember the date, but it was...was it Monday?

AUDIENCE MEMBER: Monday.

MR. GROSCUP: He says Monday. But it was at the point in the sequence of things when we had identified the indication.

And it was at the point where we, you know, had an indication that we wanted to really bore in on and as using methods that were technically correct, technically sterile, if you will, in an approach that would more accurately define what we had.

MR. VOLLMER: I'll let Combustion speak for themselves, but did they do independent measure widths, or just evaluation of the data already taken?

MR. GROSCUP: It was the latter. So with that, Don, if you would...

MR. ADAMONIS: Don Adamonis, Westinghouse. What I plan to do here is summarize the results of the initial vessel examination in this area, then describe the additional evaluation and investigation that was done.

Everyone see these? During circumferential scanning of the circumferential seam joining the intermediate-to-lower shells, we detected an indication.

The indication was detected with both 45 degree transducer, scanning and opposite circumferential directions, both 60 degree transducers with scanning and opposite circumferential directions.

When the indication was plotted, it would found to be located at the 345 degree vessel axis, 345 and a half, actually.

And it was found to be located three inches below the circumferential seam joining the intermediate-to-lower shell.

MR. VARGA: Where in respect to the vertical seam?

MR. ADAMONIS: I'm getting to that. I've got a view-graph here that shows it. On plotting this indication, we find that it lies in the vicinity of the location of what we refer to as weld number 12, with the lower shell longitudinal seam on the 345 degree vessel axis.

The next slide is a computer graphics representation of only the peak amplitude plots.

AUDIENCE MEMBER: Isn't that upside down?

MR. ADAMONIS: I'm sorry. Only the peak amplitude plots. That indicates obviously the detection occurred during scanning of the adjacent base material on the lower shell side.

This indication was again verified during subsequent scanning of that (inaudible). What I'm showing here are the vessel outside surface, vessel inside surface, and ray plots of the peak amplitude locations for transducers 22 and 24 on these lines, which represent 45 degree sheer waves examination in the clockwise case of TR24, and the counterclockwise in the case of TR22 directions.

TR25, transducers 25 and 26, are 60 degrees sheer wave examinations being conducted. It's again in the clockwise-counterclockwise direction.

The initial data plots seem to indicate that there were perhaps a number of reflectors causing the indication. We have subsequently done investigations that would indicate that these are only one.

The plots were made assuming pure 45 and 60 degree sheer wave angles, not considering any effects of the plotting that might change those angles slightly.

MR. HAZELTON: Don? Don?

MR. ADAMONIS: Yes.

MR. HAZELTON: Did you get indications on all those four scans?

MR. ADAMONIS: Yes.

MR. HAZELTON: All four scans showed some?

MR. ADAMONIS: Yes. I have the amplitude marked here. I'll need to bring them up a little bit, perhaps, for you to see them.

The reflector seemed to be preferentially angled to get maximum response with the 60 degrees scanning in the counterclockwise direction.

Amplitude on that was 100% DAC plus 15dB, the amplitude of the 45 degree scanning in the same direction was 100% DAC plus 6dB.

TR24, which is a 45 scanning in the clockwise direction was 100% DAC. TR25 was the 60 degree scanning 'n the clockwise direction, 63% DAC.

MR. HUMM: Are you planning to describe the array as marked?

MR. ADAMONIS: I can show you on a chalkboard sketch or ...I don't have a...

AUDIENCE MEMBER: Are we going to get a copy of this?

MR. ADAMONIS: Yes. This is only a array diagram. It's included in the packet, showing the areas of location where the transducers were located when they made their peak.

AUDIENCE MEMBER: There's a chalkboard behind the screen.

AUDIENCE MEMBER: Do we have a sketch?

MR. ADAMONIS: Of the array?

AUDIENCE MEMBER: There's a chalkboard behind the screen there.

MR. ADAMONIS: It might be helpful if I had the drawing.

AUDIENCE MEMBER: Do you want the technique sheet?

MR. ADAMONIS: Well, if I had a sketch of the array, we could...

(Simultaneous conversation.)

MR. ADAMONIS: What we have is an array of...I'm looking in the face of the array.

(Simultaneous conversation.)

MR. ADAMONIS: The transducer...I'm going to show you the array if I'm standing inside the vessel looking.

I'm standing out of the vessel wall, looking at the array face.

(Mr. Adamonis draws on chalkboard.)

We have an array of 15 transducers, all...I had to count them myself...all doing examinations essentially through a multiplex system.

Transducer TR20 is a straight beam transducer channel. 21, 23 are 45 degree sheer scanning vertically in the vessel plane.

26 and 28 are 60 degree sheer scanning vertically in the vessel. 32 and 30 are full face, again, vertically in the vessel.

The transducers of interest are along this line. TR27 is our 60 degree scanning circumferentially with respect to the vessel, as shown earlier in the clockwise.

22 is a 45 clockwise direction. 24 is a 45 counterclockwise direction. 25 is the 60 degree counterclockwise direction.

MR. JOHNSTON: Don, this is Bill Johnston.

MR. ADAMONIS: Yes, sir.

MR. JOHNSTON: After you did this scan and saw that you were doing circumferential scan, did you then go down the longitudinal weld on a separate scan mode, or is all of the information so far...

MR. ADAMONIS: Yes, the circumferential scan is one routine. When we did the examination of the long seam, which is the next routine we did, I believe, we also found the same indication of the same types of amplitudes.

MR. JOHNSTON: Were you using the same transducers?

MR. ADAMONIS: Same array and same calibration. The calibration was performed on a nine-inch thick caliberation standard.

Both welds...all the welds in the intermediate and lower shell and the surface seam joining the intermediate-to-lower shell are about 8.9 inches thick.

So the same calibration on the same block was appropriate.

So if I just took a cut through the array plate, through this plane, opened it up and looked at it, I would see TR27, transducer 22, transducer 20, 24, and 25.

If one drew an array diagram down the inside

surface of the vessel, that's essentially what we'd see. Is that clear?

Initial work to dimension the reflector was conducted to 50% the distance amplitude criteria. The transducer 27 enveloped...results with transducer 27 enveloped the results of all other transducers and doing our calculations, 50% DAC criteria, we came up with a 2a dimension of 2.03 inches, and a length of 1.96.

Effectively, the reflector was being sized at 21dB drop points when one considered the peak amplitude. Maximum amplitude points, probably talking on the order of 1.08 inches.

When we corrected the size based on beam spread determination in the vertical plane, determined a 2.4 degree half angle, the 2a dimension was 1.2 inches, the length would stay at 1.96 inches, the lower extreme of that reflector was located a quarter-inch from the outside surface.

The initial investigation indicated that it intersected the surface.

I guess this is where John Fox joined in, and perhaps he'd like to say a few words about your review of the information at that point.

MR. FOX: My name is John Fox, Combustion

Engineering. I was essentially hired by Con Ed to be independent evaluator of the data taken to date.

What I plan on describing is the mode in which I operated and the conclusions that I drew and steps that I drew them at.

The first is to give you some historical information, on 8/6, I was notified that Westinghouse had reported on their initial evaluation of the reactor vessel an indication that was to be further evaluated, or there was an indication that was detected in the detection mode of the examination.

I was requested by Con Ed to provide myself access to that data, evaluate that data and give them recommendations on, number one, the correctness of the data, the data taken to date, and number two, the conclusions that had been drawn from the data that was taken to date, and number three, which came at a later point in time, what further or, rather, an independent conclusion as to whether, if they performed additional testing, that that additional testing would give us the type of information that we were looking for. Okay?

In other words, a conservative viewpoint as to whether or not this indication was being analyzed correctly. Okay?

On 8/7, I traveled to Pittsburgh to access the data

which the preliminary data, or the computer plotting of the data had been performed on 8/6 to provide me with that information on 8/7 so that we could have generalized discussions, to familiarize myself with the techniques that were being used, the description of the transducers as Don has gone through here, to familiarize myself with the tool and to familiarize myself enough to assume that the data had been taken correctly, or the correctness of the data taken to that point.

Can everyone read that? There are hand-outs passed around that duplicates this information. This will be summary type of information.

Please interrupt me if you need to to discuss the details of this as necessary to draw your own conclusions.

Phase I. In Phase I, I essentially described the results of my observations through the morning of 8/8, which is the evaluation of the Section XI exam data taken to that point in time. Okay?

This record was RPV exam data for ten-year ISI on Indian Point Unit 2. Phase I was a review of that Section XI data specifically at the region of Vessel Elevation 236 inches at 345 degrees.

I want to make clear the point that the data that I

was reviewing was the data that surrounded the indication in question. Okay?

So I'm not speaking for the correctness of the rest of the vessel. Let's assume that there was no reportable indications in the rest of the vessel. It is this specific one.

Okay. To first indoctrinate myself, we went through the discussions of the techniques that we utilized and essentially the plots of the indication that had been performed to date.

Included in that was a review of the videotaped A-scan presentation performed on all transducers, both clockwise, counterclockwise, zero degree, and I availed myself to the information looking perpendicular to the reflector.

Each one of those contained independent information that needed to be analyzed to draw a separate conclusion.

Based on the testing that had been performed at that time, I came...well, let me introduce Phase II. Phase II occurred after that date, in which I made recommendations for recommendations to Con Ed as to where to proceed past the Section XI initial detection mode.

When I talk about the review of the Section XI exam

data at the indication in question, I arrived at several conclusions that I relate to Con Ed.

The end conclusion, essentially, these are separate conclusions. The end result of these conclusions was a recommendation to do further testing.

In other words, the data that had been taken to date in the detection mode was not accurate enough to draw conclusions about that reflector. Okay?

And that conclusion was arrived at on the morning of 8/8, by noontime on 8/8.

The indications...these are my separate conclusions. The indication has to be considered, based on the information I had, as a surface connected planar indication.

The indication in question at this point in time should also be concluded as being multiple indications, in the fact that there was different circumferential position on the reactor vessel for each separate transducer.

Therefore, you could not lump some of these indications as being one single indication at this point in time. In order to do that, further testing had to be performed.

By using non-code and Reg Guide, this is essentially manipulating the data in a non-code and a

non-Reg Guide fashion.

The best that could possibly be achieved with the 60 degree, the 45s and the 60 that was looking in such, as Don brought out, the ones with the lower amplitudes, the indication in question was the one that was performed with a 60 degree that had a 200 plus 9 dB response, okay.

And that one was far enough away from the rest of them to be considered separately. That indication, when considered separately, was the one that was arrived at as being a 1.2 inch depth, or 2.0 inch depth, depending on whether you use the beam spread subtraction or the raw data itself.

In performing non-code and Reg Guide type manipulation of that data, what I'm talking about is to lower bound the indication.

This is a non-conservative viewpoint which arrived at the fact that that indication was, in fact, smaller than the transducer beam, and therefore, could not be accurately sized with the 60 degree transducer. Okay?

So my conclusion was that further testing is required. What allows me to perform the third conclusion was the sense that in viewing the presentations, they differed slightly from the plot in that the indication could be considered to be peaking

or the maximum of the indication should be considered at or near the OD surface, that in performing the calibration on the code calibration standards, rather than an angle of 60 degrees, the beam spread, without the beam spre. essentially the nominal angle was 56 degrees.

So all the data needed to be adjusted to down to 56 degrees. Those indications which essentially that portion of the indication which went outside of the OD surface, should then be enveloped back into the reflector, resulting in an overall size of .6 inches.

The transducer that was used to find this indication was a 1.5 inch diameter .25 frequency transducer, yielding a fairly large beam size.

Historical information tells me that with something that is smaller than that beam size, I cannot accurately size it with conventional Section XI techniques with a beam of that magnitude. Okay?

At that point in time is when we said that further testing had to be performed to essentially disposition each and every one of these conclusions from an independent standpoint.

This is what I took as a very conservative viewpoint. Okay?

MR. CHENG: The first point on the multiple

indications, just did you use that conclusion from a different angle 45 and 60 degree?

MR. FOX: Yes.

MR. CHENG: And pointed out the different locations?

MR. FOX: Yes.

MR. CHENG: That could come from a single vessel? Is that possible?

MR. FOX: All of those things, there are many things that are possible to cause that result, but the most conservative conclusion would be that they were separate indications and should be treated as such.

That is a most conservative viewpoint. You can also say that you can group them all and they become a single volumetric indication, but the depth is still the same.

It might change it from a planar to a laminer. There's a lot of things that you could talk about involving that.

You could talk about the clamping redirection. You could talk about spreading of the sound beam. You could talk about all plate axis.

There are a lot of things that can result in that type of a conclusion, but the fact of the matter is that that conclusion is still drawn as a conservative

viewpoint, okay, which said that further testing had to be performed without any further documentation being given, okay?

MR. HAZELTON: This is Warren Hazelton.

MR. FOX: Yes, Warren.

MR. HAZELTON: Up to now, we haven't talked anything about how sure you are of the circumferential location of this.

Is it in the vertical seam? How close to the center of the weld is it? Or could it be in the heat affected zone? Did you look at their data from that standpoint?

MR. FOX: Yes, I did. Yes, I did. That's the reason that I drew the conclusion that it should be considered as multiple indications, because one of those indications would have put it on one side of the long seam, and the other indication would have put it on the other side of the long seam at or close to the fusion line.

And that was a 60 degree information.

MR. HAZELTON: But you felt that it was not likely that you had two separate indications, one on each side of the weld?

MR. FOX: I felt at that point in time I could not draw a conclusion that it was a single indication, and

therefore, further testing had to be performed if it was going to be analyzed as a single independent.

MR. HUMM: Did Westinghouse take data at three-quarter-inch indexes?

MR. FOX: Westinghouse took data up and down the reflector at half-inch indexes and at multiple passes, so the end result would be that they took data at smaller increments than a half of an inch.

MR. HUMM: Did they go past it initially and then come back and evaluate it?

MR. FOX: Yes, yes, they did.

MR. HUMM: On initial scan for detecting it, were they taking data in three-quarter-inch increments?

MR. KURCK: Mr. Fox, Dave Kurck of Westinghouse. The scanning is performed at three-quarter-inch increments during a normal exam sequence.

MR. FOX: Yes. I'm trying to ferret from Martin whether he is talking about the detection phase or the evaluation using the detection transducers.

MR. HUMM: No, I was speaking about the ability to perceive indication initially on first pass. I'm assuming that the data was taken at three-quarter-inch increments.

MR. FOX: My first observation of the indication was that it woke someone up.

(Laughter.)

MR. HUMM: Yes, I'm sure of this, but obviously on appearance, I was wondering conceptually, as they were scanning this vessel, if they were taking data at three-quarter-inch increments.

MR. FOX: Correct me if I'm wrong, but it was detected in two separate indexes with at least one transducer and that was multiple transducers involved, so it was detected numerous times.

MR. HUMM: That was because it was (inaudible) purely at a certain consequential scene, it may not have taken place.

MR. ADAMONIS: Don Adamonis. I don't understand.

MR. HUMM: I just wondered as such how you were doing the index, you know, under the initial scan.

MR. ADAMONIS: Don Adamonis again. When we're doing our circumferential scan routine, those scans are done, all transducers firing with three-quarter-inch steps.

When we do the longitudinal one and we'll sweep 180 degrees at one time and step three-quarters of an inch, then step, make another 180 degree sweep, continue on in that fashion.

When we're doing a long seam, we make the same sweeps only to cover the welds adjacent to the base

material on either side of the weld, which may be a distance of some 20 degrees on either side, so all transducers are covered properly. And again, step up three-quarters of an inch, make a counterclockwise sweep.

So essentially, that area was scanned twice, using essentially the same increment scan speed.

MR. HUMM: Did you go both circumferentially counterclockwise and clockwise?

MR. ADAMONIS: Yes.

MR. FOX: If we talk about the first conclusion a little bit, I'd like to describe that a little more in detail.

My concern over this separate single 60 degree indication was multiple, the first being the amplitude of the indication that was found was 200 plus 9 dB, which is above reference.

The report of notch amplitude was a lot less than that for the size of holes, and therefore, this was, if you will, considered to be a very high amplitude reflector in the detection mode.

And therefore part of the reason that it was so large was because of the sensitivity that it reflected at.

The other was that if it was indeed a OD surface as

the 45s and the other 60s showed it to be, at or near the OD surface, then why did it behave with the corner reflector, why did it not behave similar to the notch? Okay?

We have a lot of documentation on how a large transducer behaves to a volumetric reflector unbounded by a surface, i.e., the size of holes in the calibration standard.

But we have very little information about how a 60 degree transducer behaves to a corner reflector.

So therefore, one of the tests that was recommended to be performed was a scanning of, to mock up various OD configurations in a calibration standard, and to perform 60 degree evaluation of those surface type reflectors, to see if indeed the beam size on the beam dynamics could be reproduced with a surface type of discontinuity. Okay?

So at this point in time, we're in two phases, okay. We get into Phase II.

Phase II is a recommendation to Con Ed that they perform mock up type testing and second is to perform additional dispositional evaluations in the reactor vessel.

I'll stop at that point in time, turn it back over to Don. I'll let him criticize what I've said today

and to go forward with what he performed in Phase II, unless anyone has any further questions.

MR. ADAMONIS: In my description of the course of events earlier took us up to the Sunday, August 5th time frame.

During that day, we spent several hours looking at the reflector with several different angles, angulating our array plate.

And the results of that investigation were still inconclusive. We didn't feel as though at that point we had a good handle on what it was we were looking at.

By the following morning, Monday, we had developed a game plan which included looking at the area with another array plate, and needed to fabricate this array, design and fabricate this array.

And in discussion with Mr. Fox and Con Ed, we initiated the work on the calibration standard to look at the beam dynamics off of various notches.

So this two-phase investigation included establishing the effect of beam spread on, say, sizing a small notch on the outside surface of the vessel.

We looked at notches of various configurations, some with reflecting surfaces at 30 degrees, some at 45 degrees, some at essentially 90 degrees to the surface.

The striking bit of data that we were able to

collect was that at calibration, the 2% notch in the nine-inch Indian Point calibration block travelled to the extent that one would predict the indication to be, 1.68 inches deep, if one used 14 dB drop points.

Notches of the 30 and 45 degree configuration essentially revealed similar results in terms of depth. If we were to size those, we would come out with pretty much the same answers.

On the second phase, we manufactured a transducer array that would allow us to pitch and catch at 45 degrees through the part, and I'll show a view-graph which depicts that array.

It would also allow us to use a delta technique in the area of interest. And we plan to look at the area with 5 MHz straightening.

Again, this array of transducers gave us three capabilities, the capability to pitch and catch with transducers 22 and 24, the capability to transmit with either 24, and receive with 20, which is shown on TRO on this particular view-graph, or vice versa, the capability to pitch with 22, catch with TRO.

The initial work in the area was done with the 45 degree sheer assembly in a pitch-catch mode. We moved through the area of interest many times in order to determine if we'd see any effect that might be caused

by a large planar indication, or large planar reflector on the outside surface.

We went out to an essentially clean area of the plane. We saw normal variation in this response, either 22 transmitting, 24 receiving.

In the range, we set a nominal at 50% of screen height and the range would go from 15 to 20 to 80 to 90.

A multiple scan of this area, we could see no significant effect that one might expect if one had a two-inch deep planar reflector at the surface as originally predicted by the uncorrected ultrasonic data.

MR. CHENG: Question, Don.

MR. ADAMONIS: Yes, sir.

MR. CHENG: You indicated that 2% notch can be sized. That number is six. That would give you 1.68.

MR. ADAMONIS: Yes.

MR. CHENG: (inaudible)

MR. ADAMONIS: That's correct.

MR. CHENG: And I assume this is primarily with the 60 degree?

MR. ADAMONIS: With the 60 degree.

MR. CHENG: Okay. You can calculate this to have no effect. Can you use that down to 2% notch depth?

Do you understand my question? A 2% notch, due to the beam spread modified, gives you 1.68 inches.

MR. ADAMONIS: Yes.

MR. CHENG: Okay. Now, I'm asking you that to do beam spread calculation correctly, that should be really looked at at 2% notch depth.

Have you checked that one?

MR. ADAMONIS: I have not done that calculation. I have not done that calculation.

MR. FOX: As an independent, I would have to say that anything other than pure amplitude, anything that was regarded as smaller than the beam size, will still come up to yield that same number.

So if you put a 3% notch in there, you may get a larger amplitude, but you will not get a linear increase in the size of the indication until you exceed the size of that beam.

MR. ADAMONIS: I guess the point is that beam spread calculations could have been conducted at 60 dB drop points and 14 dB drop points.

It becomes a question of which is really appropriate.

MR. CHENG: Let me ask my question differently. Instead of 14 dB drop, say you sized at the vessel floor. How...

MR. FOX: It would make it bigger.

MR. CHENG: How bigger, I'm asking. Did you try it?

MR. FOX: I didn't do so.

MR. CHENG: Three, four inch, you know, five inch?

MR. FOX: Probably. Probably significantly more, because we're talking about another 60 feet at least.

MR. CHENG: I know.

MR. CLAYTON: Bill Clayton. Don, were all the beam spread modification measurements that you made at the point standard dB points that we've discussed?

MR. FOX: That we've discussed prior to this?

MR. CLAYTON: Right.

MR. FOX: The beam spread corrections that we discussed prior to this was part of our detection and analysis of the detection data. And those data were at the 60 dB drop points.

This is essentially the first time that I'm discussing beam spread data, if you will, under 14 dB drop points.

Are there any other questions?

MR. CHENG: I'll ask one more question. Did you people realize just before, I mean, the 2% notch?

MR. FOX: We knew it would be large. We knew it would be large, but the extent on a 60 degree hadn't

been quantified on the Indian Point block. Our normal calibration sequence, in accordance with the code, is only to take that indication.

Beam profile determinations are made on the side drill holes in the calibration line.

MR. FLACH: Wayne Flach. When you were going through this examination, did you have any video that you could look at the inside surface and notice any irregularities on the inside surface?

MR. ADAMONIS: We had cameras, we had cameras and weren't really recording it. The cladding effect...Dave, can you describe any of the cladding that we saw?

We mounted a camera back on the box of the reactor vessel inspection tool.

MR. KURCK: Planning of the interest in depth? I would say no more than usual.

MR. FOX: We didn't see anything unusual about the cladding in this particular area. In other words, nothing in the form of finding out, I guess.

MR. FLACH: You didn't notice any anomalies that could be (inaudible)

MR. FOX: We scanned several degrees before we went over the area of interest, and we saw normal variations in the range between the 20 up to 80 or 90.

We attributed most of that to some redirection that might occur, things of that nature, primarily redirection.

But it's significant to note that scanning over the same elevation with this assembly as we detected the peak or the largest apparent 2a dimension, when we went through our initial data uncorrected, we couldn't attribute any loss of signal or any unusual behavior to the presence of any indication.

There was nothing unusual about this area as compared to other areas in the vessel that we scanned with the same arrangement and preparation for this investigation.

MR. FLACH: If you took all your beam plots and between them on an arc, how close to the same point do they all cross?

MR. ADAMONIS: Again, those data were plotted with assuming sure 45 and 60 degree. We could try to account for beam shifts in the vessel, but in some cases, those are unpredictable.

MR. FLACH: If you assume the multiple pass is correct, then the angle could be plotted right.

MR. ADAMONIS: Right. And that's what we would anticipate.

MR. FLACH: They cross at a common point.

(Simultaneous conversation.)

MR. LEFEVRE: It worked out to what we determined the angles to be. The plot that Don showed first were plotted, as he said, carefully under 45s and pure 60s.

When we look at what we have with the calibration angle, we're talking on the order of 40, of 56 degrees and 39 degrees.

When we pull the 60 degree down to the 56, it puts it out right about at the surface. That's what we plot.

But in doing that, if we treat both sides accordingly, it would therefore put the others out in space by a considerable amount.

We don't feel that we can treat all the clockwise and the counterclockwise in the same fashion. If you feel that the redirection from that going clockwise and that going counterclockwise, it's not symmetrical.

Therefore we can't ...

MR. FLACH: That's quite possible, but you can also have some very localized factors. I just wondered if you tried to swing them all to a multiple pass arc and see what you came to, where they joined.

MR. LEFEVRE: I might add for that clarification, when one recalls the previous view-graph we had, the 60 degree showed to be somewhat embedded in a distance

of 7-point-something inches. I don't recall exactly. And if we rotate that transducer array 180 degrees, and you look at essentially that same area with the opposite 60 degrees, and you plot it to the same element, there is a similarity in that respect.

MR. FLACH: Don, does your data package include the multiple pass transducer at various amplitude points for all these as you detected it?

MR. ADAMONIS: Yes.

MR. FLACH: So one could take the package that you have and reconstruct all this?

MR. ADAMONIS: Yes, and that's essentially what you saw the initial sketch that I showed, was our computer graphics reconstuction of the examination of the findings during the exam.

Yes, Martin.

MR. HUMM: Was there a pre-service done at this vessel?

MR. WASILENKO: There was no pre-service inspection done because at Westinghouse, the codes (inaudible).

MR. HUMM: Was there a manual inspection done?

MR. WASILENKO: Yes. To characterize that, (inaudible) after the vessel was typed.

MR. HUMM: Did CE do this?

MR. WASILENKO: Yes, we did.

MR. HUMM: Did they do an OD examination?

MR. WASILENKO: I'm not sure if I can respond to the question. We did not find any correlation in those tests (inaudible).

MR. HUMM: I'm wondering is if there was an OD examination, the data sheet indicated there was some sort of an anomaly.

MR. WASILENKO: In doing the OD?

MR. HUMM: Yes, I was wondering whether the shop did an OD examination.

MR. WASILENKO: They did the ultrasonic tests from the inside of the vessel.

MR. HUMM: Only?

MR. WASILENKO: Only.

MR. CHENG: And they did not have any problem with overcrowding in the service they can do?

MR. WASILENKO: I'm sorry, I didn't hear the question.

MR. CHENG: I say, Combustion did the job on the service?

MR. WASILENKO: Yes.

MR. CHENG: I'm asking did they not run into any problem because of the crowding of the design?

MR. WASILENKO: Their test report did not indicate any problem with that from the results. Like I say,

(inaudible) in those conditions, planning surface geometry to be compensated by the flexibility of the facility. We did not have problems.

MR. ADAMONIS: I think that it's pretty well-documented in the literature that it isn't only the clad surface that accounts for this type of redirection in the sheer beams.

The interface also has a lot to do with it. The only time that you would know that you had a problem with redirected sheers, whenever you found something.

MR. FLACH: So you can assume that since there was an examination done but there were no important indications during shop examinations, you are basically using this as the first inspection.

MR. ADAMONIS: Yes, that's correct.

MR. WASILENKO: Did this inspection (inaudible) much more elaborate.

MR. LIAW: Don, this is B. Liaw from the staff. You are not able to answer the size question with regard to the exact character of the calibration size.

Let me ask you. How many vessels have you inspected using this?

MR. ADAMONIS: I don't have an exact number. I would say several.

MR. LIAW: I understand that for a four-inch

calibration problem, on the service of a vessel, it seems to be a common practice among the manufactures, isn't that correct?

MR. ADAMONIS: Repeat your question.

MR. LIAW: For the calibration notch.

MR. ADAMONIS: That's correct.

MR. LIAW: Quarter-inch notch. It's a common practice.

MR. ADAMONIS: That's correct.

MR. LIAW: And in the single vessel you have the exam, and you have never seen such degree of magnification?

MR. ADAMONIS: No. We found a large indication outside surface at Robinson during the ten-year examination in March of 1982.

MR. LIAW: Was that calibration notch?

MR. HAZELTON: His question, I think, let me put it another way. If there are some vessels out there that have quarter-inch deep calibration notches, have you ever looked at these with the array you've seen and noticed this amount of magnification of the quarter-inch notch?

MR. ADAMONIS: I guess I just don't see the point of the question.

MR. LIAW: Because you present data to show the

large degree of magnification.

MR. ADAMONIS: Oh, I'm sorry. During the Robinson investigation.

MR. LIAW: No, I'm not talking about Robinson now. I am back to your earlier presentation.

MR. ADAMONIS: Our typical calibration, our typical use of the OD notch is to determine a peak amplitude as Section XI would require.

There is no specific requirement to make beam spread measurements. You're only asked to consider the response from the notch when looking at reflectors on the outer surface.

MR. LIAW: No, Don, I'm not asking code requirement. I'm asking your Westinghouse experience.

MR. ADAMONIS: Yes, if you made beam spread measurements on notches, they would, I would say they would give you very similar results as what we see here.

We did that on a number of plots.

MR. LIAW: On the actual inspection of vessels.

MR. BANFORD: Let me try to interject here. Warran Banford from Westinghouse. I think what he's asking, Don, is, have you ever seen the result of another inspection of another vessel where you picked up the quarter-inch notch that was put in a lot of the earlier

vessels by code requirements. In other words, there's a possibility, and in fact, we have some information that leads to a conclusion that there may be a quarter-inch notch on the outside of the vessel in this area.

And what you're saying is, have you ever seen it in another vessel. Is that what you're asking?

MR. LIAW: More or less.

MR. HAZELTON: If he's looked at a known quarter-inch calibration notch and said, "By golly, that quarter-inch is two inches deep."

MR. ADAMONIS: In the calibration plot, but not in a vessel.

MR. HAZELTON: Okay. We were asking in a vessel. You haven't run across that situation?

MR. ADAMONIS: No.

MR. HAZELTON: Or when you did see it, you didn't try to determine whether it was really quarter-inch or not?

MR. ADAMONIS: I don't believe I've ever detected a quarter-inch deep notch in the outside of a vessel.

MR. HAZELTON: All right.

MR. LIAW: Or maybe...

MR. ADAMONIS: Hopefully that type of ...

MR. LIAW: Let me ask our friend from Southwest. Have you people ever seen this sort of thing?

MR. FLACH: There are not notches in that area of the vessel. There are notches in calibration plots, but not in vessels.

MR. LIAW: Okay.

MR. CLAYTON: There have been a couple of different methods of attempting to put some location, UT location reflectors on vessels.

But these have been a build-up on the outside of the vessel. Combustion does that typically with paths that are two-inches or so that are added on to the vessel.

And I think some of the early Westinghouse vessels have an L-shaped we d at certain locations to try to locate ultrasonic.

But I don't believe I have ever seen a vessel that had purposefully had encroachment notches or reflectors into the surface for that purpose.

MR. LIAW: That was part of my earlier question I thought that was a common practice in tne calibration process.

MR. HUMM: In the calibration process.

MR. LEFEVRE: We feel that the premise seems to be based on perhaps an assumption that there are some vessels out there that have four-inch deep notches.

MR. HAZELTON: He asked the question and he

interpreted his question as yes, that's a common practice.

MR. LIAW: Because through discussion, I heard, somebody was saying that somebody's vessel had a four-inch notch intentially on the vessel, for calibration. That's something special.

MR. ADAMONIS: I can address that. There is an internal trip report which indicates that that might have been the case.

But in looking at photographs of the vessel in this area, we can see no evidence of a buttress type notch that was described in the trip report.

In fact, we have two trip reports, one dated on a trip May 2nd and 3rd, 1966, one dated for a trip May 10, 1966, to look at ultrasonic examinations of various parts of the vessel.

One indicates that there was in fact an OD notch in the lower shell. The second trip report indicates there was a notch put in a calibration.

But we do have photographs of that particular portion of the vessel, and see no evidence of a buttress type notch.

MR. HAZELTON: Describe what you mean by buttress type notch.

MR. ADAMONIS: Well, typically when it's described

as one straight side at an angle.

MR. HAZELTON: All right. Isometric.

MR. GROSCUP: This is Gary Groscup. One final caveat to that. Combustion Chatanooga has no record of this vessel being notched.

There is nothing in their records that would say that it was. And in trying to come to grips with this, they absolutely have established that this vessel had calibration block.

They have said that their practice procedures at that time where vessels had a calibration block, they did not have a calibration notch.

MR. HUMM: In regard to the calibration standard, was that calibration standard discussed?

MR. ADAMONIS: The one we are using?

MR. HUMM: Correct.

MR. ADAMONIS: For this examination that we're talking results from?

MR. HUMM: Yes.

MR. ADAMONIS: No.

MR. FLACH: How similar is it, Don, as far as the cladding? Is it the same cladding process? How thick is it? Is it pedigreed material?

MR. ADAMONIS: We've duplicated the automatic cladding process to the extent that we can. The feed

widths are not as wide, but the materials are the same, the fluxes were the same.

We just don't have the width on the beam. We made 45 degree sheer measurements in the clad and unclad side of the blocks prior to using them in the examination.

We found differences on the order of 16, 17 dB.

MR. HUMM: That would encompass some inspection. Is it more tentative or less?

MR. ADAMONIS: My experience is that variations in the range 10 to 14 dB are typical.

MR. HUMM: It varies along the block. I mean, in the sense that you did not use the basic calibration block to do the inspection.

MR. ADAMONIS: Yes. Essentially, well, our measurements that the numbers that I've just cited are based on establishing distance amplitude curves on the side built holes in the block, first from the clad side, then from the unclad side.

MR. HUMM: What I'm saying is that there is a variation within the block that's not...that you took the calibration from within the calibration scale.

MR. ADAMONIS: That's true. That's true.

MR. HUMM: Do you have any feeling as to the attenuation differences between basic calibration block

in the areas other than where the calibration is?

MR. ADAMONIS: No, I don't.

MR. FLACH: Don, did you have the block in the side there where you could calibrate there, or did you use some type of transfer intermediate type mechanism?

MR. ADAMONIS: The intermediate mechanism was a set of cylindrical reflectors, an array of cylindrical reflectors.

MR. HUMM: The calibration reflector, was it Westinghouse or the plant's?

MR. ADAMONIS: It was at our Walls Mills service...

MR. HUMM: So during the process of the inspection, you didn't go back and...

MR. ADAMONIS: No. During this investigation, we were concurrently doing work at the site and at our Walls Mills service center to support that.

MR. JOHNSTON: This is Bill Johnston. Was there any requirement that there be a block provided at the time the vessel was delivered and it didn't have some kind of a notch put onto it?

MR. ADAMONIS: I don't believe there was. We're talking about a vessel that was shipped to site in 1968. Again...

MR. JOHNSTON: So the code wouldn't require any such...

MR. CHENG: There is no code? What?

(Laughter.)

MR. CHENG: '70 or '71.

MR. DURR: Jack Durr. Have you reviewed the fabrication radiographs? Are they still alive in the weld?

MR. ADAMONIS: The fabrication radiographs have been reviewed. I have not reviewed them myself. Would somebody...Gus Wasilenko, would you like to address the results of those reviews?

MR. WASILENKO: We have reviewed the radiographs. We had approximately six people to review them. Some of them have the level of wide experience.

The conclusions are that you would not expect to see anything in the reviewing screening graph normally until 1968, at the first pass.

However, if you look carefully and you point your finger at something, I believe there is a slight density gradient in that particular area of the radiograph.

MR. DURR: What is the quality of these radiographs after 20 years?

MR. WASILENKO: I personally don't know how to judge the quality, but I can look at them and can see the (inaudible) see the density variations, you can see

indications where the previous reader sheets indicate indications.

The reader sheet on this particular radiograph show no indications (inaudible). So with that, I think that you can certainly draw conclusions, but I don't know how they compare to their original quality.

MR. KURCK: Dave Kurck. If I could just interject. This is Dave Kurck of Westinghouse. The quality of film of 18-year-old film is kind of subjective.

I think that the present quality is probably less than desirable to make an accurate interpretation of the area of interest.

There is a minor density change, which is noticeable.

MR. FLACH: Is that gradual, or what?

MR. KURCK: It's sort of gradual and sort of elongated, however, it's very difficult to discern at this time.

MR. FLACH: Did you do any other types of evaluation other than pitch-catch? In other words, very high sensitivity, looking for (inaudible) or anything like that?

MR. ADAMONIS: Yes.

(Laughter.)

MR. ADAMONIS: We went into, after the passes

through with the 45 degree pitch-catch, we went into a delta type mode with either angle beam transducer transmitting straight beam receiving in a delta configuration optimized for at or near the outside surface.

We made calculations in the delta mode as to where some reflector right at the back surface would show up in terms of transit time.

We came up, our calculations predicted 137 microseconds. That is for a reflector at the techniques we're considering here to be 8.903.

When we looked, scanned across in the delta mode, we could define indications and these indications appeared in the ranges of 131 to 133 microseconds as we made various passes across.

That's the type of information we were able to gather, together with the delta, the only evidence of a delta type signal in that region.

We would consider that to be something on the order of maximum three microseconds where we would anticipate a back surface type reflection.

MR. FLACH: If it were a tip, how deep would it be

MR. ADAMONIS: We made that calculation, and I had that on my next slide, between three-tenths of an inch.

We confirm that in both directions and again, this

is the mode that we used to define it, where we're looking at one reflector, we made scans on various passes on both sides, and the only place where we could identify a reflector was along this 16 degree, 15 and a half degree vessel axis.

MR. FLACH: And that corresponded well with the location of the angle beam?

MR. ADAMONIS: You saw the angle beams and they were slightly...

MR. FLACH: It fits right in there.

MR. ADAMONIS: That's right. On either side.

MR. FLACH: On the calibration block, what was its thickness compared to the missile wall?

MR. ADAMONIS: Nine inches, flat.

MR. FLACH: Side drill holes and notch?

MR. ADAMONIS: That's correct.

MR. HUMM: And what is the thickness of the area here?

MR. ADAMONIS: 8.913, from calculations.

MR. CLAYTON: Bill Clayton again. Did you characterize the notch in the calibration block when you dealt with this?

MR. ADAMONIS: No.

MR. FLACH: You did compensate for the difference between calibrating on a flat surface and the curved

surfaces of the vessel in looking at your pitch-catch? Or did you...

MR. ADAMONIS: To compensate the incident angles?

MR. FLACH: Yes.

MR. ADAMONIS: Yes. Curvature is taken into consideration.

MR. HUMM: When you did the original scanning, was there any gating of the OD surface?

MR. ADAMONIS: Yes, the gate runs out to five-eighths response to three-quarter key hole.

MR. FLACH: What were the general environmental conditions as far as RFI and noise? Did you have pretty nice, clean signals to work with? Did you have any disturbances?

MR. ADAMONIS: On the delta?

MR. FLACH: On the original angle scan.

MR. ADAMONIS: No, on the original angle beam scans, we didn't have any significant amount of noise. The signal to noise ratio was good, extremely good.

MR. FLACH: Your basic scanning level of sensitivity was what, 60 on back?

MR. ADAMONIS: We used the calibration sensitivity.

MR. FLACH: And came down from there for (inaudible).

MR. ADAMONIS: Right. And we were alarming at a

40% DAC amplitude in this.

MR. HAZELTON: One question I have, your transducer array is on a plate. Do your calculations depend very highly on accurate angularity, in fact?

You have to know precisely how it's oriented.

MR. ADAMONIS: Uh-huh.

MR. HAZELTON: If you tilted a little bit, you'd get lots of different results. And for example, I don't know the sensitivity of that, but can you address that?

How sure are you you having the thing pointed in the direction it's supposed to be pointed in?

MR. ADAMONIS: On the typical array plate that I showed earlier, there are three transducers that are used for monitoring perpendicularity in water pass.

Several other checks are made also. This straight beam transducer in the center of the plate, these two outer lower transducers, which I've identified as water pass.

During the sequence of scanning and setting up some of the angle beam reflections off the plate are also checked and modified such that we can be sure that we do have the plate perpendicular.

The array that was used for the delta and the 45 degree pitch-catch also had...I'll have to ask Dave

Kurck...I think it was three, and other three transducers.

If I looked at the top view of the plate, it's shaped, I can see withd these being test units, this being the center transducer TR20, another transducer in this location, and two more transducers, and these would all be for monitoring water pass.

These would all be used for water pass perpendicularity. There is another 45 degree...

MR. HAZELTON: You say monitoring. Are you telling me that any point in time you can take a look at those and say, "Woops, here, one degree off of where you ought to be." So you do a switch a little bit to the correct position?

MR. ADAMONIS: That's correct. Especially during this investigation.

MR. HAZELTON: All right.

MR. ADAMONIS: Particularly careful, realizing that that could have impact on the results.

MR. HAZELTON: Okay. So my question is getting back, how accurate do you think you are regarding directions?

If you're talking about an angle of 20 degrees, are you with 15 to 25, or are within 19 to 21, or...

MR. ADAMONIS: I would say that the angle is

probably within a half a degree, to a degree.

MR. FOX: Don, I would like to interject something at this point. I would like to...this is John Fox from Combustion Engineering.

On the part of my evaluation that included that information, I'd like to recall part of the previous conversation in which you discuss the method of evaluating the indication initially, in which you stated that you analyzed the indication from the transducers that were lined in the axis of the vessel, rotated the plate simply 180 degrees, and reevaluated with the transducer.

That essentially, there was some angulation, essentially the plate would be tipped this way. Essentially they got the same results the second time around after they clipped the same transducers but now were in exactly the opposite direction.

So the answer to that would be if there was some off-axis in plate, with no adjustment being done, then that axis should force the data to move over to the other side.

That didn't happen, so that assumes in the initial evaluation as the correctness of the plate at least in that plane.

MR. ADAMONIS: You feel comfortable maybe on the

order of one to two microseconds.

MR. FOX: And the other...

MR. ADAMONIS: And that represents less than a tenth of an inch.

MR. FOX: The other is, as he said, in this evaluation, that using the so-called pitch-catch technique or the through transmission where one 45 is looking at the other, we essentially replicated that indication in both directions at a simultaneous position. This meant that those were fairly well aligned.

MR. ADAMONIS: That's another point that I didn't mention. The transducers that we set up to do this investigation were the ones where the 45s that were calibrated, and they were performed using the same channels and calibration settings as the original investigation.

MR. FOX: If we're looking at what could possibly cause things to move around in the reactor vessel, the anomaly that we should consider is the clad itself and the materials as being the bad actor if we're going to move anything around.

MR. HUMM: Would that be the eccentricity in the vessel itself? I assume that plate is played to within a degree, half a degree, when you calibrate.

But the best circular at this location, how do you...are you compensating for the concentricity of the vessel at each scan?

As you eject from it, are you doing something from just the plate so that it is perpendicular to the surface?

MR. ADAMONIS: No, we do that at various points during the scan prior to starting the scan. If there is any change in that axis position of our array plate, it will show up on the print out or on the computer read out from that particular axis.

MR. HUMM: So when you start the inspection, you're ploying around in taking some kind of average value for the concentricity of this vessel at certain seams?

MR. ADAMONIS: Uh-huh, prior to initiating a scan, and then after every...at every how many steps, Dave Kurck? Five steps or ten steps there's an automatic prompt.

MR. KURCK: I don't know the answer to your question, Don.

MR. ADAMONIS: There is a prompt after a given number of steps to stop and make a verification.

MR. HUMM: How much did it vary in this seam, circumferential? How much were you changing the angle plate?

MR. O'FAVOR: Vernon O'Favor. I think addressing your concern, you're looking at areas in here that are rather small.

We are establishing perpendicularity right at that area, like a complicity aspect, that area is perpendicular and the area we are in...

MR. HUMM: I mean after you went through an evaluation, you went through, scanned this circumferential seam, and you were making adjustments for your angles.

Warren asked a question about plates. Initially since we were one degree, that's one degree. I'm asking as you go around this circumferential scheme, you must have been adjusting the plate angle since doing the tests.

I just wondered how much...

MR. ADAMONIS: I don't have the answer to that question.

MR. KURCK: We have adjusted our routines so that we now only scan 90 degree segments on certain welds for that reason, primarily.

MR. HUMM: Thank you.

MR. JOHNSTON: Johnston. I have a couple of questions but of a more general nature, since I'm not an expert in this.

You're still talking about examining the circumferential weld. I'm still mystified, since this thing is located on the longitudinal weld, when you're going to tell us that you examined that weld on either side of the indication and whether you saw something on a vertical scan.

Have you done that?

MR. ADAMONIS: I thought I said we also detected it during our scan of the longitudinal weld seam.

MR. JOHNSTON: Okay. I didn't hear that.

MR. ADAMONIS: A reflector was also detected during scans of this area during our longitudinal seam.

MR. JOHNSTON: Now there is subsequent discussion that confused me a little bit in that in part, I'm hearing you say yes, by golly, that was an indication, for sure.

We've got 16 different ways we concluded there is an indication there.

MR. ADAMONIS: There is an indication.

MR. JOHNSTON: And now the next thing I guess we're trying to...I think what you're saying is now it's not an indication; it's some magnification artifact or something.

I'm confused about what it is, where we're going.

MR. ADAMONIS: I think it's a significant

magnification of the area, based on the results from the...sorry.

MR. FLACH: Don, let me ask you one question before we get into that. How consistent was the response of this notch as you went over it and over it and over it?

Could you pick a location that it gave you this very consistent response and came up with almost exactly the same answer? It's a little "iffy" sometimes.

MR. ADAMONIS: Are you speaking of the notch or are you speaking of the reflector in the vessel?

MR. FLACH: Reflector.

MR. ADAMONIS: We looked at it twice during scan routine and several times during subsequent investigation with conventional array plate and the characteristics were the same.

MR. FLACH: So every time you ran over it, you were getting just about the same answer?

MR. ADAMONIS: The indications were there, correct.

MR. JACKSON: How many other kinds of indications did you detect during your investigation examination at this time that you required some kind of evaluation?

MR. ADAMONIS: Dave Kurck, would you like to address that one?

MR. KURCK: Yes, Dave Kurck, Westinghouse. We had

a total of 49 indications that were reported for pursuit.

Of the 49, all were assessed according to the appropriate table of the code and one indication was assessed as being in excess of the item B35 in our table.

And this is the indication under investigation. All the rest of the indications which consist of about...I don't have the exact number, probably 20 straigh beam indications.

And other 45 and 60 degree indications that were mid-wall and even using rod data, size (inaudible). So basically we only had one indication which you see.

MR. JACKSON: Did you have any that were similar to these?

MR. KURCK: No, not that we had to assess.

MR. JACKSON: I'm not talking about singular ones to evaluate. Did you have any that were similar in location, OD?

MR. KURCK: We did have some OD geometry. I don't know that we saw a great deal of geometry scanning certain material (inaudible).

MR. JACKSON: What you're essentially telling me, then, is that there is only one area on this vessel that has an anomaly that will produce an ultrasonic

effect.

MR. ADAMONIS: Only one area in the area that we did the examinations where we covered the welds.

MR. JACKSON: All areas that you examined.

MR. ADAMONIS: Right.

MR. KURCK: It's fairer to say that we only have one area when, assessing all the data from all the recordable indications for procedure, we only have one area which gives raw three wall dimension in excess of what is in the code. And therefore, it requires further assessment.

MR. JACKSON: But essentially what I'm getting so far to date is that there is some grinder blinder in the OD of the vessel that is producing this ultrasonic reflector that we're currently evaluating.

I find that a little hard to believe that there is only one spot on the outside of that vessel that has any grinding done to it.

MR. FOX: John Fox from Combustion Engineering. I think we're in the format trying to say that we aren't finished with the presentation from the standpoint that we have just started our evaluation mode.

The fact that there is...I think the fact of the matter is that this is the only indication of this magnitude in the reactor vessel as the OD surfaced that

was in the shell force, to answer your question.

But I didn't analyze that data, so I'm reiterating what he stated.

I think we're trying to assume that we made a conclusion that this is an OD grind out, and that conclusions has not been reached yet.

All we've stated is that we have found an indication and we set upon some evaluation to disposition that indication.

We have not yet arrived there. Okay?

MR. VARGA: Let's look at this logically.

MR. FLACH: Ma I ask that question more specifically, then? Are there other indications of the same nature and location but of a code-acceptable size elsewhere in the vessel?

MR. KURCK: Not to my knowledge, that were determined valid.

MR. HUMM: Could you discuss what valid and non-valid indications are? You talk about 49 indications. Those are valid indications.

Is that correct?

MR. KURCK: Correct.

MR. HUMM: Could you maybe describe to the people's benefit as to how you determined what a valid and non-valid indication is?

MR. KURCK: Well, the determination of whether an indication is valid or non-valid is up to the examiner, the ultrasonic level to an operator who is conducting the examination along with a computer operator.

When a reflector is noted, that is an indicated area, and exceeds the alarm level. The tool is basically stopped and the examiner proceeds to investigate in determining whether the reflector has a valid source.

Valid and non-valid reflectors are being redirectioned, geometry, and all valid reflectors are reflectors that are within a gated area, that meets the alarm level for that channel, and are assessed as being valid in character.

MR. HUMM: So you use them sort of amplitude based criteria while operator interpretation, before a certain number of valid indications, and they make a decision on the vessel.

MR. KURCK: Correct.

MR. ADAMONIS: Martin, the instrumentation captures any indication which exceeds predetermined alarm level. In this case, it was 40% DAC and 20% DAC, and therefore were taped.

At that point, having found an alarmable condition, the tool stopped and that area is investigated by the

computer operator who is moving the tool, and the examiner.

There are many...in doing an ultrasonic examination of a reactor vessel, there are many indications that occur which are what I'll call non-valid or non-"potential flaw sources."

Those include beam redirection. Those include stud holes, if you're doing examinations of the plans to show weld and leave the gates (inaudible) as you approach up near the plank to show welds.

So the operators are making those kinds of assessments, interpretations, as the examinations go on.

Those indications which don't have a logical source are interpreted as valid until further...

MR. HUMM: Do you have...I can't believe (inaudible)

MR. ADAMONIS: There was some beam redirection noted when scanning in the axial direction, and I think that may have accounted for a significant number of indications.

I can't give you exact numbers.

MR. HUMM: Okay. Do you have any feeling as to how many there were? I mean, they were noted on the data sheet, right?

MR. ADAMONIS: Yes.

MR. HUMM: As non-valid indications.

MR. ADAMONIS: Yes.

MR. HUMM: And I just am interested in how many there were.

MR. KURCK: Magnitude of non-valid indications?

MR. HUMM: Yes.

MR. KURCK: Ratio of valid to non-valid in this particular examination is at least ten to one.

MR. CLAYTON: You say that the indications or determinations of validity of the indications is based upon aptitude criteria in conjunction with the examiner's evaluation, on the spot evaluation of that indication as that examination is being conducted.

MR. ADAMONIS: He's looking for things like does the angle movement indication travel.

MR. CLAYTON: Subsequent to that, is there an independent review by either that examiner or somebody else, another qualified person, of all of that data to make sure that they're satisfied with his on the spot evaluation?

MR. ADAMONIS: There is a level three review conducted by the individual level three on the site.

MR. CLAYTON: And that's of the entire data package such at...

MR. ADAMONIS: He's reviewing the data as they complete any given routine.

MR. HAZELTON: So if he decided that it might have been valid, he could do some investigation on it? He could reverse that decision?

MR. ADAMONIS: Right.

MR. HAZELTON: Okay.

MR. ADAMONIS: As a result of our investigation on the notches, considering the possibility that in fact the calibration blocks could result in an amplitude and calibration sensitivity, some 4 to 6 dB higher than the types of sensitivities we would see had we drilled this same side-drilled holes, in the reactor vessel, notch results, delta results, we conclude that the reflector size is nowhere near the size predicted by the original investigations, nor near the 1.2 inch dimension as predicted by the DAC sizing methods.

Our delta results indicate, telling us that the reflector is at or very near the vessel OD surface, and the delta results would predict a through-wall dimension of three-tentns of an inch.

At this point, Mr. Fox can discuss his independent assessment of this data, and then we can go into some more discussion.

Thank you.

MR. FOX: We begin Phase II. I'll be quick. Phase II is an evaluation of subsequent evaluations. In other words, an independent evaluation as to the correctness of the conclusions that were drawn out of subsequent tests.

To reiterate my previous concerns, I think these previous concerns have been re-expressed in all of the conversation that I've heard.

Now what I am expecting is for each one of these concerns to be addressed and put to bed, logically put to bed.

Let me rediscuss the Phase II program. Phase II is evaluation of dispositional data. The first was a mock up of certain types of OD geometric signals to see what the beam profile, what the behavior of the beam profile pattern was if it was an OD type of signal.

The reason for this, I must reiterate, at 60 degrees showed a separate...I called it a separate indication.

In order to link those two or to call those two one and the same, I have to be able to explain why the other three angles behave as OD surface and this one does not.

Okay? So mock up of an OD configuration to see how the 60 degree behaves on a buttress and a square notch

was necessary, and from the standpoint that it was rumored that photographic evidence existed of a grind out.

Okay. So what happens when a grind out type of configuration with the normal two to one paper on that grind out existed?

Is that a potential that this indication could have been that? And if so, were the other indications potentially the same?

So the next step after the mock up of the geometric reflectors was to put additional tests or additional systems, inspection systems, inside the reactor vessel and get quantitative information about those reflectors in order that I could draw an independent conclusion.

Evaluation of the proposed tests, I was called rather late one evening and it was stated that they were getting ready to go inside the reactor vessel with another test.

Well, the testing on the mock up occurred the night before. I was appraised of the results on the morning of 8/9 of that mock up testing, and the evening of 8/9, they were getting ready to go back into the reactor vessel with additional testing.

So I was ask to draw a conclusion as to whether that testing was going to answer my questions or not.

I think contacted Westinghouse, had a subsequent conversation about the types of testing that was going to be performed to justify or to put to bed my concerns that my question would not be answered.

If my questions weren't answered, then as a utility representative, we would have to do additional testing until those questions were answered.

So at the conclusion of that conversation, I called Con Ed and told them that I was satisfied with the types of tests that would be performed.

And since I had had the information at that time of what the mock up OD testing looked like, I felt very comfortable in the informtion that I was presented to date and we'll discuss that.

Then the third was once all this testing was performed again, we had a get-together and conversation with Con Ed and whether I could reach an independent conclusion as to what that reflector was, okay, whether or not I believed that they were complete with their examination, okay, and therefore to go forward.

Everybody understand the sequence of events here. This is very important. Okay. The evening, yesterday morning, which would be the 10th, we had another phone conversation in which we discussed the results of the examination.

I believe it was that morning. Things are starting to go together here in more ways than one. The evaluation, the first conclusion I was able to draw was some comfort in that the evaluation of the OD 2% notch with the 60 degree gives the same beam profile as the indication of the reactor vessel.

That's a very important point. It gave the same size through-wall dimension, approximately the same through-wall dimension, even though it had lower sensitivity than the reflector in the vessel.

Okay? So what it told me was that yes, it behaved like a corner reflector or an OD surface, and it essentially was independent of amplitude and was dependent on the beam.

Okay? Therefore, I can start feeling comfortable about merging these indications and calling them one. Okay?

And that's an important factor. Do we have multiple OD indications here, or do we have one OD indication?

And moreover, how do I explain the type of amplitude that occurred on the 60 degree? In fact, the amplitude from the 60 degree in the reactor vessel could be reproduced with a back side attack of the 60 degree angle on the calibration standard.

In other words, a 30 degree taper on an OD type of reflector gives a back wall to the 60 degree and yielded equivalent amplitude.

Okay? The front side, which behaves in the corner track fashion, gave the type of responses to size, the through-wall size.

Okay? These are starting to make sense. This can now start being treated as an OD type of reflector, bound by the OD.

It doesn't have to be. It does not have to be at the OD. It has to be near enough to the OD so that the OD becomes a boundary condition.

Yes?

MR. FLACH: How long is the (inaudible)

MR. FOX: 1.5 inches, so it's longer than the beam. Or no, I'm sorry. At this point in time, we can say that it's approxiately equal to the beam or a little bit smaller than the beam.

We're starting to say that that beam is approximately 2.5, two inches to 2.5 for an OD type of bound.

So it's not behaving like a side drill hole anymore. A through-wall dimension of that notch was 2% and the amplitudes gotten off of it was equivalent to, nearly equivalent to the 21 dB that we got on the

reactor vessel. Now let's regress a bit. One of the things that we should remember is that this calibration was performed on a flat calibration standard.

Now we're in a curved vessel. Even though we corrected for the 45 and 60 degree angle as we enter the vessel, what happens to the angle as it attacks the OD surface?

It changes. It becomes 51 degrees and 39 degrees. It gets down into the amplitude criteria that gets away from the 60 degree dip and the corner reflector curve.

Okay? It gets away from that. It goes back up to the 100% point similar to a 45 degree attack at the OD surface.

So we're starting to make sense out of this corner reflector curvage. So now I can start treating this as a potential corner reflector.

If I didn't do that, then the indication could very easily have been 1.2 inches in depth from the OD surface and being small or large, but not behaving like a side drill hole or something like a planar reflector at that point.

Conclusion number two. This was one of the things that bothered me the most, was the

position information as recorded of the multiple indications.

Therefore, I had to conclude that I had multiple indications in the reactor vessel.

Once we used the delta technique, I got two types of techniques being put into the reactor vessel simultaneously.

One is the delta which is a 45 to 0 shot, from both sides, simultaneously. We got exactly the same results from both sides.

And nowhere else did we get any information of that nature. Okay?

So essentially what we're saying now is the rest of it is effectively clean, and we're getting essentially the delta technique type of shot off of one indication.

Pulse echo, the original detection phase, pulse echo. Same spot in the reactor vessel from both sides. Okay?

This system was designed so that Westinghouse could either treat this as a delta technique, a through-transmission technique, and pardon my use of the terminology, but through-transmission in the sense of as pitch-catch shooting at the same spot. So, if you will, it's its own pitch-catch.

Okay? So the zone pitch-catch then showed me also

that I got no loss when I traversed in this orientation.

I got no loss of information, and therefore, there wasn't anything large enough to shadow, and we'll get into that later.

So my conclusions, I can now start believing that I have a single indication. I have put to bed my original concern of multiple indications.

Now we can treat it as a single indication, because all the information starts being coincidental.

Now let's regress a moment. How can I say that? I've got a 60 degree transducer that puts this reflector out in space here, and the rest of it is coming out over here.

What can cause that? Well, Wayne Flack and Bill Clayton pointed out an anomaly in ultrasonic inspection that's caused by the clad.

That's call beam redirection. If you do hit essentially the same clad surface with the same transducer or different transducers, then it's a very good likelihood that that sound beam could move around on you.

The other thing that can happen is as shown in the calibration, the sound beam is not a nominal 60 degrees; it is 56 degrees.

So there is some treatment of that sound beam. Okay? So as we start moving these apart, or lowering the angle, they start meeting at a common point for the original detection phase, which was one of the points made earlier.

Conclusion number three. The delta shows a maximum depth to be .3 inches. The original detection phase transducers were an inch and a half in diameter and were used in the entire beam.

The nice part about a delta technique is that first it has been documented in literature over the years and the other is that it is not susceptible to the same problem.

In the delta arrangement, you have an insonifying transducer, which in this case was a 45 degree. The furtherest extent of the reflector will defract and send the sound to the surface and the closest arriving signal will be received by the 0 degree.

Therefore, I no longer have the treatment of the entire beam causing some obscuring of the flaw sizing.

So now I feel that we can start talking about a true size, or zeroing in on the true size of the indication and as was reported earlier, when I performed my calculations, the worst case analysis showed this to be .3 inches in depth, that is, the

furthest extent of the indication from the OD surface was .3 inches. Okay?

That still doesn't mean it has to be surface connected. It could be much smaller then .3 inches, but the point is that the furtherest extent that the delta showed it was .3 inches.

The 45 to 45 showed no loss of signal, was corroborated by that. It said that there was nothing that was obscuring that reflection going on, okay?

Which starts to tell you that you are dealing with a very small indication, very near the OD surface, because it's starting to behave like a (inaudible) because of the high sensitivity that's coming back from the 60 degree.

Now this is essentfally the package that we're talking about in the ultrasonic exam on this indication.

This is the package. The conclusion of this package is that we hav an indication. We have not tried to call that an indication of OD geometry reflector, or an indication of defect, or an indication of an anomaly.

What we've said is we have a reflector, and that reflector behaves as I've described here.

The important fact of that is that what we have

is additional evidence that would be related by Con Ed later, that says that there's been some surface treatment in that area.

We also have a radiograph which says that there is "potentially" (in quotations) something in that area. So with those two combined with the ultrasonic information, we should consider that package.

Okay? At that point in time, is there any questions on what we've done?

MR. CHENG: Yes, I have a question. The .3 inch deep, just how was this used to graph the (inaudible)

MR. ADAMONIS: Can you answer that, Don? Is that a calibration block or is it an expected...the calibration block was used to arrive at the original thickness of the wall, of 8.902 inches.

And the treatment is that we were dealing with a velocity of .127 microseconds per inch, versus the 0 degree, 2.29 microseconds per inch, which is essentially the calibrated velocities on various calibration notches and assumes some nominal.

Then that's what that comes up with. Okay?

MR. CHENG: You used the (inaudible)?

MR. ADAMONIS: Yes, and I must restate that that's tne maximum. That's the worst case analysis, okay? That's assuming that most of the information isn't here

and very small, and that velocity is made up with the longitudinal component.

MR. FLACH: Did you do the delta scan over the notch in the calibration block and observe any drop in transmission at 45?

MR. ADAMONIS: The delta scan arrangement and the calibration of the delta scan was performed by Westinghouse.

They essentially gave me the information that was performed on that and I treated only the information that resulted from the original calibration.

MR. FLACH: I suppose Don or somebody could answer that?

MR. ADAMONIS: Pardon?

MR. FLACH: I asked whether ...if the delta scan is formed on the calibration block with a notch in it.

MR. ADAMONIS: No.

MR. FLACH: So you don't know if the machine notch caused any reduction in heat penetration or not?

MR. ADAMONIS: No, we based all these numbers on theoretical calculations and on the documentation.

MR. CLAYTON: Bill Clayton. Don, you actually built this mock up and you did some testing with this mock up.

Is that correct? A block with some sort of a

reflector with a 30 degree, or with various shapes?

MR. ADAMONIS: Yes. Varying 45.

MR. CLAYTON: Did you do a significant amount of correlation work, say, between the delta head and between your normal scanning techniques on that reflector that you settled on as what you felt was similar to the type of reflection you were getting in the vessel?

Have you documented correlation between all of your standing techniques on that reflector and on the vessel reflector and drawn your conclusions because of the similarities on all these different types of techniques?

MR. ADAMONIS: In terms of the measurement of the notch sizes to 14 dB drop points, and considering that the reflector we're addressing here in the vessel would make a 21 dB drop points initially, yes.

MR. CLAYTON: Did you get similar results using similar results on all responses from the delta head on the vessel and on this notch?

MR. ADAMONIS: The delta wasn't used on the calibration.

MR. CLAYTON: I'm talking about the mock up.

MR. ADAMONIS: No, it wasn't used on the mock up.

MR. CLAYTON: Okay.

MR. ADAMONIS: The mock up was used to develop information compared directly to the sizing information from the Section XI examination technique.

MR. CLAYTON: Once you had determined the type of reflector you felt that you were dealing with that you had in this mock up, did you compare results of the 0 degree or straightening scan over the area that supposedly contained a similar type of reflector in the vessel and the mock up and correlated that information?

MR. ADAMONIS: The straight beam results with both two and a quarter and 5 MHz in this area were inconclusive.

We were looking for two things. We were looking for a shift in back wall. We were looking for indications near the back wall or some perturbation in the back wall.

We didn't see anything of that nature.

MR. CLAYTON: As in the vessel.

MR. ADAMONIS: Correct.

MR. CLAYTON: Did you perform a similar scan with that 0 degree set up on the mock up?

MR. ADAMONIS: No.

MR. CLAYTON: The notch in the mock up?

MR. ADAMONIS: No.

MR. CLAYTON: Okay. I have one other question, and

I'll let you all move on.

MR. ADAMONIS: Yes, this particular plate was only used in the vessel.

MR. CLAYTON: What type of fluctuation in perceived amplitude with the pitch-catch 45 technique did you find in scanning the vessel, say, in a good portion of this?

As you scan, you're going to see a significant fluctuation.

MR. ADAMONIS: If we'd set a nominal at 50% screen height, we would see normal variation in the range 15 to 20, up to 80 and 90.

MR. CLAYTON: As low as, say, 15% and as high as 80 or 90%?

MR. ADAMONIS: Correct.

MR. VOLLMER: I have a couple of questions before we break. I appreciate your role as the evaluator in this thing.

I heard you say that you received phone calls and information. Did you look at any of the physical data, the physical evidence of this process?

Can you say a little bit about what you did in this regard?

MR. FOX: The original evaluation as performed, I related, that I reviewed the A-stand presentational

information that was on the cathode ray tube.

The rest of the evaluation performed in the reactor vessel was essentially relayed by telephone, telecon through Con Ed, to myself, essentially a conference call in which they related the results of the examination.

So all of my information was related on verbal information and at that point in time, it was a conclusion based on notebook, and the formal documentation has not been reviewed.

MR. VOLLMER: I may have missed this when I was out at my phone call. Has Westinghouse come to the same conclusion that was presented by Combustion in terms of what the maximum depth with the reflector origin is likely to be?

MR. ADAMONIS: Yes, I believe I said in my concluding statements that we're looking at a reflector, a small associated with being very close to or at the outside surface.

And the delta information would indicate a depth .3 of an inch in the worst case.

MR. VOLLMER: You are concluding ...you independently confirm their conclusion.

MR. FOX: Yes.

MR. CHENG: The way I listen to this mock up, you

have a quarter-inch notch and then you conclude, use a 60 degree, you can modify it through the same degree of (inaudible).

Okay. Suppose the notch is one-inch deep rather than a quarter-inch. Do you think you might see the same magnificant to that degree?

MR. FOX: You might see magnification, but not the same magnification as...

MR. CHENG: But essentially some will, is that right?

MR. FOX: And the only answer I can give to that is purely speculative, since we didn't do that. I would assume that you're going to get some magnification, but the magnification will decrease up to the point where the indication becomes the size of a sound beam and starts behaving like pure reflector.

So essentially the magnification should essentially decrease. The smaller, the more magnification.

MR. CHENG: And somewhere it will saturate, no matter how deep the (inaudible)?

MR. FOX: Again, that's purely speculative.

MR. CHENG: Do we have any other theoretical basis? You know, are you against that case, if I'm asking right?

MR. FOX: In other words, what you're asking is

point in which we start equalling that information?

MR. CHENG: I am asking suppose now you tell me that the quarter-inch deep notch is the same magnification.

MR. FOX: Yes.

MR. CHENG: Okay. Suppose I have maybe instead of a quarter-inch, I have a one-inch deep notch.

MR. FOX: Yes.

MR. CHENG: Is that one-inch deep notch might give me approximately the same magnification, or maybe half inch?

MR. FOX: No, it's not linear. It's...

MR. CHENG: I'm not saying it's linear, but somewhere I am asking...

MR. FOX: I couldn't answer that. Someone who has done that...

MR. JOHNSTON: Somewhere I thought you said that you'd get the same amplitude whether it was an inch and a half or a quarter of an inch.

MR. FOX: No. What I said was...

MR. JOHNSTON: Same indication.

MR. FOX: What I said was that if you size an indication smaller than the sound beam in a normal size for hold test, you will essentially reproduce a sound beam.

Essentially you've done the same here, regardless of the size of that indication up to the size of the sound beam.

You're still going to size it somewhat around the same size as it has, but we don't know how that behaves in a corner reflector.

So essentially...

MR. JOHNSTON: Then if when you did the 0 degree, which is straight on and nothing but the time of flight down and back, if I heard correctly, you said the results were inconclusive.

You say you cannot distinguish what, a third of an inch or something or other in a straight time of flight and back?

Or did I not hear you correctly? This is a beam you can look right down on this thing, presumably, and come right straight back without any angles to talk about.

Is the beam spread confusing you a bit?

MR. ADAMONIS: Well, the back wall indications certainly has some width, so if we're talking about something very close to a close proximity and the backward reflection doesn't hold a constant tape process.

It's something very close.

(Simultaneous conversation.)

MR. JOHNSTON: I guess what I ... I don't understand your answer yet. This is how you inspect your turbines.

It should be right straight down and right straight back and you get accuracies that I think are just general for exams.

I'm trying to figure out why you can't...why it doesn't work out here.

VERNON: (inaudbile)

MR. JOHNSTON: So you're saying the reason is interference of the clad interface with the...

VERNON: It could well be that. The fact is that we normally do that examination (inaudible) and we still could not determine (inaudible). It could be embedded.

MR. JOHNSTON: You're saying that if you made repeated measurements, you were getting a variety of answers that spread over a certain distance that was greater then three-tenths of an inch, something like that?

Is that what you were actually seeing when you made the same...looked at your screen?

MR. KURCK: In evaluating the (inaudible)

MR. HUMM: Would you expect to see the size of the

transducer you were using while you were shooting it?

MR. ADAMONIS: Use one-half by one. (inaudible)

MR. HUMM: I just wanted to establish that I assume you would expect to be able to see black or whatever this is with the spread inclination.

You couldn't have detected it.

MR. ADAMONIS: I have seen some 532 material with heat cracks in it at a high sensitivity indicate the responses for the tips and cracks.

But on the other hand, I've seen a steam generator weld, volumetric flaws near the inside surface, sized to Section XI methods, and oversized by factors of ten or more.

And those reflectors also were not physical with the straight beam, but behaved such that you could detect them both scanning directions, both scanning directions normal to the reflecting plane of the reflector, at 45 and 60 degrees.

MR. VARGA: I have a suggestion. You have, as I understood, that there is concluding remarks by Con Ed having to do with the history or what appears to be on the vessel, to correlate what we see here with some previous indication or occurrence.

How long will that take?

MR. ADAMONIS: Very brief.

MR. VARGA: I'd like to conclude that before we break. Then my suggestion is that the staff caucus in terms of assembling a series of questions that we may like to ask in somewhat ordered way without giving anyone short trip.

But let's do that after your discussion, the concluding discussion, and then we'll take a small break.

MR. GROSCUP: This is .. we were able to uncover some photographs taken at the time the vessel was being installed.

We would not say that what these photos indicate is what we are seeing. Rather, we are saying this is a possibility.

I think our conclusion is more that we have identified an indication at or near the surface which is structurally insignificant and we are not pointing to either what I would show in this photo, which I will leave with you, photos, or what may have been there when the original X-rays were shot.

But they are two possible, possible scenarios in the exact location where we are identifying this indication.

These are just two photographs of the vessel at the time it was being lifted. We have been able to

absolutely identify that a ... you won't be able to see much more than a right mark.

This is discoloration there, is where we are getting the indication. We have been able to locate the axis of the vessel because of other shots that we had coming in this way.

And the array at the bottom of the vessel was not symmetrical. So we have been able to fix the axis of the vessel.

You can also see from this where the circumferential weld is, so there are two photos, just different shots, both of which show a discoloration at the spot where we are getting this indication.

We are not concluding that that's the source of the indication, but as a possibility for that.

So we'll leave this with you.

MR. VARGA: Let me ask one question. When you mention .3 as a maximum, could that be smaller than that?

MR. GROSCUP: Yes.

MR. VARGA: You're not saying it is .3, but the maximum that it could be is .3. But it could be much less than that?

MR. GROSCUP: Yes.

MR. VARGA: Okay. Let's take a break.

AUDIENCE MEMBER: What's the date of these photographs?

MR. GROSCUP: '68.

(Whereupon, a short break was taken.)

MR. VARGA: Okay. We are back on the record. So if everyone will take their seats, I guess we have some comments Dick is going to sum up.

MR. VOLLMER: On the basis of what we heard this afternoon, I will characterize the staff's view, that it would appear without saying we completely agree or disagree with what we've heard, that there are some fairly good arguments that you've presented with the supplemental information and measurements that you've made after the first finding was found, that the reflector would not be a threat to the vessel, would fall under code allowables.

However, we do feel that there are some confirmatory measurements which we feel would be necessary to make, and which we will detail by letter to you early next week.

These measurements would be on the calibration block and not require at this point in time any as we see them now.

And if they're successful in their resolution, it would not require any further in-vessel measurements.

For example, we feel that putting a code allowable notch in your calibration block and going over with the techniques that you used, the latter says your measurement, just to see that this would give measurements more significant than what you've found, would be a solid piece of evidence which you have.

Secondly, we would like you to consider, and again, all of these items will be specified as best we can in a letter.

Maybe we'll need an additional meeting to nail down the specifics, but we think we should look into enhancement of the radiograph that you do have, to see if this would give us any further evidence of value.

Thirdly, we think you should go back, since you can, to look at fabrication records, to see if these point to anything in this particular area.

Fourthly, we think, if you haven't already, that some sort of a fracture mechanics evaluation should be made to show the acceptability of the vessel under the worst interpretation of the measurements that have been made.

I think those are the four major items that we would like to describe to you in a letter for further information.

In the interim, we feel it would be acceptable, of

course, at your own risk, to reload the internal support.

And we would want to have this information to allow us to write a staff report prior to the time that you want to go back into power operation.

I guess that's mid-September, so time is fairly short.

In addition, I think since CE was sort of your independent evaluator, I think I would like to see CE write a report to you as an independent evaluator and have you send that to the Commission, and give to us their independent views of what they've seen.

I think that will keep them set aside as an evaluator in this case.

And lastly, I guess, depending on what results of all these other evaluations and staff findings and if we feel that there is something that we still have nagging doubts about, characterizing the reflector and so on, we'd have to certainly consider possible actions in the future, perhaps an inspection before the next ten-year cycle, something like that.

I don't want to characterize those now, but I think those would not be completely out of the question, unless we're ready to put this thing to bed.

MR. GROSCUP: Dick, just a couple of points for

further clarification. We have had Combustion into an intensive record search in Chatanooga.

We didn't bring it up because it didn't reveal anything. And we will continue to pursue that. Now that record search included our sending a man down there so that we could get a hands-on feel for what was going on.

So that has been pursued, and if there is any additional information, until they run it to a conclusion, they just can't do anymore, that will be continued.

MR. VOLLMER: Well, presumably we could record that in our response.

MR. GROSCUP: Sure.

MR. VOLLMER: I assumed you were looking in a lot of different areas.

MR. GROSCUP: Yes.

MR. VOLLMER: And if they're negative, fine. But I think for the record we want to know that those looks were negative.

MR. GROSCUP: And additionally, at the end of the detection phase, when we were developing our course of action to technically resolve what we had, one of the contingency items that we launched was a fracture mechanics exercise both with Westinghouse and

Combustion and they have completed an overview type evaluation already, both.

And both are in the advanced stages of concluding the detailed specific fracture mechanics.

That we launched early on, because we didn't know what we had, and that will be a part of the record.

MR. VOLLMER: We sort of figured you had those under way.

MR. GROSCUP: Again, that was done at a time as a contingency, because we didn't know what we had. That will be part of the record.

MR. VOLLMER: Are there any other additions or subtractions or clarifications? We may wish for additional detailed questions and have some conversation up there, which I suppose should be on the record.

MR. VARGA: If it's for clarification, I'm not sure they necessarily have to be, but if it's new questions that we have to address, I think it would be better to be on the record.

MR. VOLLMER: So even though as hot as it is, perhaps we'd be available for a little bit after these remarks to discuss specific items.

MR. CHENG: I have a question (inaudible) based on the Section XI requirement. (inaudible)

MR. VOLLMER: We can address it down there. Repeat your question.

MR. CHENG: What number is (inaudible). Therefore, my regulation.

MR. ADAMONIS: 2.03.

MR. CHENG: By regulation, though, that's eventually augmented inspection rather than regular inspection? (inaudible). No? Is the answer no?

MR. VOLLMER: Let's not guess. Your question was, since you have to report a flaw to the code inspection of two inches of so, does this mean that the inspection, the frequency of inspection needs to be augmented by the code rules.

MR. CHENG: Right.

MR. ADAMONIS: Not if one would demonstrate that in fact that size was exaggerated by the nature of the technique that was applied.

I think there is plenty of information available that would indicate that these techniques are...

MR. HAZELTON: The question is, does the code legally permit you to do that?

MR. VOLLMER: Well, we can all wrestle with that one.

MR. HUMM: Do you have an agreement to authorize inspection as far as assessment and (inaudible)

MR. WASILENKO: Can I respond to that? We had an authorized inspector on-site. I'll have to address that question to him, rather. I can't answer that myself.

MR. O'TOOLE: If there is nothing else, I'd like to say that on behalf of Con Edison and associates, Westinghouse and Combustion, this has been a very satisfactory meeting, needless to say, but your response has been excellent.

We had some pretty good guys helping us. I appreciate their help, but I think your fellows and the response you got was prompt and thorough.

I think this shows that NRC is capable of doing this kind of thing, and I think it's very encouraging.

MR. VOLLMER: Thank you.

MR. VARGA: That's all I have.. I appreciate you all coming. Unless there's something else, we might as well call this day to a close.

(Whereupon, the meeting ended at 4:25 p.m.)

CERTIFICATE OF PROCEEDINGS

This is to certify that the attached proceedings before the NRC COMMISSION

In the matter of:

INDIAN POINTNUCLEAR GENERATING PLANT, UNIT NO. 2

Date of Proceeding: Saturday, August 11, 1984

Place of Proceeding: Bethesda, Maryland

were held as herein appears, and that this is the original transcript for the file of the Commission.

MELBA REEDER

Official Reporter

Official Reporter - Signature

Official Transcriber
D. Reed

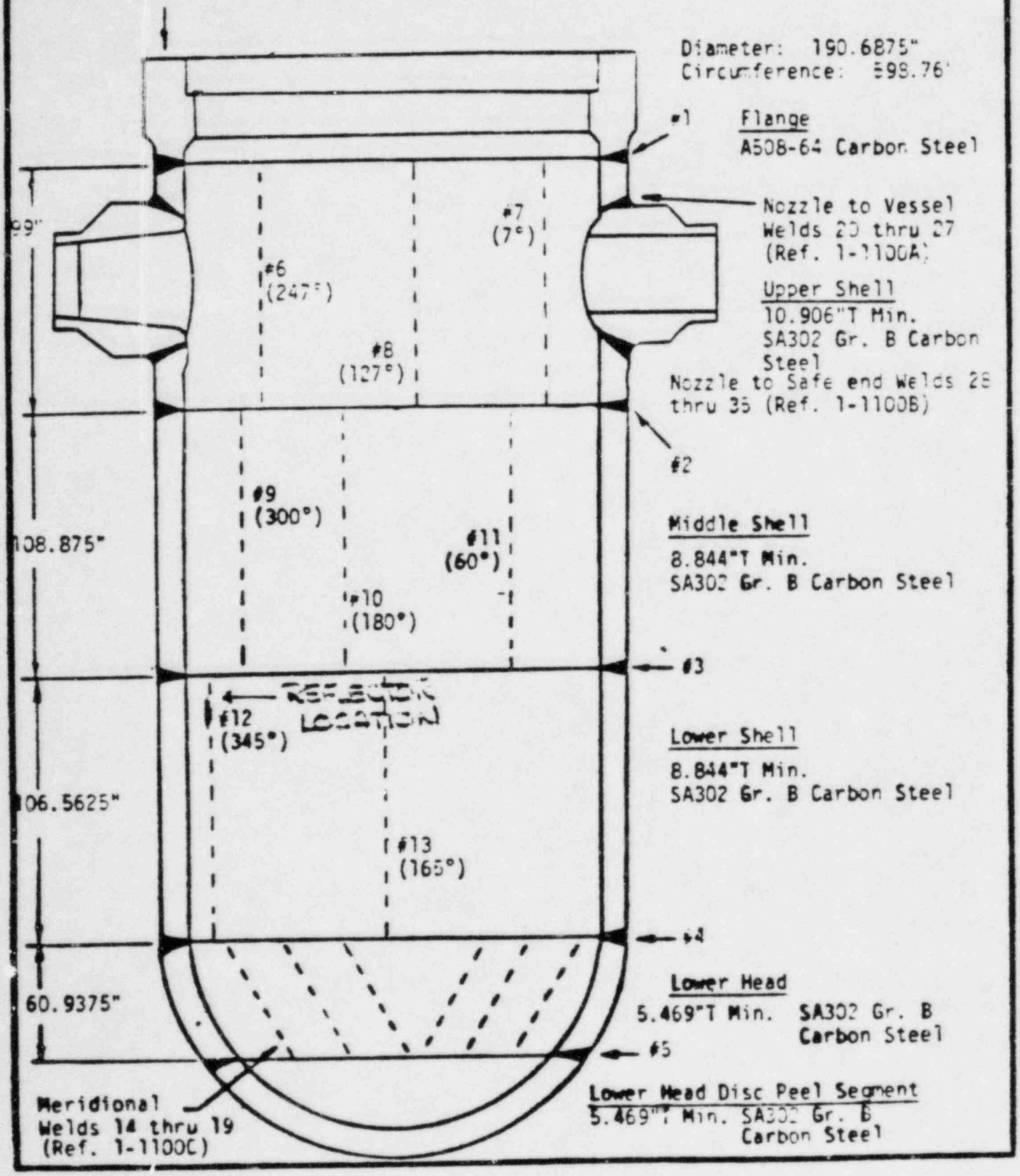
I. Indication Summary

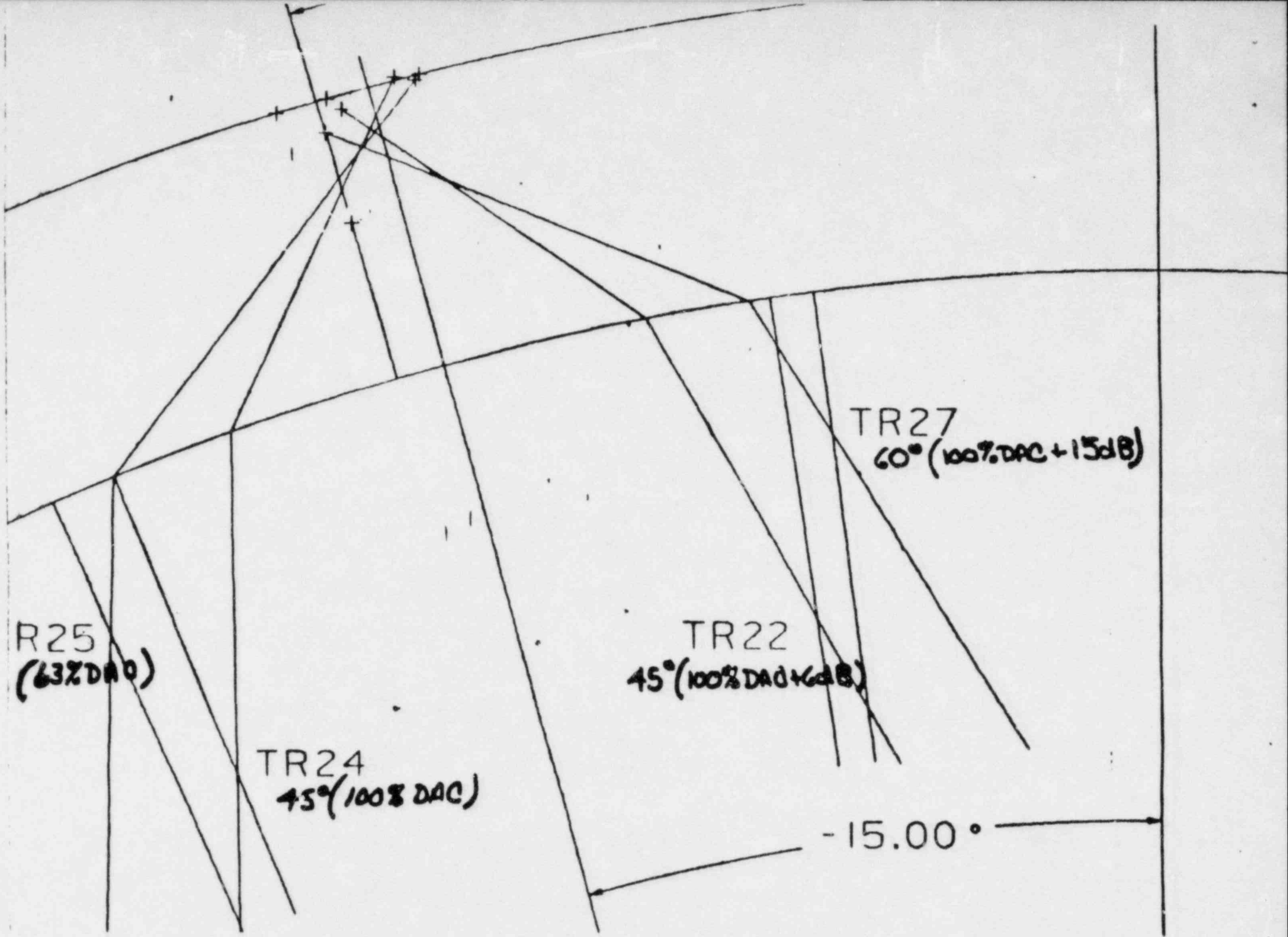
- Lower Shell Longitudinal Weld - 345°.
- 3-inches Below Intermediate-to-Lower Shell Circumferential Weld.
- 45° and 60° detections in both circumferential directions.

Illustrative Only

IPP-I-1100
Rev. 2: 2-84

REACTOR VESSEL




TR27
60° (100% DAC + 15dB)
R25
(63% DAC)
TR22
45° (100% DAC + 6dB)
TR24
45° (100% DAC)
-15.00°

II. REFLECTOR UT ESTIMATED DIMENSIONS

- ASME XI / R.G. 1.150 - 50% DAC CRITERIA.
  - $2a = 2.03"$ SURFACE
  - $\ell = 1.96"$
  - EFFECTIVELY SIZED TO 21 dB DROP POINTS.
- BEAM SPREAD DETERMINATION IN VERTICAL PLANE (2.4° HALF ANGLE)
  - $2a = 1.2"$ LOWER EXTREME .25" FROM OD SURFACE.
  - $\ell \sim 1.96"$

INVESTIGATION

I. • ESTABLISH EFFECT OF BEAM SPREAD ON NOTCH SIZING.

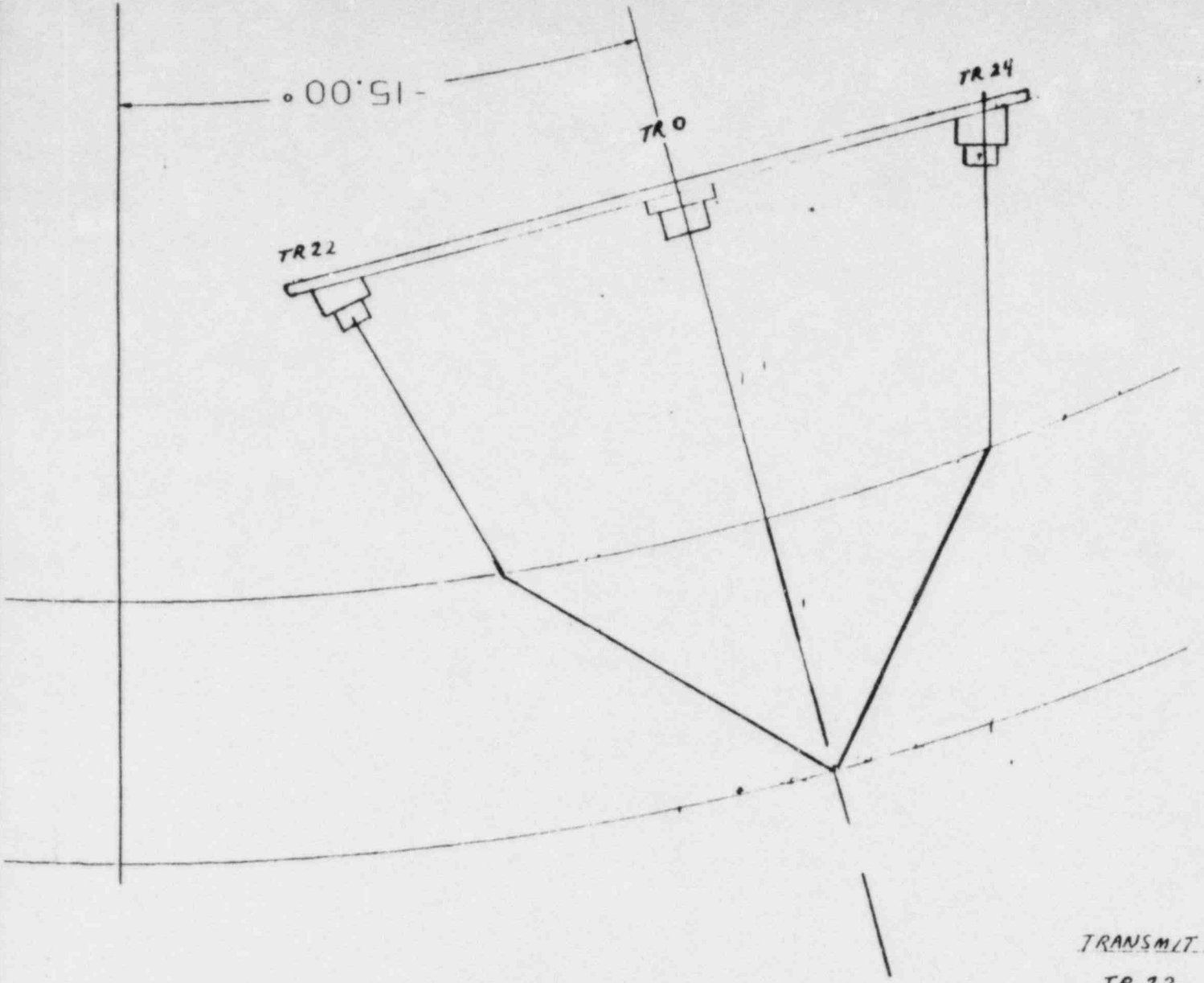
• AT CALIBRATION THE 2% NOTCH IN THE IPP 9" CALIBRATION BLOCK (0.180" DEEP).

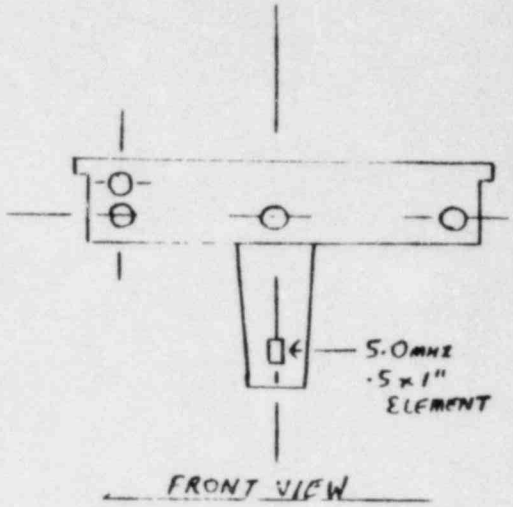
- 1.68" APPARENT DEPTH AT 14dB DROP POINTS

• NOTCHES OF 30° & 45° CONFIGURATION - SIMILAR RESULTS

II. • DEVELOPED TRANSDUCER ARRAY

- 45° PITCH-CATCH
- DELTA TECHNIQUE
- HIGH FREQUENCY (5.0 MHz) STRAIGHT BEAM





FRONT VIEW

TRANSMIT	RECEIVE	TRANSIT TIME
TR 22	TR 24	188 μsec (BACKWALL)
TR 24	TR 22	188 μsec (BACKWALL) (PREDICTED 184.8
TR 22	TR 0	131-133.6 μsec (PREDICTED 132.8
TR 24	TR 0	131-131.6 μsec

CONCLUSIONS

- REFLECTOR SIZE IS NOT 2.03" - 2σ OR 1.2" - 2σ AS PREDICTED BY 50% DAC SIZING METHODS.

- DELTA TECHNIQUE INDICATES THE REFLECTOR IS AT OR VERY NEAR THE VESSEL OD SURFACE

- DELTA TECHNIQUE WOULD INDICATE A DEPTH OF 0.3" AS A WORST CASE.

Independent Evaluation
of
Indian Point Unit 2 RPV Exam

Phase I - Review of Section XI Exam Data at Vessel Elevation 236° and at 345°

Phase II - Evaluation of Further Testing for Disposition of Indication.

Results of Phase I - Review of Exam Results

- Indication was to be considered as surface connected planar.
- Indications found in the region have to be treated as multiple indications until further proven to be at same vessel location.

- By using Sec. Code and Reg. Guide Techniques the lower limits of bounding the 60° Information resulted in conclusion the Indication is smaller than the Beam Size.

∴ Further Testing is Required

Phase II - Evaluation of Disposition

- Mockup of OD Geometric reflectors
- Evaluation of proposed testing
- Independent conclusions based on results of Testing

Conclusion # 1

- Evaluation of OD 2% Notch with 60° gives same beam profile as the indication in the RPV

- Amplitudes from 60° in RPV can be reproduced from a back side of a .25" Butress Notch sloped at 30°

conclusion # 2

- Delta (45° TO 0°) from both sides of the reflector gives the same vessel position

- Pulse echo 45° from both sides of reflector gives same vessel position

∴ Single Indication

Conclusion #3

- Delta shows max. depth to be .3 inches

- 45° TO 45° shows no loss of signal ∴ Indication is too small to cause shadowing