UNITED STATES OF AMERICA

NATIONAL TRANSPORTATION SAFETY BOARD

Investigation of:	*	
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ENBRIDGE - LINE 6B RUPTURE IN MARSHALL, MICHIGAN	*	Docket No.: DCA-10-MP-007
	*	

Interview of: PETRA SENF

Volume 2 (Parts 4-6)

GE Pii Facilities
Calgary, Alberta
Canada

Thursday,
January 12, 2012

The above-captioned matter convened, pursuant to notice.

BEFORE: MATTHEW NICHOLSON
Investigator-in-Charge

APPEARANCES:

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Hazardous Materials Investigations
National Transportation Safety Board

RAVINDRA CHHATRE, Chair
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I N D E X

I N D E X

I N T E R V I E W

MR. NICHOLSON: Okay. Let's go on the record. This is NTSB Pipeline Case No. DCA-10MP-007, Enbridge Energy, July 2010, crude oil release in Marshall, Michigan. These are the Integrity Management Group follow-up interviews being conducted at the GE Pii offices in Calgary, Alberta, Canada. Today is Thursday, January 12th, 2012.

Let's go ahead and go around the room. We're continuing with our interview of Petra and we'll go around the room and just have everyone state for the record their name. No contact information is needed. I'll start. Matthew Nicholson, NTSB, IIC.

MR. CHHATRE: Ravi Chhatre, NTSB, Integrity Management Group here.

MR. PIERZINA: Brian Pierzina, PHMSA, Central Region, Kansas City.

MS. SENF: Petra Senf, Pii Pipeline Solutions.

MR. KILLORAN: Bill Killoran, GE Oil and Gas.

MR. FOREMAN: Geoff Foreman, Pii Pipeline Solutions.

MR. JOHNSON: Jay Johnson, Enbridge, US Compliance.

INTERVIEW OF PETRA SENF

BY MR. NICHOLSON:

Q. Okay. Petra, we'll continue along the same lines that we were yesterday, namely, talking about the six features on this failed segment of pipe. And then what I'd like to do maybe is start with this and just go back and -- I'd like to go to back

through each of the features starting with the 9.3-inch flaw and just maybe have you again walk us through what you see now versus what it was called then. And if you could, to begin with, can you just confirm, were all six of these features considered Step 1?

A. Yes, all of them.

Q. Okay.

A. Yes, um-hum.

Q. And with that I'll come down there. And as we discussed before the interview I'd like to -- you know, we'll just go through the crack field versus crack-like and then also the orientation because I've got the report here. I want to be sure we understand whether it's above or below that weld seam.

A. Um-hum. Okay. So I start with feature ID 154-005538. This feature is located at 11.04 feet from the upstream girth weld.

Q. Okay.

A. The girth weld number is 2-17-720. So the first feature was classified as -- this feature was classified as crack-like with a depth of 25 to 40% deep with a length of 9.3 inches. The circumferential position given in the software is 100 degree and the position of the long weld is given with 96 degree.

Q. Okay. That's consistent with what I see in this report. And then just for clarification that -- the feature orientation degrees because it's a box and it has width, where is that selected? Is it the centerline?

A. So it's the centerline of the box, yes.
Q. Okay.
A. And so, the feature was located at the -- below the long weld, this feature here. And do you want me to go through all the sensors and tell you what I see or --
Q. Yes. Let's do that.
A. Okay. Good. Also the empty sensors or just the ones where I have a signal?
Q. Just the ones where you have a signal I think would be --
A. Okay. Okay. I'll start with sensor 1-4. And I see reflections of the crack field. Also with amplitude or --
Q. Yes.
A. Okay.
Q. Well, in fact, what I was going to ask -- so we are looking at what you would classify this as a crack field.
A. Um-hum, um-hum.
Q. In this crack field can you tell me then what the longest indication might have been out of this crack field and then how you would size the depth? Is that possible?
A. Okay. The longest indication -- so what I would do, I would manually measure all the -- if I can just -- then I can see it that here on my screen.
MR. KILLORAN: Matthew, just for clarification of the record, are you asking her for the longest -- the length of the

longest pixel within the crack field or the length of the crack field?

MR. NICHOLSON: The length of the longest crack within the crack field.

BY MR. NICHOLSON:

Q. Isn't that -- well, you tell me. It's a definition -- it's a GE definition, right? Longest indication?

A. So we have the overall lengths and we also try to identify the longest indication in a crack field, that's right.

Q. And the overall length we have.

A. Yeah, we --

Q. That's the 9.3, correct?

A. Correct, yes. Um-hum.

Q. Okay. I'm looking for the longest single entity within that 9.3.

A. Okay. So the process today would be that it's determined by the software so the analyst doesn't measure it, so the software is determining it.

Q. Is that something you could run? You have that software? You're saying -- is that the algorithm we've been discussing? Okay.

A. Yes.

Q. Are we capable of running that from here?

A. Yes, we -- yes, I guess we are.

Q. Okay.

A. Okay. I just need to open the software because I cannot --

MR. FOREMAN: This could take time.

MR. NICHOLSON: Oh, is it going to take --

MR. FOREMAN: She's accessing the server from Germany now, I think.

BY MR. NICHOLSON:

Q. Ah.

A. Yes, so -- yeah, the data -- the database is in Germany and the data is on my computer.

Q. Okay.

A. So it will take some time, but let's just continue with all the other things we have and later --

MR. CHHATRE: But what -- this is Ravi, NTSB -- a question. What you are describing now, like crack field, that's interpretation today or interpretation in 2005?

MS. SENF: This is the interpretation today.

MR. CHHATRE: Okay.

MS. SENF: Yeah, um-hum.

BY MR. NICHOLSON:

Q. And to clarify again -- this is Matt -- in 2005 then would they have sized the longest indication manually? I mean, would that be an analyst's job?

A. Yes, right.

Q. Not software?

A. No.
Q. Okay.
A. That was a manual task, yes.
MR. FOREMAN: Did we in 2005 give the longest indication inside a crack field?
MS. SENF: Yeah, we give that quite for a while, um-hum. Yeah, but it wouldn't -- so it -- we took that out of the B-scan this longest indication, which isn't really a correct --
MR. FOREMAN: I didn't realize it was an Enbridge --
MS. SENF: -- or accurate thing to do.
MR. FOREMAN: I didn't realize -- was that an Enbridge deliverable to give the longest indication in a crack field?
MS. SENF: Well, it just -- it was a standard deliverable also in 2005, yes.
MR. NICHOLSON: There's a column in your 2005 report.
MR. FOREMAN: Right.
MR. NICHOLSON: It says LI.
MS. SENF: Yeah.
BY MR. NICHOLSON:
Q. I'm assuming that's your longest --
A. That's the longest indication.
Q. Okay.
A. Correct.
MR. FOREMAN: So just -- I didn't quite catch it. What was the start position from the girth weld of this defect and the

end position in feet from the girth weld?

MS. SENF: There isn't really a distance. I haven't given that value because there isn't really a distance between the long --

MR. PIERZINA: 11 --

MS. SENF: -- and the indication itself.

MR. FOREMAN: Well --

MR. PIERZINA: 11.04 feet downstream from the upstream girth weld.

MR. FOREMAN: Yeah, 11 --

MS. SENF: Okay. Okay -- um-hum.

MR. PIERZINA: And 28.95 from the downstream.

BY MR. CHHATRE:

Q. Petra, this is Ravi again. So we are looking at the big box that we have initially and then we are going into that big box and looking at five different indications. Is that correct?

A. Right. Then I'll look at that data of the different sensors.

Q. Right.

A. Yes, um-hum.

Q. And that long box contained 51-inch -- indication of this long box is 51 feet -- 51 inches indication?

A. There are six boxes in this pipe joint.

Q. The rupture pipe joint?

A. Yes, right.

Q. Okay.
A. And right now I'm looking at one at 11 feet, so this is not --
Q. Not -- so not (indiscernible).
A. -- not part of the failure.
Q. Okay.
MR. NICHOLSON: We're going to do --
MS. SENF: So --
MR. NICHOLSON: I'm going to ask her to go through all six.
MR. CHHATRE: I just want to make sure that I understand it.
MR. NICHOLSON: Okay.
MR. CHHATRE: And now, I understand what you're saying.
MS. SENF: Um-hum, okay.
MR. CHHATRE: So, the first one that we are looking at in that pipe joint?
MS. SENF: Correct.
MR. CHHATRE: Okay.
MS. SENF: Correct, yes. Okay, so the first sensor I look at it's 1-4 and I see crack field indications with a mean max amplitude of 41 dB.
MR. PIERZINA: This is Brian. Petra, on the right-hand side of the screen we're seeing an amplitude of 44. Now, is that going to be a value coming from a different sensor than the one

that we're looking at?

MS. SENF: Yeah, so this is the absolute or the maximum amplitude we have in that feature.

MR. PIERZINA: Okay.

MS. SENF: Not necessarily from this sensor here.

MR. PIERZINA: Thank you.

BY MR. NICHOLSON:

Q. Okay. That's the maximum amplitude for this feature?

A. Yes.

Q. Okay. Not of this sensor?

A. Yeah.

Q. Okay.

A. The mean max five amplitude on that feature.

Okay. The next sensor it's 1-5. I also see crack field indications in the half skip and also some red reflections from -- they are from a little cracking indication in the first skip. The maximum amplitude here is 40 -- about 40 dB, so again mean max five amplitude.

The next sensor, it's 1-6. I can see reflections off the longitude in the weld.

Q. Say that one more time. What was it? The crack? Oh, reflections, I'm sorry.

A. No, a reflection -- right.

Q. Okay.

A. A reflection of the longitude in the weld. No defect

indications with the weld. The next sensor 1-7 it's -- it also shows reflections off the long seam, no defect indications.

MR. CHHATRE: Petra, this is Ravi. Are these sensors, now they are -- can you tell if they are looking at the clockwise or --

MS. SENF: So, these are all the clockwise sensors we're talking about right now.

MR. CHHATRE: Okay.

MS. SENF: It always starts -- when I open a box it always starts with the clockwise sensors.

MR. CHHATRE: Great.

MS. SENF: Okay. And the next one it's 1-8. Some weak reflections off the longitude in the weld, no defect indications.

And 1-9, sensor 1-9 shows me also some reflections off the long seam, but not in that area where my defect indications of the previous sensors is. So it's just upstream and downstream of it, so this sensor didn't detect any data at that position, which is fine. So it's just the longitudinal weld reflections might be that low that they're not going to record it.

BY MR. NICHOLSON:

Q. Okay.

A. So these were the sensors off the clockwise side and now I move to the counterclockwise. The first one I see it's 16-29. Some weak reflections from the -- a background signal I would call it. The next sensor is 16-30 and here I see some weak

reflections. Knowing that there is a crack field I would assume that these are the reflections in the one-and-a-half skip from the crack field, which will be displayed in a later sensor better. So, reflections of a crack field in the one-and-a-half skip and --

Q. Would you look at the -- would you go the amplitude on that one?

A. Okay.

Q. Or would -- or do you --

A. Yeah, yeah.

Q. Is there any need to --

A. So maximum amplitude there would be 30 dB --

Q. Okay.

A. -- mean max five. The next sensor I see it's 2-16. I see similar data. I see reflections in the half skip and in the one-and-a-half skip of a crack field. And the maximum amplitude here about 35 dB. And the next sensor, 2-17, I can see nice reflections of a crack field in the one-and-a-half skip with a maximum -- mean max five amplitude of 44 dB.

MR. FOREMAN: Is that the strongest one?

MS. SENF: This is the strongest one, yes. Yeah, 44 is the strongest.

The next sensor it's 2-18. And here also I have some reflections in the half skip with a maximum amplitude of 41 dB.

MR. FOREMAN: So just for the record, when you say maximum -- that just say max mean five.

MS. SENF: It's mean -- it's always mean max five.
MR. FOREMAN: It's not the actual --
MS. SENF: Yeah, it's always mean max five.
MR. FOREMAN: -- maximum signal amplitude.
MS. SENF: Um-hum.
BY MR. PIERZINA:
Q. This is Brian. It appears, upstream and downstream of this feature we are seeing some weak reflections.
A. Um-hum.
Q. Would that be a minor crack field or something?
A. Minor -- yes, yes.
Q. Okay.
A. And -- yeah, I guess at the beginning and the end of this stronger crack field -- yeah, um-hum.
MR. NICHOLSON: Well -- so you're referring to these here?
MR. PIERZINA: Yep.
MS. SENF: Yeah, these ones --
BY MR. NICHOLSON:
Q. Well, what -- are those in another box feature? What would be -- or would you ignore them?
A. Today I would box it not only on the red pixels, I would box it also on the yellow pixels. So, today they would be included in that crack field.
Q. Oh, you would extend this to pick it up?

A. I would extend it. Yes, right.

Q. Okay.

A. Um-hum. In the past it was too minor because this is way too low. Maybe as -- yeah, surface ID of a crack field below the spec.

Okay. There is one -- there are a few sensors left. Sensor 2-19 I see some reflections of the longitudinal weld in the one-and-a-half or between the one-and-a-half and the second skip. No defect indications. And in sensor 2-20 I also see reflection of the longitudinal weld, no defect indications. And the last one I guess is -- yes, is 2-21. Some reflection from the entry point and also some reflection from the background, no defect indications, no longitudinal weld indications.

BY MR. CHHATRE:

Q. Petra, this is Ravi. Now, I notice you have three, six, eight sensors on -- going counterclockwise, but you only have like six going clockwise. Is that normal or --

A. Yeah, so I did not -- I didn't mention the -- so in my box or in my list of sensors I always have the same number of sensors clockwise and counterclockwise.

Q. That's what I thought.

A. But -- so some of the sensors might not record anything. So it's still in my list, but there is no data because I didn't mention it.

Q. Okay.

A. Yeah, um-hum.

Q. So the sensors that are not mentioned is -- they have nothing to report.

A. No data. Right. Yeah, nothing to report.

Q. But you will have eight clockwise, eight anti-clockwise? Have the same number for both?

A. Yeah, right. Um-hum. Um-hum. Right.

MS. SENF: Okay, so --

MR. NICHOLSON: Has our algorithm come up yet?

MS. SENF: Yes, so this is the real database here. Let me see if I'm in the right mode. Yes, I'm in the right mode. So let's --

MR. KILLORAN: Petra, just for the record would you describe what you're showing in the monitor to your right?

MS. SENF: Okay. So I have opened the same data set again. So, previously we looked at the client database so -- where only the reportable features are included. And now I am -- I'm looking at the same data on a database located in Stutensee and there I can change a few things. I can change the feature type and I also can change -- or can calculate the depth.

Okay. So first thing what I will do is -- oh, yea, yeah, yea. That's the bad thing (indiscernible) -- I'll give it a try.

What I will do now, I will do all the steps which an analyst is doing when he's checking a feature. So here I see the

crack field indications. I don't do anything with these. I accept them and all the reflections from the long seam, which do not correlate or -- which are not part of the crack field are, I try to -- the problem is I cannot -- well, let's do it differently. Let's do it differently.

So I will create a new area to be able to classify the feature and size it.

MR. FOREMAN: So the problem is, is there's already a data set created, so she's having to create a dummy set to do this exercise or it corrupts everything --

MR. NICHOLSON: I see.

MR. KILLORAN: Yeah, we definitely don't want her to be altering --

MS. SENF: Well, this is a database -- you see here it's called X Dummy dB. So, it's a test database. I wouldn't change anything on our operations database. But -- yeah, I cannot change this one here because it's -- just because it's a notebook on my laptop. The notebook where I can do the classification is too big for my laptop so I cannot --

MR. NICHOLSON: Oh, okay.

MS. SENF: -- I cannot accept any changes or save any changes. So it will take a while to insert the area --

BY MR. PIERZINA:

Q. While we're waiting -- and this is Brian -- can we discuss maybe the classification of this 9.3 feature?

A. Um-hum.

Q. Did you see anything that would cause you as an analyst to classify it as a crack-like?

A. No, I didn't see anything. There was one indication on the counterclockwise side in sensor 2-19 where I call it the longitudinal weld reflections. And this is what we also see in the failed feature with a strong amplitude, so this is the same indication. So it --

Q. Where is it? Is it up here?

A. Yeah, it's these indications here and --

BY MR. NICHOLSON:

Q. But they're not really in this section, right? They're not in that length?

A. No, right. But they are going through the whole pipe joint.

Q. Oh, okay.

A. And this might have led to the classification. But when the analyst started with this pipe joint, yeah, with a quality check of this pipe joint. He went through -- I'm sure he classified this as a crack field, but when he saw the crack in the later feature for the sake of consistency he changed it back or he changed it then to crack-like. This is my assumption.

Q. So I want to point to here, the orientation's -- that's 99.3.

A. Yes. So this is -- the orientation you see here it's

always at the entry point of the signal.

Q. Okay.

A. It's not necessarily --

Q. Oh.

A. -- the position of the defect itself. It's just -- so it's 99.3 so you --

MR. PIERZINA: But if you took your cursor up to that indication that you're seeing that would give you the orientation, right, of that?

MS. SENF: Yes. Here we have -- so it would be 99.5.

BY MR. NICHOLSON:

Q. But you're pointing here -- is that the indication --

A. No, I'm just pointing --

Q. That's the crack field though, isn't it?

A. Yeah.

Q. Oh, okay.

A. Okay, so --

Q. Okay. Yeah, so the crack field is at 99.5. So the orientation again that gets published on a final report, is that through the algorithm?

A. Yes, and --

Q. Okay.

A. -- it's the center of the box.

Q. It's the center of the box?

A. Yes, um-hum. Okay.

Q. But the crack-like -- what you thought might have been classified as crack-like is actually at 90 -- I'm sorry, was at --

MR. CHHATRE: Ninety-five.

MR. NICHOLSON: Was it 95 or 99? Was at 95?

MS. SENF: 95.8. Yeah, um-hum.

MR. KILLORAN: I'm sorry. A moment ago Matthew asked you if it was at 99.5 and you said yes. And now, it's 95.8.

MS. SENF: For the crack field is at 99.5.

MR. KILLORAN: Okay. That's what I wrote down.

MS. SENF: Yeah. And this indication here, which might have led to the crack-like reclassification is at 95.8.

MR. KILLORAN: Okay.

BY MR. PIERZINA:

Q. So -- and this is Brian here -- so that indication that we're looking at for sensor 99.3 that's, that's not -- well, that is right at the long seam, correct?

A. Yes.

Q. 95 --

MR. NICHOLSON: Yeah, 90- --

MS. SENF: It's 95.8.

MR. NICHOLSON: Yeah, right.

MS. SENF: 95.8.

MR. NICHOLSON: Because 96, I think -- right.

BY MR. PIERZINA:

Q. 96 is --

A. Yeah, um-hum.
Q. Okay.
A. Okay, so the feature is here. Sorry. It doesn't work on this database, but I will open another file and -- if I'm able to do that.
Q. And what we're trying to do is use the current algorithms to determine the longest indication?
A. Um-hum.
MR. NICHOLSON: Would it be easier just to do it manually as they had done in 2005?
MS. SENF: Yeah, I --
MR. NICHOLSON: Maybe that's what we should do.
MR. CHHATRE: I think --
MR. NICHOLSON: Do you want to do that?
MR. CHHATRE: -- that will tell us the 2005, which is what we are really --
MS. SENF: Um-hum. Okay.
MR. NICHOLSON: Okay. I apologize if that's too much --
MS. SENF: Okay.
MR. NICHOLSON: I didn't realize that was -- you know, how long it would take.
MS. SENF: Go back -- so this one here, 3 inches here -- 4 inches -- 4 inches would be the longest indication.
MR. NICHOLSON: And then --
MR. CHHATRE: That will be for which defect now? Repeat

it.

MS. SENF: No, it's the defect 154-005538.

MR. NICHOLSON: And which sensor did you pull that off of?

MS. SENF: I pulled that off sensors -- I look at all the sensors and I -- then I took it out of the sensor 1-5.

MR. NICHOLSON: Okay.

MR. PIERZINA: This is Brian here. One of the questions I wanted to ask -- and maybe this is a good point to do it -- when a client requests a detailed feature profile, I'm interested in what that process is and what's done. And I know that in this instance this feature they did request a detailed profile of. So if you could maybe walk us through that process?

MR. KILLORAN: Can I just -- from a process standpoint, do you want to park that and let her go through all six features first?

MR. PIERZINA: I'm happy to --

MR. KILLORAN: It's up to you, but --

MR. PIERZINA: I'm happy to do whatever. Just, you know, if it's easier to -- you know, that's a -- that was something that was done specifically with this feature.

MR. NICHOLSON: Yeah, you know, I think we do it now because it was on this feature profile.

MR. KILLORAN: Okay.

MR. NICHOLSON: So it would mean more to us --

MR. FOREMAN: But it wasn't done in 2005, right?
MR. NICHOLSON: Yes, it was.
MR. PIERZINA: Yeah.
MR. NICHOLSON: Yeah, this one feature was profiled in 2005.
MR. FOREMAN: This one?
MR. NICHOLSON: This one, yeah.
MR. PIERZINA: Okay.
MR. NICHOLSON: And it gets to the next -- well, the other question I asked was the depth and I -- we'll probably hit that as you do the profile maybe, so --
MS. SENF: Um-hum, um-hum.
BY MR. PIERZINA:
Q. And one of the questions would be who would provide that detailed profile of the feature? Would that be the analyst or a QC person or a team lead or, you know --
A. So in 2005 -- so, shall I explain how we have done that in 2005 or --
Q. Yes, please.
A. Okay. So in 2005, it was a special request for Enbridge. We didn't do that for any other customers. We didn't have the software for it. So then what we did, we went through all the sensors and looked always for a change in amplitude, I would say. And so, for the first inch the maximum amplitude was 30 dB, so he wrote that down, the analyst, 30 dB for the first

inch. And then, here this is a longer feature. Then he took that one here, 4 inch with an amplitude of 40 dB. And then he looked for the down -- what is after that 4 inch -- maybe the data is here -- another 1 inch with 36 dB, and 2 inches with 40 dB, and another 2 inches with 30. So it was quite a manual process, which wasn't even reliable, I would say, at that time. So it's just going through and seeing are there any changes in amplitude and writing down the changes.

Q. And this is Brian. Then would the analyst need to do that with each sensor. I would expect to -- because what we just did we never got to the 44 dB amplitude, that somewhere there must be, right?

A. Yes. So he did do that and for every sensor then he combined it or he took the most severe sensors. In this case I noticed we have four most severe ones. And then he went through and looked for the changes in amplitude and the maximum amplitude in there.

MR. NICHOLSON: The mean max five?

MS. SENF: It was -- yeah. If -- when I talk about maximum, it's always --

MR. NICHOLSON: Right. It was still mean max five?

MS. SENF: -- the mean max five, yeah. So --

MR. NICHOLSON: Okay.

MS. SENF: Um-hum.

BY MR. PIERZINA:

Q. So can you tell us what you would have reported this step as manually? Was it the 46? How many -- what would be the maximum depth reported for this crack?

A. Forty-four.

Q. Forty-four --

A. Um-hum.

Q. -- dB?

A. dB, yes.

MR. CHHATRE: I think that came from your sensor 2-17 at one-and-a-half -- I think the maximum came.

MS. SENF: 2-17 --

MR. CHHATRE: You said one-and-a-half --

MS. SENF: 2-17.

MR. CHHATRE: Yeah, 2-17 one-and-a-half, decibel 44.

MS. SENF: Yes, um-hum. Right, yes.

And so, these profiles were provided for crack-like indications, right? Here it is -- it is difficult to provide a profile because we have several sensors. And for a crack-like indication it's easier because you have one crack-like indication and you have the individual changes in amplitude which you can identify easily. For this crack field for me it's almost impossible to create a representative profile --

MR. NICHOLSON: I think the way it was reported was a single depth, right? A start and an endpoint and a single depth?

MR. PIERZINA: Kind of like --

MS. SENF: Yeah.

MR. NICHOLSON: No, not the 9.3. It was reported back, I think, as start/end and one depth. It didn't -- now, the 51-inch they did more recently was a nice --

MR. KILLORAN: Do you need to look at the report to see what provision they're referencing?

MS. SENF: It would be good to see that, yes. But I --

MR. NICHOLSON: We've got the report.

MS. SENF: -- could imagine that they took these 44 dB over the whole length, yeah.

MR. NICHOLSON: Okay.

MS. SENF: -- because we don't release -- here -- when I look at this area here, I have a low amplitude but I have a higher amplitude here in the same area, or when I go to the clockwise here I also have here a high area, so the analyst can not really pull out a profile of that. It is most probably the maximum length -- the maximum amplitude over the whole length, yeah.

MR. PIERZINA: Okay. And this is Brian again. I guess, you know, one of the questions would be, you know, it seems that this would have been another opportunity for an analyst to say, well, this doesn't look like a crack; it looks more like a crack field, which I don't know if that would ever happen on a special request if --

MS. SENF: Yeah, so there is a -- kind of a process that we see. If something was reported in Step 1, we don't change it

in Step 2 or later because it -- so this feature here was reported and put in the report. The profile was created -- I assume the profile was created when we generated the report. So the people are reluctant to change anything when it has already been gone to the client. If it's real serious, that we say, okay, we classify it as below 1 millimeter and now we see it's above 3 millimeter, of course, they will change it.

But here, okay, it should be a crack field but it is a crack-like. I would assume that -- okay, it's more (indiscernible) so we don't change it. So, there is -- it's not really mandatory, but we shouldn't change anything when it has already been reported to the client, if it's not really -- if it's severe we have to change it, but if not, we leave it as it is.

MR. PIERZINA: Okay.

BY MR. NICHOLSON:

Q. So the number I get -- can you just confirm the 44 equates to a 2 millimeter defect; is that correct?

A. Correct.

Q. Okay.

A. Yes, um-hum.

Q. Which would be 27.4% of a .285-inch wall, which puts it in this bin, the 25 to 40 bin. Okay. That works. Except when -- I thought it was -- when it was profiled was it a .09 depth? Do we -- do you have that profile? You don't have the report, do you, Petra?

A. No I don't have it here in my computer.
Q. Okay.
(Phone rings.)
MR. KILLORAN: Somebody's BlackBerry is ringing.
UNIDENTIFIED SPEAKER: That's Matt's.
MR. CHHATRE: It's Matt's.
MR. NICHOLSON: Well, I'm not going to -- I'm not going to answer. It will be on the transcript now, but --
Bear with me. Here we go, .2 max depth -- oh, it was reported -- the feature profile was reported -- this is what it looked like, I guess. It's -- 5538 is the feature. That's how it came back. So, I guess it came back as percent wall 29%, which would have been greater than the 44 dB, but not by much. Did we see -- we didn't see an indication greater than 44 dB, though?
MS. SENF: No, no, no.
MR. NICHOLSON: Okay. Okay. 3.082 and you've got .078.
Okay. Any other questions on the 9.3-inch feature?
MR. CHHATRE: No, the only question, I guess I didn't quite get is how far -- I think it was 9.3 feet from the upstream girth weld; is that what you are saying? Or downstream girth weld?
MS. SENF: From the upstream girth weld.
MR. CHHATRE: Upstream?
MS. SENF: 9.3.
MR. CHHATRE: 9.3 feet from the upstream.

MR. NICHOLSON: No. No, no.

MS. SENF: No, no, no, no, no. No, sorry, sorry. 11.04 feet from the upstream girth weld.

MR. CHHATRE: Okay.

MS. SENF: 9.3 --

MR. NICHOLSON: And that is -- that's where that box starts basically.

MS. SENF: Correct. Correct.

MR. NICHOLSON: Okay. So we have orientation, centerline, start. The length of the feature is the end of the box?

MS. SENF: Correct, um-hum.

MR. NICHOLSON: Okay. Good. Okay. So let's go to the -- what's the next one?

BY MR. CHHATRE:

Q. And just one quick question. Petra, this is Ravi. Is there any difference between what was done in 2005 versus your interpretation today? Is there any discrepancy in that besides --

A. The only discrepancy is that I would classify as a crack field --

Q. But that's --

A. -- and it was classified as a crack-like.

Q. That's the only --

A. Depth-wise there is no discrepancy.

Q. No discrepancy.

A. Yeah, or orientation or position-wise, there was no discrepancy.

BY MR. NICHOLSON:

Q. Well, there is a discrepancy. The profile that's been reported and the depth that Petra's coming up with don't match. That's a discrepancy.

A. Well, I came up with a depth of 25 to 40%.

Q. The bin is correct, yes.

A. Yes, and this is the only thing I can provide. So the 9 -- 25% -- 29% concerns me a little bit, that that was delivered in, back in --

Q. 2005?

A. 2005, yes.

MR. KILLORAN: I'm sorry. You were tailing off there, Petra. What did you say?

MS. SENF: So, I'm concerned that an absolute depth of 29% was given in 2005 because we didn't provide an absolute depth at that time. Maybe it's because providing a profile so we have to give kind of a maximum depth. But it's -- it is a value -- well, we don't have a spec on it or tolerances on it, so the only tolerance and spec we have is on the depth range, the 25 to 40.

MR. CHHATRE: So instead of 29 what you are saying, Petra -- this is Ravi, NTSB -- should have reported 25 to 40 instead of just number 29?

MS. SENF: Correct.

MR. CHHATRE: Okay. Yeah, I understand now.

MR. NICHOLSON: Even if they profiled it? This was on the profile that they gave --

MR. FOREMAN: There is on tolerance on profile, absolutely none. It's not in the contract as deliverable.

MS. SENF: But that's the number --

MR. CHHATRE: So it was (indiscernible).

MR. NICHOLSON: So, it should have still said 25 to 40, is what you're saying?

MS. SENF: Yes. Yes, correct, yes.

MR. NICHOLSON: Okay. And a profile doesn't really do an operator any good then?

MR. FOREMAN: It's not a standard deliverable.

MR. NICHOLSON: Oh, okay.

MR. FOREMAN: In 2005, it was not a standard deliverable. We did it as run requested from Enbridge just to try and get an understanding of the shape of the crack.

MS. SENF: Yeah, there is a value --

MR. FOREMAN: On single cracks.

MS. SENF: -- seeing the shape, but not really the depth. So --

MR. NICHOLSON: Okay.

MS. SENF: -- even when we give a maximum depth of 29, so it even -- it still can be 40% deep, right? So you -- so --

MR. NICHOLSON: All right.

MS. SENF: -- we say it is somewhere in this range, but we cannot give an exact value of depth. Ultrasonic is not -- it's the physics which cannot give us an exact value. We see an amplitude, but how was that amplitude reflected, right? What were the conditions in that pipe that it was reflected? So, there is a -- there's a tolerance. And the depths we get, it's not a measurement or a sizing; it's an estimation.

MR. NICHOLSON: So, Geoff, then who would have agreed to doing something outside the norm? Is that -- where does that come from? The project manager?

MR. FOREMAN: Yeah.

MR. NICHOLSON: Okay. So some agreement was made to deviate?

MR. FOREMAN: Yeah.

MR. NICHOLSON: Okay.

MR. FOREMAN: It was like almost R&D, if you like, at that time. Enbridge was the first companies to ask if profiles could be done, so we attempted profiles. The problem Petra is having is it's a crack field and not a crack-like feature. So a crack-like feature you have one indication so you have one set of values. She's got -- so we're picking the highest dB pixel, five -- mean max five here today and we don't know what the analyst actually picked.

Now, today the process is formalized and the computer does it for you so there's no human error --

MS. SENF: But it still is --
MR. FOREMAN -- in the selection.
MS. SENF: But it still is saying we don't give a spec on it. We still don't give a spec on it. We have our depths bin, so we only guarantee that we arrive within the tolerances. But we don't guarantee on the profile itself. So it's (indiscernible) and the depth itself is the profile of that --
MR. NICHOLSON: So that's made clear to Enbridge in this case when you give them a profile, that it's --
MR. FOREMAN: Yeah.
MR. NICHOLSON: -- you can't --
MR. FOREMAN: Today it's broader than an exact.
MR. NICHOLSON: Okay. They know that?
MR. FOREMAN: Yeah.
MS. SENF: Um-hum.
MR. CHHATRE: This is Ravi, Petra. I guess to finally cap it off for this defect 154-005538, what has done since the accident and 2005? Would the discrepancy (indiscernible) caught, was the classification as a crack field versus crack-like feature?
MR. FOREMAN: Um-hum.
MS. SENF: Correct.
BY MR. CHHATRE:
Q. And the other discrepancy would be the absolute number of 29% versus 25 to 40 range?
A. Well, we --

Q. Is that correct?

A. We gave a depth bin at that time. We gave a depth bin today. So at that time it was percent wall thickness. Today it's millimeters. We gave an absolute depth of 29% at that time and today we would give a depth, an absolute depth in millimeters.

Q. Okay. So that --

A. So we would do it in the same way. In the past it was done manually.

Q. Right.

A. Today it's done by the software, but still no spec on the profile contents, I would say, the shape of the profile or the absolute depth of the profile.

Q. Okay. So the 29% shouldn't have been given, shouldn't have been used?

A. Well, it can be given, but it needs to be -- the client needs to know that there is no spec on it, that it's done on best endeavor, based on amplitudes.

Q. Right.

A. Which is not the only criteria you should use for depth sizing.

Q. Okay.

A. Yeah.

MR. NICHOLSON: And that holds true today, if I ask for a profile. Even though you give me absolute depth now, I'm -- it's -- there's no tolerance on that?

MS. SENF: Right.

MR. NICHOLSON: It's still within -- it's only as good as the band that you reported it?

MS. SENF: Correct.

MR. NICHOLSON: Okay.

MR. CHHATRE: Okay.

MR. NICHOLSON: All right. So are we ready to move on to the next feature then?

MR. CHHATRE: Yeah, I'm ready.

MR. NICHOLSON: 14.1 inch?

MR. FOREMAN: And just for the record, for the actual tolerance, you -- I think Ravi asked -- Geoff Foreman here. And Ravi asked me yesterday, I think, for the confidence level in the banding accuracies.

MR. CHHATRE: Right.

MR. FOREMAN: I can give you it for today. I don't know what it was in 2005, but I found the spec sheet, the current spec sheet.

MR. CHHATRE: Okay. If you can --

MR. FOREMAN: And the banding today would be 1 to 2 millimeter, 2 to 3 millimeter, greater than 3 millimeter, with a plus or minus .5 tolerance at a 90% confidence certainty, or plus or minus 4 millimeters at an 80% confidence.

MR. NICHOLSON: Say that again? Plus or minus 5 --

MR. FOREMAN: Millimeter at a 90% certainty and an 0.4

millimeter, plus or minus 0.4 millimeter at an 80% certainty. So that would mean, as an example, a 2 to 3 millimeter band can be 1.5 to 3.5 at a 90% certainty or would be 1.6 to 3.4 millimeter at an 80% certainty.

MR. CHHATRE: Okay. Are you going to send that to us electronically or --

MR. FOREMAN: I can send it out electronically.

MR. CHHATRE: Okay. Great.

MR. FOREMAN: That's the standard spec today.

MR. CHHATRE: Okay.

MS. SENF: Okay. So Matt, the next feature you mentioned --

MR. CHHATRE: Do you want it back or --

MR. FOREMAN: Well, yeah, I --

MR. KILLORAN: Yeah. Well, I mean, we're going to have to label it.

MR. CHHATRE: Okay. That's fine. I'm okay with that.

MR. PIERZINA: So -- yeah, that's right. So --

MR. CHHATRE: I don't want you to deviate from the procedures.

MR. PIERZINA: -- the longer the band of the depth or the wider the depth band the more confidence, right? So --

MR. FOREMAN: Um-hum.

MR. PIERZINA: -- so 1½ to 3½ --

MR. FOREMAN: That's 90%.

MR. PIERZINA: -- you get 90%. By taking --
MR. FOREMAN: Taking the band --
MR. PIERZINA: -- taking that tenth of a millimeter off on each end you lose 10% of your confidence?
MR. FOREMAN: Yeah. Yeah, that's correct.
MR. PIERZINA: You know, not -- I don't want to get off track, but this is a question I wanted to ask related to this POD and POI is -- so that's a value for the entire pipe, correct?
MR. FOREMAN: Um-hum.
MR. PIERZINA: Now, if -- I assume that for 95% of the pipe body you actually have a higher degree of confidence than you would within -- as opposed to within the long seam? Because the long seam will affect your --
MR. FOREMAN: Yep.
MR. PIERZINA: -- your certainty, I guess? So the question I would ask is does the 90% and the 80% take the uncertainty with respect to the long seam into account so that it's an average over the pipe circumference? Or could you apply that 90% to the 1 inch along the long seam?
MR. FOREMAN: The specifications are for the equipment regardless of where it is, so that what you said, the second (indiscernible) would kill the average. The fact that it's got a weld in there is how it's been devised, so it's not specifically for a pipeline but for the equipment. But you would expect the equipment to work at that specification in the pipeline. So to

answer your question, it does take into account you're going to be working in weld areas. There isn't two -- or we would have two specs. You would have -- like for magnetics, for TFI, for instance, there is a -- there's a pipe body spec and there's a seam weld spec. For CD there's just one spec, but it takes into account that the majority of the analysis is going to be along a seam, which is where the -- 90% of your reflectors are going to be.

MR. PIERZINA: Yeah.

MR. FOREMAN: Now, if you read the spec there are some areas, depending on the shape of the weld, the length of the weld and the type of the weld, which they're all (indiscernible) on confidence. You'd have to look at the bottom of that sheet.

MS. SENF: Um-hum.

MR. PIERZINA: I'd like a copy of that.

MR. FOREMAN: But what you really need is the 2005 spec, which I'm going to try and get my hands on. What --

MS. SENF: I have, I have --

MR. FOREMAN: But it should be in the contract.

MS. SENF: Yeah, and it's also in your folder. I have it there.

MR. FOREMAN: Oh, oh, right.

MS. SENF: The 2005 spec, right. Yeah.

MR. PIERZNA: Okay.

MR. CHHATRE: And this is Ravi, NTSB. Geoff, when you

officially send me this, could you also in this one give the example you're talking about? And now here you are talking about the percentage of wall thickness?

MR. FOREMAN: Um-hum.

MR. CHHATRE: And if there is the wall thickness you mentioned maybe you can make a note that that's the wall thickness you are referring to here, will be what your wall thickness sensor data is. Or is it a nominal wall thickness? Because, I guess, I think it was (indiscernible) for a while because .285 was just .25. So here you are saying 12½ to 25% of wall, 55 to 40% of the wall thickness, you will clarify when you send that document to me officially as to what wall thickness you are referencing to here. The one that you measured with your probe or the nominal?

MR. KILLORAN: Why, why don't we -- this is Bill. Why don't we reference that as an information request?

MR. CHHATRE: Right.

MR. KILLORAN: And we will --

MR. CHHATRE: Yeah, sure.

MR. KILLORAN: -- address those questions in the context of the 2011 general inspection of longitudinal crack specifications grid 14 to 36.

MR. CHHATRE: And what's 2005 and 2008. I mean, since the accident.

MR. KILLORAN: Right.

MR. CHHATRE: And give an example also you gave. That's

much easier for non-technical people to understand.

MR. NICHOLSON: Okay. Hold on. Did we just make an information request here?

MR. CHHATRE: Yes, we did.

MR. NICHOLSON: Who captured it?

MR. CHHATRE: Nobody.

MR. NICHOLSON: That's what I thought. Okay. Let me get -- let me get that down. What was it, Ravi, that you were asking for?

MR. CHHATRE: This was the spec sheet.

MR. NICHOLSON: What spec sheet is -- that's a current spec sheet.

MR. FOREMAN: This is a current spec sheet.

MR. NICHOLSON: Petra's going to give us 2005.

MR. FOREMAN: '5. The request is for 2005.

MR. CHHATRE: And -- both.

MR. KILLORAN: The request was for --

MR. CHHATRE: For 2005 and --

MR. FOREMAN: And the present one.

MR. NICHOLSON: Okay.

MS. SENF: Yeah.

MR. CHHATRE: And in addition to give -- what I asked for was clarifying the percentage of wall that they report, that could be the wall thickness either nominal or your wall thickness sensor. And give me an example of 80% confidence, 90% confidence

limits. Like if your defect is reported as 1½ millimeter with 80% confidence it could be in this range.

MR. PIERZINA: Specific to the 24- and 36-inch pipe. That spec sheet.

MR. NICHOLSON: What size? Twenty-six to 30?

MR. PIERZINA: Twenty-four to --

MR. FOREMAN: Twenty-four to 34.

MR. NICHOLSON: Twenty-four to -- okay.

MR. PIERZINA: Oh, 24 to 34?

MS. SENF: Um-hum.

MR. PIERZINA: Okay.

MR. KILLORAN: Matt, can we go off the record for just a second?

MR. NICHOLSON: Sure. Off the record.

(Off the record.)

(On the record.)

MR. NICHOLSON: Okay. Back on the record. Okay. Are we ready to move to --

MR. CHHATRE: The next feature.

MR. NICHOLSON: -- the next feature?

MS. SENF: Okay. The next feature is -- the area ID is 154-006742. It is located 23.91 feet from the upstream girth weld.

BY MR. NICHOLSON:

Q. Can I stop you for a second?

A. Um-hum.
Q. I believe there's a 0154-006749 crack-like feature?
A. 6749?
Q. Do you not see that? At 20.79 feet from the upstream?
A. Excuse me. Yes.
Q. There is? Okay, good.
A. You were right.
Q. Good.
A. Yeah, excuse me. Okay, let's start with that. So area ID 154-006749. It is located at 20.79 feet from the upstream girth weld. It is classified as crack-like with a depth of less than 12.5% wall thickness. The circumferential --
MR. CHHATRE: I'm sorry. Crack-like and what is the next number?
MS. SENF: The depth is less than 12.5% wall thickness. The circumferential position is 102 degree. The length it's 14.13 inches. Yes?
MR. NICHOLSON: I'm sorry. The length is what?
MS. SENF: 14.13.
MR. NICHOLSON: Oh, okay.
MR. CHHATRE: And the defect was at 102 degrees?
MS. SENF: At 102 degrees. So the center of the box is at 102 degrees.
MR. CHHATRE: Okay.
MS. SENF: Okay. Good. So first I look at the

clockwise sensors. The first sensor with data is sensor 1-6 and I only see the entry echo and some background noises, no defect indication. The next sensor 1-7. It's the LW-C, which means it's a long weld sensor, so I only see the reflections off the long seam. The next sensor 1-8, only shows me reflections from the entry echo and some background noise.

MR. CHHATRE: No defect?

MS. SENF: No defect indications. The next one, is 1-9. I see some weak reflections off the longitudinal weld, but no defect indications. And so, these were the clockwise sensors. Going to the counterclockwise sensors the first sensor is sensor 16-13 and I see some weak reflections of a crack field with a maximum -- mean max five amplitude of 33 dB's. These indications are located in the half skip.

Next sensor is 2-6 -- 2-16. I also see crack field indications with a mean max five amplitude of 38 dB, which is the maximum amplitude we achieved in this feature. And the next sensor is 2-19. I only see some weak reflections off the longitudinal weld.

MR. CHHATRE: No defects?

MS. SENF: No defect indications. The same for the next sensor, 2-20, reflections from the long weld and no defect indications.

MR. PIERZINA: I'm sorry. This is Brian. Don't we see some crack field type -- you know, some weaker, the green?

MS. SENF: Which one? Do you mean these ones here?
MR. PIERZINA: Nope, up --
MS. SENF: This?
MR. FOREMAN: Is there one upstream?
MR. PIERZINA: Yeah, that -- yeah, right there.
MS. SENF: No. No, no. So you see this is a continuous signal so it's also upstream and downstream of this feature and it's the grade of the long weld. So, it would be reflections or diffused signal from the long weld.
MR. PIERZINA: Okay.
MS. SENF: No defect indications.
MR. PIERZINA: Thank you.
MR. FOREMAN: So there's one red pixel at one-and-a-half skip there and --
MS. SENF: This one here.
MR. FOREMAN: Can we see one -- is that giving us an amplitude or not?
MS. SENF: That gives us an amplitude of 30 dB, but this is a long weld reflection.
MR. FOREMAN: Right.
MS. SENF: Yeah.
MR. FOREMAN: I just want to make sure for completeness that we --
MS. SENF: Yeah. And so, the --
MR. FOREMAN: -- we pick them all up.

MS. SENF: -- these kind of short reflections I wouldn't even consider these.

MR. FOREMAN: Right.

MS. SENF: So this is here -- here it shows me in the data as 1 inch -- is this right, 1 inch? No, it isn't -- yeah, it's 1 inch, but -- yeah, because of the resolution I would say it's even less than 1 inch. It's half an inch only. So it's -- we wouldn't consider it anyway.

MR. FOREMAN: Right.

MS. SENF: The next sensor is 2-21 and it's a long weld sensor, LW-C sensor. Again, I only see the reflection of the long weld, no defect indications. Yes, and then I'm through. So, these were all the same --

MR. NICHOLSON: So longest indication --

MR. FOREMAN: So, can you back to --

MR. NICHOLSON: -- and amplitude -- sorry.

MR. FOREMAN: Sorry. Could you go back to the very first screen, Petra?

MR. KILLORAN: 1.6 or 1-6?

MR. FOREMAN: No, to the very first sensor that you went through on --

MR. CHHATRE: 1-6.

MR. NICHOLSON: It's 1-6.

MR. FOREMAN: 1-6?

MS. SENF: This one here?

MR. FOREMAN: Okay. So just for completeness as well, that strong red reflector that looked to be just below the half skip?

MS. SENF: This one here?

MS. FOREMAN: That's part of the --

MR. SENF: Part of the --

MR. FOREMAN: -- entry signal? It's not --

MS. SENF: Yeah. Part of the entry signal.

MR. FOREMAN: Okay.

MS. SENF: Yes, correct.

MR. FOREMAN: I just wanted to clarify that.

MS. SENF: Um-hum, um-hum.

MR. NICHOLSON: This here?

MR. FOREMAN: That one, yeah, near --

MR. NICHOLSON: Is part of the entry signal?

MR. FOREMAN: This one, yeah.

MS. SENF: Yes, right, um-hum.

MR. FOREMAN: It's got no dB's, right?

MR. NICHOLSON: Oh, it's got no dB's, right. Okay.

MR. FOREMAN: I just wanted to make sure for completeness that we've gone through every single red pixel in that feature.

MS. SENF: Okay. And the longest -- let me see. The longest indication here, I would say it's about -- it's less than an inch. And this is -- how we reported it in the -- how we would

have reported it in the past, if it's below the spec we say -- we just say it's below -- it's less than an inch and we don't say it's half an inch. So, it's just below 1 inch or below 30 millimeters.

MR. CHHATRE: But that is your detection limit?

MS. SENF: Yeah, the 30 millimeters are the detection limitation.

MR. CHHATRE: Okay.

MS. SENF: Nominal speed.

MR. NICHOLSON: And the deepest indication would be that 38 decibels?

MS. SENF: Correct.

MR. NICHOLSON: Or 1 millimeter?

MS. SENF: Um-hum.

MR. NICHOLSON: Okay.

MR. PIERZINA: This is Brian. Just a question. What if the defect was in between two skids? I mean it seems like all the sensors that we're looking at for these first two features are on one skid. Or are they on two?

MS. SENF: You mean -- so when I have the clockwise sensors and they -- all of them are on the same skid, right, or when it goes from one skid to the other.

MR. PIERZINA: Oh, all right. So, that's not true. Actually, the one --

MS. SENF: It can happen that -- so here you see it.

For instance, here on skid 16, 16 and then the next one is 2 --

MR. FOREMAN: Skid 2.

MR. PIERZINA: Skid 2, right?

MR. FOREMAN: Yeah.

MS. SENF: Skid 2, so, yes.

MR. PIERZINA: Okay. Thank you.

MR. NICHOLSON: The crack fields -- what was the orientation on, let's say -- let's see, which one this would be.

MR. PIERZINA: 102 degrees?

MR. NICHOLSON: 16-30 maybe or 2-16?

MS. SENF: No, it's -- 103 to 104, 105, so it's --

MR. NICHOLSON: That's on the 16-30?

MS. SENF: Um-hum, 104 -- the center of it, I would say.

MR. NICHOLSON: And the 2-16 would have been what?

MS. SENF: The 2-16, it's 103.

MR. NICHOLSON: Okay. Can we -- let's go off record for a second here.

(Off the record.)

(On the record.)

MR. NICHOLSON: Okay. Back on the record, Petra Part 2, Day 2.

All right. So where we left off we were going to enter into this 25½-inch long feature. And covering the same ground we were before, if you would, please, Petra?

MS. SENF: Okay. So when we talk about feature area ID

154-006742.

MR. CHHATRE: What was that again? Can you repeat it? 1-4?

MS. SENF: 154-006742. This feature is located 23.91 feet from the upstream girth weld, circumferential position 100 degrees. It was classified as a crack-like feature with a depth of 12.5 to 25% wall thickness, a length of 25.45 inches.

Going through the sensors, first sensor is 1-4. I just see some weak signals -- some signals from the entry point and also some -- yeah, some background signals, no defect indication. The next sensor, it's 1-5. I see some crack field indications not on the full length, pretty short, with a maximum -- mean max five amplitude of 35 dB.

MR. NICHOLSON: And can you give an orientation?

MS. SENF: Orientation of this is 99.3 degrees.

MR. CHHATRE: And the weld -- this is Ravi. What was the orientation of the weld?

MS. SENF: The orientation of the weld is still the same. It is at 96 degrees.

MR. CHHATRE: Okay.

MS. SENF: Okay. The next sensor shows me the reflections of the --

MR. NICHOLSON: 1-6, right?

MS. SENF: 1-6, sorry. Yeah, 1-6, some weak reflections from the long weld, no defect indications. The next sensor, 1-7,

I just see the LW-C sensor, the long weld sensor, no other data, no defect indications, sensor 1-7. And the next sensor, sensor 1-8, I see some weak reflections, could be -- might not be caused by the long seam because I'm already beyond the long seam. Might be caused by a toe crack, very weak the reflections, so they're in the half skip, and maximum amplitude here is 31 -- mean max five amplitude 31 dB.

MR. FOREMAN: Petra, the -- between the one-and-a-half and second skip, is that a shading effect or is that just --

MS. SENF: This one here?

MR. FOREMAN: Yeah, is that shading effect or just a --

MS. SENF: No. No, it's just some background -- some gaps in the background noise.

MR. FOREMAN: Okay.

MS. SENF: But not, not shading, no. If there would be shading I would already expect that where I have a higher amplitude here -- on the right-hand side of the feature --

MR. FOREMAN: Then the shading would be --

MS. SENF: -- I have a high amplitude.

MR. FOREMAN: Okay.

MS. SENF: When there is shading I would expect it rather here. But this is just the background signal.

MR. FOREMAN: Okay.

MS. SENF: Okay. The next sensor, it's 1-9.

MR. NICHOLSON: Can you go back? 1-8, what was our

orientation of that --

MS. SENF: The 1-8, the orientation is 94.8 degrees.

MR. NICHOLSON: 94.8?

MS. SENF: Eight.

MR. NICHOLSON: Okay.

MR. CHHATRE: That will make it above the long seam then?

MR. FOREMAN: It's a tool crack so it'll be on the edge of the weld.

MR. PIERZINA: The top side.

MS. SENF: Edge of the weld, yeah.

MR. NICHOLSON: On the top side.

MR. CHHATRE: The outer edge.

MS. SENF: On the top side, yes, um-hum. The next sensor, 1-9, I see some crack field reflections in the half skip. It is at 93 degrees with a mean max five amplitude of 34 dB. And I also see some corresponding crack-like indications in the one-and-a-half skip. So corresponding to the previous sensor it's about 94.8 degrees again. And here the maximum amplitude is 32 dB's.

MR. NICHOLSON: Orientation one more time was what?

MS. SENF: The orientation was 30 -- 94.8 degrees.

MR. CHHATRE: That was at one-and-a-half skip?

MS. SENF: That's in the one-and-a-half skip.

MR. CHHATRE: In the half skip it was 34 dB at 94

degrees?

MR. KILLORAN: 93.

MS. SENF: Yeah, 93 degrees and --

MR. CHHATRE: No -- 34 dB's, 94 degrees, I thought?

MS. SENF: No. No, it's 93 degrees.

MR. CHHATRE: 93. Oh, that is --

MS. SENF: 93. Yeah, um-hum.

MR. NICHOLSON: That's what I have.

MS. SENF: Um-hum. Okay. Next sensor 1-10 -- let's see here -- I see some weak reflections of a crack field, I would say, not only in the half skip but also in the one-and-a-half skip. In the half skip it's at 91.4 degrees with an amplitude of 30 dB and in the one-and-a-half skip it's about 26 dB and it is at 93.2 degrees.

MR. NICHOLSON: Those were weak reflections of crack field?

MS. SENF: Correct.

MR. CHHATRE: And that one, the orientation puts them above the seam weld?

MS. SENF: Yeah. All of it is above the seam.

MR. CHHATRE: Okay.

MS. SENF: 93 -- yeah, above, um-hum.

MR. NICHOLSON: Where are we in the box? What distance?

MS. SENF: Here we are at -- so you want to have the distance to the upstream girth weld. I guess it's about 25 feet

from the upstream girth weld. Um-hum.

MR. CHHATRE: And we are still looking at the clockwise, right?

MS. SENF: Right. We are still looking at the clockwise sensors. Okay. The next sensor is 1-11. It's not part of the sensor list anymore, but I still can see some weak reflections. It's not part of the box anymore because the reflections are too low for it, but I see crack field reflections in the one-and-a-half skip corresponding to the indications in the previous sensor and with a mean max five amplitude of 26 dB and at 91.4 degrees.

BY MR. NICHOLSON:

Q. So, can we go back to 1-9?

A. Um-hum.

Q. Where were we on 1-9? Oh, we were -- so you're seeing indications --

A. So we see -- I see indications --

Q. -- throughout --

A. -- starting at 24.5 to 26 feet from the upstream girth weld.

Q. And then on your -- what was 1-5? It must have been the very start of the feature?

A. Yes. Right.

Q. So what are we -- what would you call that?

A. I would say it's also part of the crack field or some crack field reflections.

Q. Starting --
A. Yeah, starting at 24.7 I would say.
Q. To 25?
A. To 25, yeah.
MR. KILLORAN: I'm sorry. I couldn't hear you, Petra.
MS. SENF: To 20- -- from 25.7 to 25.
MR. PIERZINA: 24.7?
MS. SENF: 24.7 to 25.
MR. CHHATRE: So, I'd say, about 5, 6 inches long? You are in decimal, right? You're not in inches?
MS. SENF: Three inches roughly. Yeah, um-hum.
MR. CHHATRE: Okay.
MS. SENF: Any other questions for the clockwise?
MR. PIERZINA: So, so far we haven't seen much of anything below the long seam, correct?
MS. SENF: Um-hum, um-hum. Yeah, so the clockwise sensors normally see the things about the long seam and the counterclockwise the things below the long seam, so let's see what we see on the counterclockwise.
MR. PIERZINA: Okay.
MS. SENF: So it's -- it's okay, everything is right.
MR. PIERZINA: Sure.
MS. SENF: Okay. Counterclockwise side, first sensor 16-29. I see some weak reflections in the one-and-a-half skip. I cannot tell if it's part of a crack field so there is no real

signal visible. It could also be background signal. So, I need some corresponding signals in other sensors to make an assessment on that.

The next sensor it's 16-30. The sensor detected two indications: one at about 24.1 feet with a length of 4 inch and I see -- what is it -- some weak reflections. It could be caused by a crack field, I would say -- 24 dB in the one-and-a-half skip.

And the second indication I see from that sensor is at 25.5 feet from the upstream girth weld. This looks really like a crack field indication going from the half skip to the -- of the first skip and the one-and-a-half skip. And the maximum amplitude here is 29 dB in the one-and-a-half skip. In the half skip I only have 27 dB's.

MR. NICHOLSON: 27 dB?

MS. SENF: Um-hum.

MR. NICHOLSON: In the half skip?

MR. CHHATRE: And what is the orientation?

MS. SENF: In the half skip for the amplitude.

MR. PIERZINA: What's the orientation?

MS. SENF: The orientation, in the half skip it is at 104 degrees and in the one-and-a-half skip at 103 degrees.

MR. NICHOLSON: That's -- those are the orientations of your second indication. What was your --

MS. SENF: Yes, right. Orientation of the first indication is at 103 degrees. Next sensor is 2-16.

BY MR. CHHATRE:

Q. I have a question, Petra.

A. Um-hum?

Q. So here you're saying the clockwise sensors show the defect above the seam weld.

A. Above the seam weld, um-hum.

Q. And the counterclockwise signals show the defect below the seam weld.

A. Um-hum, um-hum.

Q. Now, would that mean the defect really lies at the weld or it can be -- I'm just trying to -- because I haven't seen so far that happened in the first --

A. So -- yeah, when it is exactly at the weld, really, so at the edge of the weld, it is normally seen as you mentioned, so the one above from the clockwise and the one below from the counterclockwise. If it's a little bit away from the long seam so we see it with clockwise and counterclockwise sensors. It's just when the beam goes directly through the long seam I wouldn't see anything which is behind the weld, so I can only see it from clockwise or counterclockwise.

Q. So this will mean it is -- is it close to weld or --

A. So here in the 3D scan of that feature, black lines --

Q. Is the weld.

A. -- show the long weld, correct.

Q. Right.

A. And now you see here on the top, the clock -- from clockwise indication. So this was the toe crack I talked about. And here below the weld you see the blue indications, counterclockwise crack field, but also some red indications. So we also saw some --

Q. Clockwise, you mean.

A. -- crack field indications in the clockwise sensors. So as long as I'm right at the edge of the weld I only get it from one side, but when I am a little bit away from it -- and here I'm an inch away -- I should get it with clockwise and counterclockwise sensors.

Q. So when you are away from the weld you're getting --

A. Yes.

Q. -- both clockwise and counterclockwise?

A. As long as I go through that weld with my beam I won't get anything which is behind the weld.

Q. Behind.

A. But when I'm next to the weld I will get a (indiscernible).

Q. But this one will you put, I guess, upside of the weld or downside of the weld? I mean, I realize it's away from the weld, but which side is away? Is it away on the -- do you know what I'm saying?

A. Um-hum.

Q. When the defect is away from the weld, where is it? Is

it above the weld or below the weld?

UNIDENTIFIED SPEAKER: Both.

MS. SENF: Both, yeah.

MR. FOREMAN: But, no, the -- well, okay. Yeah, then clarification. The toe --

MS. SENF: Yeah, but it depends where you are --

MR. FOREMAN: -- that the toe crack is one side and the SCC is on the other side, is that what you're saying? The two crack fields will be the same?

MS. SENF: So a crack field is not exactly at the weld. It is a little bit away. It is a wide area.

MR. CHHATRE: Okay.

MS. SENF: And as long as it's wide I have a chance to get it with a clockwise and with a counterclockwise.

MR. CHHATRE: So your crack field -- really some of the crack field contains cracks above the weld, some may contain below the weld, and that's what's happening here?

MS. SENF: Yeah.

MR. CHHATRE: I got you.

MR. NICHOLSON: Yeah. They're independent features.

MR. FOREMAN: So, the black --

MS. SENF: Yeah, independent features.

MR. FOREMAN: -- the black line is the weld. That's the toe crack and that's the crack field. So is this crack field on the same side as the seam weld as the previous feature? Is it the

one that we looked at before?

MS. SENF: Most of them we looked at so far were below the weld, the crack fields.

MR. FOREMAN: So when we see it below the weld --

MS. SENF: Yes. Yeah, um-hum.

MR. FOREMAN: -- we using the same reference because we can see it above and we see it below, so this is the direction of flow? Okay.

MS. SENF: Um-hum.

MR. PIERZINA: Then that makes -- that makes sense, right, if the coating has disbonded and, you know, you --

MR. CHHATRE: Yeah, I mean, I did not see where -- what the interpretation we got. I mean, so far the first time I saw indications clockwise on one side and counterclockwise on the other.

MS. SENF: Um-hum.

MR. CHHATRE: Until this point they're all on one side of the seam weld, so --

UNIDENTIFIED SPEAKER: Right.

MR. FOREMAN: Which is why we drew -- we're not in the big box yet, but that's why I drew --

MR. CHHATRE: Yeah. Now, I see what you're getting at.

MS. SENF: Um-hum.

MR. CHHATRE: Some cracks may be above, some cracks may be below the seam weld?

MR. FOREMAN: Yes.

MS. SENF: Right. Um-hum.

MR. CHHATRE: Yeah, I understand.

MS. SENF: Okay. Where are we?

BY MR. NICHOLSON:

Q. You were on 2-16.

A. Um-hum.

Q. And I think we're ready to go.

A. Okay. Okay, 2-16 I see a crack field indication, which is visible in the half skip and also in the one-and-a-half skip. In the half skip, which is at 103 degrees, my maximum amplitude is about 38 dB, mean max five amplitude again. And in the --

Q. What was that -- where are we on the plane? Where is that crack field? From upstream?

A. It is over the whole length from that feature, so all these indications are crack field indications.

Q. Okay. For the whole --

A. So some of them really weak and some of them stronger. And the indications in the one-and-a-half skip are at roughly 1.1 -- 101.5 degrees and the maximum amplitude here is 34 dB.

Q. I'm good.

A. Okay.

MR. NICHOLSON: Anyone else?

MS. SENF: Next sensor at 2-17, I see some strong reflections of a crack field in the half skip, mean max five

amplitude 41 dB at approximately 101.6 degrees going over the whole length of the feature. And in the one-and-a-half skip I have reflections with a mean max five amplitude of 30 dB and this is at 99.9 degrees.

And the next sensor it's 2-18. I only have a -- I also see a crack field indication in the half skip. It's a pretty short indication. It starts at 25.7, I would say, 25.7 feet from the upstream girth weld, and it ends at 25 point -- excuse me, 25.2 to 25.5 from the upstream girth weld.

BY MR. PIERZINA:

Q. This is Brian. Can you help try to make me understand why we see such a thin band of the sensor recording? You know, everything else is great.

A. Um-hum.

Q. Is that just because the sensor didn't register data or --

A. Correct. Correct. So the data or the indications upstream and downstream of -- downstream of that small band did not meet the detection criteria, so the amplitudes were too low for detection. Only these ones here met the thresholds. And when we go back, when we look at -- now we see both sensors here. We see 20-18 and 20-17, and so you see that this -- these indications of sensor 2-18 correspond to the little -- I don't want to call it gap -- there is a little gap in the crack field at 2-17 and they correspond to each other.

So either -- the crack field is not a straight crack field, it's slightly curved, and in here there are no reflections from the crack field but they are here. So it's just the shape of it -- of the indication or the shape of the crack field made it possible that only a small part is -- or the shape of the crack field really depends on the detection. When there is -- in this range here where I have the gap, when the amplitude's too low it won't record it, so --

Q. And so -- and this is Brian again. Given that we know that there's a lot of reflectors over that length and we're not getting any amplitude signal returning on the other -- you know, outside of that narrow band, is -- does that mean -- could that mean that there's an issue with the, you know, sensor? Did it maybe not fire or something or -- I guess I'm having a hard time understanding why --

A. Yeah. Um-hum, um-hum.

Q. -- why we wouldn't see more --

MR. FOREMAN: Could it be -- could it be this? Because it's a crack field. It's not a single crack. So could it be a short crack --

MS. SENF: Right.

MR. FOREMAN: That's what will happen, it's not all in the same orientation?

MS. SENF: Um-hum. So, so when we look at the 3D scan I can -- I think we can see the shape of the crack field. So, it's

straight here and then we have a curve here. And this curve is right -- it is at 25.2 up to 25.6, I would say. It's exactly -- or part of this region here or here. Now, the curve is displayed like this in our data, so -- nothing was detected by the sensor here, but by the next. To answer your question, if the sensor would not work, I wouldn't get any data here, so --

And when I -- what I can do is -- going back to that sensor here -- so you see the sensor is working here, it is working here. I make a compression of the data to see more of it. Okay, there's no data here, but the sensor worked well so there is no reason to assume that it did not work here. There is no reason for it.

BY MR. PIERZINA:

Q. Okay. Maybe -- so maybe I'll ask a different way and this might help me understand. Why -- if you could put up 2-17 again with --

A. Um-hum.

Q. -- along with 2-18. Why do you see so much in 2-17 and so little in 2-18?

A. The main indications are detected here with 2-17, so this is the sensor we get all the signals from that small crack field -- or from that narrow crack field, this is how I would call it. This sensor is slightly next to it. The position of this sensor is not -- the position of the sensor to the defect is not in such a perfect position as here.

Normally I get signals from one indication in the half from one sensor only, not from two or three sensors, just from one sensor. And this sensor here was in a perfect position to detect these defects or these features here. But because of the curved shape only this sensor was in a good position to detect --

MR. FOREMAN: (Indiscernible) that's the crack field.

MS. SENF: -- the crack field.

MR. PIERZINA: Okay.

MS. SENF: It is a curve which -- this is responsible that only a little part of the crack field was detected by that sensor but more of it here. The same question would be why don't we have anything here? Yeah.

MR. FOREMAN: Right, so -- piece of paper. If the perfect footprint for 2-17 is here and it sees the majority of the crack -- but the crack's not totally linear. It's wandered off and come back again. But the perfect footprint for 2-18 is adjacent to it, so it doesn't see anything in this area but it sees it there. And this one only sees this area and doesn't see that. So it's because it's not a perfectly straight crack. It's wandered off and come back again.

MR. NICHOLSON: But on the skid 18 is behind 17.

MR. FOREMAN: Right.

MR. NICHOLSON: Because that skid actually has kind of a helical shape to it, so it's not --

MR. FOREMAN: So it's really offset --

MR. NICHOLSON: Yes.

MR. FOREMAN: -- diagonally across by half an inch or an inch.

MR. NICHOLSON: Right.

MR. FOREMAN: Right? So you're picking one footprint up and then another footprint on the overlap. So you're not seeing it overlapping. You're seeing one sensor seeing one side clearly and then the other sensor picks up the long piece. So it's just the orientation is the crack's not running perfectly straight, it's (indiscernible).

BY MR. CHHATRE:

Q. But -- this is Ravi --

A. So, so --

Q. This is Ravi. A follow-up question to Brian's and Geoffrey's. I'm not so much worried about not seeing the crack, but my concern -- not really a concern, but actually I'm not seeing anything. I'm not seeing the background. Like, you normally see background, you normally see scatter. I'm not seeing anything in that particular -- that's the question I really had was -- forget about the crack.

A. Um-hum. Um-hum.

Q. Why I'm not seeing anything? No background, no scatter?

A. So when there is only background the data is not recorded except at the long seam. When I'm at the long seam I also record data when there is background. So, yesterday we

talked about the LW-C sensor. So when the LW-C sensor or when a sensor identifies a long seam, the two neighboring sensors will record the data if there is --

MR. FOREMAN: Are forced.

MS. SENF: -- if there is a signal or not. If that's just background it will be recorded.

BY MR. CHHATRE:

Q. Okay.

A. Here in this case we are -- we are in the base material more or less. And if there is only background we won't record it because if we would record background the discs would be full after a minute or two.

Q. Okay. So the program automatically eliminates any background reflections?

A. The program only records data when indications meet a certain threshold, when the reflections are an indication above the background signal. So, we have a threshold for it. So, it needs to be 11 dB above the threshold, for instance.

Q. Okay.

A. And if this is not the case it's not recorded.

Q. Okay. So I mean there could be a whole bunch of points there or pixels there, but they all will be -- if I understand you correctly, below 11 dB?

MR. FOREMAN: Right.

MS. SENF: Yes, right.

MR. CHHATRE: Okay. So that's what I'm really --
MR. FOREMAN: So that cuts out really --
MR. CHHATRE: Okay.
MS. SENF: Um-hum, um-hum.
MR. FOREMAN: -- the gray and blue.
MR. CHHATRE: But that's --
MR. NICHOLSON: So the gray, I guess, really is an indication.
MR. FOREMAN: It's just not seen.
MR. CHHATRE: Right. Right. That's what I'm saying. So, not makes it sense that they are in there. That makes sense.
MR. NICHOLSON: Okay. Don't leave 2-18 till we get amplitude and orientation for this.
MR. FOREMAN: That's right.
MS. SENF: So we don't have it for 18?
MR. FOREMAN: No.
MS. SENF: No, okay.
MR. NICHOLSON: We didn't get there.
MS. SENF: 18, an external crack field at 99.9 degrees in the half skip, mean max five amplitude 37 dB.
BY MR. CHHATRE:
Q. And that's about a 3 -- 3 to 4 inches long roughly?
A. Yeah, maximum 4.
Q. Yeah.
A. Um-hum. The next sensor is 2-19. I have a pretty wide

reflection from the entry point and background signals, no defect indications.

Q. Now, Petra, do -- it's hard to line up -- can you line up the clockwise and anti-clockwise sensors from your data? I mean, I can see we had 2-17, 2-18, 2-19 counterclockwise and 1-4 and 1-6 clockwise.

A. Um-hum.

Q. And if I was able to see the two -- all this will be matching clockwise and counterclockwise sensors.

A. Um-hum, um-hum.

Q. Does your program tell you which one of these will be matching with the -- or which one of the clockwise will be matching counterclockwise?

A. Yeah, it tells me somewhere here having it in the list, but I also could have a look at my sensor configuration.

Q. Okay.

A. But, yeah, the sensor configuration just tells me the numbers of the sensors.

Q. Um-hum.

A. So, it doesn't really tell me which one correspond to each other.

Q. Okay.

MR. PIERZINA: And the orientations for those sensors are the entry point orientation; is that right?

MS. SENF: Correct, yes.

BY MR. CHHATRE:

Q. The (indiscernible) one -- sensor 1-27 is equal to 2-12, one clockwise and one counterclockwise. I just have the impression -- if you wouldn't have told me that, that's the impression I would have gotten, that 2-12 is counterclockwise at the same location as 1-27, which is clockwise. I mean, that's all --

A. These two here?

Q. Yeah.

A. Yes.

Q. That's what I figured that --

A. Yeah, but --

Q. -- they are different skids, but --

A. Yeah, both of them are on the same skid here.

Q. Oh, they're on the same skid?

A. No, they are -- no, this is really how you have seen it in the workshop.

Q. Right.

A. So this displays one skid.

Q. Okay.

A. The clockwise and the counterclockwise. So you see the angle of incidence -- and the position of the entry point is close to each other because the sensors are.

Q. Okay.

A. Is that right what I'm saying? There is one degree part

of it -- is that right what I'm saying? And the distance -- oh, it's an inch, okay.

Q. Yeah, I'm just curious, on the tool, I thought it one skid you have all these sensors. They may be opposing, but they're all going the same way. And the next skid will have making sensors going counterclockwise to equal clockwise. Or did I --

A. So, I guess -- so the sensor 2-7 here and the sensor 1-7 here from the other -- from the neighboring skid.

Q. Will be going on the --

A. They will go on the same position, yeah, um-hum.

Q. Clockwise and counterclockwise?

A. Counterclockwise, yes.

Q. Okay. So you can --

A. On a neighboring --

Q. -- like 1-24 --

A. -- a neighboring skid, yes.

Q. -- will match with 2-24, clockwise and counterclockwise?

A. Sorry. Can you say that again? 2-24?

Q. Like 1-24 will be clockwise and 2-24 will be counterclockwise the same location?

A. No, no, no. So it's -- so then I have to go to the next skid. So I'm here at the 1-24 here and now this here corresponds to that one here.

Q. Oh, okay.

A. So, it's always the neighboring skid.
Q. Oh, okay.
A. Yeah.
Q. All right.
A. Okay. So you just asked me why the tool didn't collect any --
Q. Right.
A. -- background signals here.
Q. Um-hum.
A. It didn't collect anything here, but now you only see background signals.
Q. Right.
A. So you see that this one of the neighboring sensors. Now we are getting closer to the long seam and now we see background signals.
Q. Okay.
A. So -- and there is no defect indication in sensor 2-19. It's just some signals because the sensor was forced -- or the tool was forced to collect the data.
Q. This is Ravi again. And the other -- the other way to put it that was like all these background pixels they are beyond the threshold, they're all -- the color code looks like they are --
A. Um-hum. Yeah, they're all --
Q. -- (indiscernible).

A. Yeah.

Q. So --

A. Yeah, so there is -- there isn't really a need to record this data, but we have clues at the long seam. One of the sensors identified the long seam and that means you have to collect the data of the neighboring two sensors if there is anything or not. It doesn't matter.

Q. Okay. I see.

A. So -- yeah.

Q. So it's a default programming --

A. Correct. Yes.

Q. Okay.

MS. SENF: The next sensor is 2-20. It's the second neighboring sensor and what I see is some reflections off the long seam, no defect indications at all. The next sensor, 2-21. It's a LW-C. I only see the reflections of the long seam and no other indications. So these were all the counterclockwise sensors, so we are through.

MR. PIERZINA: And anything in there that lead you to call that feature a crack-like feature?

MS. SENF: Yes -- yes and no. So the reflections off the clockwise sensor 1-8 and 1-9, there we have some toe crack reflections, but these reflections are not as strong as the reflections from the crack field.

MR. PIERZINA: That's the toe crack in the one-and-a-

half skip?

MS. SENF: Yeah, we have -- in sensor 1-8 we have it in the half skip and in 1-9 it's in the one-and-a-half skip, yes.

MR. CHHATRE: And you will call that a toe crack?

MS. SENF: Yeah, so --

MR. FOREMAN: Crack-like.

MS. SENF: It is a toe crack, but we would call it a crack-like indication.

MR. CHHATRE: Okay.

MS. SENF: So it's the other term we use it.

MR. FOREMAN: So in that box there are both crack-like and crack field indications?

MS. SENF: Correct.

MR. FOREMAN: And you called it a crack-like?

MS. SENF: Correct.

MR. CHHATRE: There's one, two and three so far.

MS. SENF: Um-hum.

MR. CHHATRE: Up to five?

MS. SENF: Halfway through, um-hum.

MR. CHHATRE: Okay.

MS. SENF: Yeah, let me know when we can jump to the next one.

MR. CHHATRE: I'm ready.

MR. NICHOLSON: Oh -- did we get -- oh, you gave me the -- oh, for the crack fields then on this one what would be our

longest indication recorded? And deepest?

MS. SENF: Um-hum. Below, below 1 inch -- this is 1 inch -- yeah, it's below 1 inch. There isn't really an interlinked indication visible.

MR. CHHATRE: The longest was less than 1 inch?

MS. SENF: Less than 1 inch, yeah.

MR. JOHNSON: What was the length of the toe crack?

MR. CHHATRE: I -- yeah, I'm going to say that 2-18 I think is telling it's 3 to 4 inch long.

MR. NICHOLSON: Well, I asked her for the longest indication of the crack field though, not crack-like.

MS. SENF: So the toe crack goes over the whole length of the feature, about 25 inches.

MR. CHHATRE: Right. 35.2 and 35.5, so one-third that means, I would say, 3 to 4 inches. And I think that would classify as crack field now.

MR. NICHOLSON: Now, what are you asking -- what are you saying, Ravi?

MR. CHHATRE: I'm saying 2-18 and --

MR. NICHOLSON: Crack field indication --

MR. CHHATRE: And that is roughly .3 --

MR. NICHOLSON: Well, that's true. That was a 4-inch -- but that's the entire field. That's the length of the field. I'm asking for the longest indication, right, and that's less than 1 inch.

MS. SENF: Um-hum.

MR. FOREMAN: But the longest indication in the box was the whole length of the box, which was the toe crack.

MS. SENF: Yeah, but there are two features. There's the crack-like feature and the crack field.

MR. CHHATRE: Exactly.

MS. SENF: And the longest indication of the crack field is less than an inch.

MR. FOREMAN: No, I understand that.

MS. SENF: Yeah, yeah.

MR. FOREMAN: But if I'm the analyst in 2005 and I'm looking at a box that's 25 inches long and I've got a crack-like that's 25 inches long and I've got to see it as a crack field indications that are all short. And the biggest amplitude is maybe -- I don't know in that crack field indication?

MS. SENF: Yeah.

MR. CHHATRE: So --

MR. FOREMAN: But he's reporting the box, so he's took the crack-like length and the deepest indication from the crack field, max five -- mean max five.

MR. NICHOLSON: For the final report?

MR. FOREMAN: For the final report.

MR. NICHOLSON: In 2005.

MR. JOHNSON: Yes.

MR. NICHOLSON: That's fine. I'm asking had it been

analyzed as a crack field, what would have been the longest indication?

MR. FOREMAN: Right.

MR. NICHOLSON: That's what I'm trying to get to.

MS. SENF: Um-hum.

MR. CHHATRE: And Petra, all of our discussions, this one for all these features we talked about, that's the current interpretation, right? That is not how --

MS. SENF: Correct.

MR. CHHATRE: -- the 2005 person would have looked at it?

MS. SENF: This is my interpretation, correct.

MR. CHHATRE: Okay. I just want to make sure.

MS. SENF: Yeah, um-hum.

MR. CHHATRE: Okay. Great.

MR. NICHOLSON: And I didn't catch the deepest indication for a crack field. Which one of those?

MS. SENF: So this is in sensor 2-17, maximum amplitude of 41 dB.

MR. CHHATRE: So I must have missed that 41 dB somewhere.

MR. NICHOLSON: Which one? You said it was on 2-18 --

MR. CHHATRE: I knew -- yeah, I knew it's -- which one was it? 41?

MR. NICHOLSON: At 2-18 I wrote down 37 dB.

MR. CHHATRE: Where'd you have 41 dB?

MR. PIERZINA: She said 2-17.
MS. SENF: 2-17 does have 41 dB, um-hum.
MR. NICHOLSON: Oh, yeah. Actually I wrote down 42.
MR. CHHATRE: Okay. I had written down 30 dB for that. So it's 41 dB?
MR. NICHOLSON: That's on the one-and-a-half skip.
MR. CHHATRE: Oh, I see. 41 dB was --
MR. NICHOLSON: I wrote down 42 dB.
MR. FOREMAN: Do you want to just go through those couple of sensors again and just confirm that we've got --
MS. SENF: This is the maximum one we have is 41 dB.
MR. CHHATRE: Yeah, okay.
MR. NICHOLSON: Okay.
MR. JOHNSON: That was 17, 2-17?
MS. SENF: Um-hum.
MR. NICHOLSON: Okay. I'm ready when you are.
MS. SENF: Okay? So, and the next feature is 154-005567.
MR. CHHATRE: 1 --
MS. SENF: 154-005567.
BY MR. CHHATRE:
Q. Okay. Why are these numbers have different -- there's no symmetry to those?
A. So we divide our data into sections, so 1.5 sections, so we start with section 1, 2, 3. So here we are -- pretty at the

end of the run we are at section 155.

Q. Okay.

A. And then the boxes, which are created during the data processing, it starts with box 1, 2, 3, 4, 5.

Q. Okay.

A. And so, one section contains about -- between 2,000 and 5,000, 6,000 boxes after data processing. In some cases the analyst needs to add a box or needs to join to boxes when he thinks so this is one feature not two features. And then he will get a new area number. So the last one was maybe 6000, so when he joins a feature it will be 6001.

Q. Okay.

A. And because we want to keep all the out area numbers in the database that we can go back and check when there's something wrong, everything will be kept. No area box will be deleted from the database. It's still there. It's just not visible in our data anymore.

Q. So only if you delete a box still we get a different number?

A. When you delete it it's gone, but when you insert a new one or when you join two boxes --

Q. Okay.

A. -- it will get a new number.

Q. Another number?

A. Yes, um-hum.

Q. Okay.

MS. SENF: Okay. So we are area 5567 --

BY MR. CHHATRE:

Q. And, I'm sorry, your segment is 1½ kilometers long?

MS. SENF: Correct.

MR. CHHATRE: Okay.

MS. SENF: Yeah. Okay. So this feature is located at 26.66 feet from the upstream girth weld at -- circumferential orientation of the box is 100 degrees. It was classified as crack-like with a depth of 12.5 to 25% wall thickness, overall length 51.61 inches.

MR. CHHATRE: How much?

MS. SENF: 51.61 inches. Okay. Going through the sensors, starting with the clockwise sensors, the first one is 1-1. I see some -- a small band of data at 28 feet from the upstream girth weld with some weak reflections. Difficult to tell whether it's a rather background signal, no defect indication again.

The next sensor is at sensor 1-4. I see a crack field indication in the half skip. The max -- mean max five amplitude is 40 dB, orientation 100.8 degrees.

MR. NICHOLSON: And where are we?

MS. SENF: It starts at 28 -- yeah, 28.2 feet from the upstream girth weld and it ends at 30.5 feet. The next sensor I see again a crack field indication in the half skip.

MR. NICHOLSON: This is 1-5.

MS. SENF: This is -- excuse me, this is 1-5.

MR. CHHATRE: And what is it -- how far is it? I'm sorry, 1-5? And you said how far it is from the girth weld?

MR. KILLORAN: She hadn't said yet.

MR. CHHATRE: Oh, she didn't. Okay.

MS. SENF: You're faster than me. So the crack field indication at max -- mean max five amplitude 42 dB, orientation 99.5 degrees. So actually I see two crack field indications. One of them starts at 28 feet from upstream girth weld and it ends at 29.2. This is the one with 42 dB amplitude. And I see a second -- a smaller indication at 30 feet with a length of about 4 inches. The maximum amplitude here is 33 dB. Orientation also 99 point -- yeah, .2, .3.

MR. NICHOLSON: Okay.

MS. SENF: The next sensor is 1-6. It's a LW-C and I just see some long seam reflections, no defect indications.

MR. PIERZINA: I have question.

MS. SENF: Um-hum.

MR. PIERZINA: And this is Brian. This is the LW -- oh, it's -- LW-N is the one that captures --

MS. SENF: Right. Right. Yeah.

MR. PIERZINA: All right. Never mind.

MS. SENF: Um-hum. Then the next is at 1-7. It's a LW-N, long seam reflections are visible, no defect indications.

Then it's sensor 1-8. I see two indications. First I see a weak toe crack in the half skip. This starts at 28 inch with a length of about 9 or -- yeah, 10 inches; orientation 94.8 degree; mean max five amplitude 27 dB. And I also see some crack -- weak crack field indications in the half skip. They start at 29.5 feet with a length of about 18 inches and mean max five amplitude 31 dB and orientation 94.7 degrees.

MR. NICHOLSON: Now, 94.7 --

MR. FOREMAN: Petra, what's that number in one-and-a-half?

MS. SENF: 94.7. Pardon me?

MR. FOREMAN: What's that indication in the one-and-a-half?

MS. SENF: This one here?

MR. FOREMAN: Yeah.

MS. SENF: I would say a reflection from the long seam.

MR. FOREMAN: Okay.

MS. SENF: Because we are still close to the long -- or you're at the long seam here. This is the toe crack, yeah.

MR. FOREMAN: Right.

MS. SENF: Um-hum. The next sensor is 1-9 and here I can see three indications. Let's start with the one on the left. It begins at 26.6 feet. It's a weak crack field in the half skip. Mean max five amplitude 34 dB; orientation 93 degree. The second indication it's a toe crack in the one-and-a-half skip. It starts

again at 28 feet and with a length approximately 8 inches, maximum amplitude 32 dB. And the third indication, it's again --

BY MR. NICHOLSON:

Q. What was that orientation?

A. Hmm? Orientation was 94.8. The third indication it's a crack field. It starts at 29.7 feet and with a length of 15 inches. Orientation 92.9 degree and max -- mean max five amplitude 37 dB's. The next sensor 1-10. On the very left of our -- at the beginning of the box it's at 26.6. I see a weak crack field indication in the one-and-a-half skip. Orientation 93.1 degrees and maximum amplitude 29 dB's. And at --

Q. How long was that? You said at 26.6 feet?

A. Right. And it's about 5 -- yeah, 5 inches long. And the second indication starts at 29.8 feet with a length of 12 inches and it's a crack field indication, which is also -- it's starting at the half skip and it goes over to the one-and-a-half skip, so the orientation in the half skip it's 91.4 degrees, 32 mean max five amplitude, 32 dB's. And in the --

Q. 32 dB?

A. 32 dB, yeah, um-hum.

Q. In the one-and-a-half skip?

A. In the one-and-a-half skip, so orientation is about 93 degree and 28 dB mean max five amplitude.

Next sensor 1-11. There is one indication of a crack field, really weak, and it starts at 29.7 feet from the upstream

girth weld. And indications are in the one-and-a-half skip at 91.5 degree and mean max five amplitude 27.

MR. CHHATRE: And how long that is? It started at 29.7?

MS. SENF: Yeah, it is 11 inches long. Now, these were the clockwise sensors. Going to the counterclockwise side, the first sensor is 16-30. I see weak crack field indications in the half skip and in the one-and-a-half skip. It starts at 28 feet on the length, so 19 inches. Orientation in the half --

BY MR. NICHOLSON:

Q. I'm sorry. It goes 19 inches?

A. Nineteen inches, yes.

Q. Okay.

A. Orientation in the half skip 104.5 degrees and mean max five amplitude 30 dB. And in the one-and-a-half skip at 103 degree and mean max five amplitude 27 dB.

Q. Okay.

A. The next sensor it's 2-16. I see crack field indications in the half skip and also some weak ones in the one-and-a-half skip. Indication starts at 28 feet on a length of 30 inch -- 30 inch and --

Q. Show me where you got that?

A. It's from here to here.

Q. Okay.

A. So that's 30 inch.

MR. FOREMAN: It starts where? At 26?

MS. SENF: 28.

UNIDENTIFIED SPEAKER: 28.

MR. FOREMAN: 28?

MS. SENF: Yeah. So the mean max five amplitude is 38 dB's and the orientation is 103.1 degrees.

MR. CHHATRE: 103. --

MS. SENF: 103.1 degree.

MR. CHHATRE: Okay.

MS. SENF: For the half skip. And in the one-and-a-half skip I have an amplitude of 32 dB and orientation is about 101.4 degrees.

MR. FOREMAN: And its length was what?

MS. SENF: Well, it's the same length so it's -- it starts at 28 feet and it's 19 inches long.

MR. FOREMAN: It goes to 30 inches.

MS. SENF: No, 30 inches.

MR. PIERZINA: 30 inches.

MS. SENF: So, 30 inches; 19 was the previous one.

MR. FOREMAN: Right.

MS. SENF: 30 inches, yeah.

The next sensor it's 2-17. I see crack field indications in the half skip, which starts again at 28 feet with a length of 36 inches. Mean max five amplitude 40 dB and orientation 101.5 degrees.

The next sensor, again I see crack field indications

with a little gap in between, so I would divide it into two indications. The first one is a crack field in the half skip and in the one-and-a-half skip. It starts at 26.6 with a length of 13 inches and the mean max five amplitude is 37 dB; orientation in the half skip is 99.9 degree.

MR. CHHATRE: 99.9?

MS. SENF: 99.9. And on the same length of the 13 inches we have reflections. The one-and-a-half skip crack field reflection it's at 98.3 degrees and mean max five amplitude of 34 dB. The second indication starts at 28 feet and is about 15 inches long. I see a crack field in the half skip and the signals of this crack field are close to the -- or they already start close to the entry point, like a little bit of a curved shape, and orientation is 100 degrees and the mean max five amplitude is 40 dB's. The next sensor 2-19 --

MR. FOREMAN: Just before we're on the next sensor, go back. So you said it was near this entry point. Does that mean it's an internal crack or was it external?

MS. SENF: No, no, it's -- but it could mean that it's -- or that the entry point does have a little curve so the shape of the crack field is slightly curved, I would say, so it's -- the signal is not a straight signal but a curved one.

MR. FOREMAN: But it's on the external --

MS. SENF: So it's close to --

MR. FOREMAN: But it's on the external surface?

MS. SENF: It's -- it is external, yeah.
MR. FOREMAN: Right.
MS. SENF: So, yeah. Okay. The next sensor 2-19 it's a LW-N, the neighboring sensor, and I see long seam reflections in the one-and-a-half skip. They start at 27.2 feet from the upstream girth weld over a length of 32 inches.
BY MR. PIERZINA:
Q. And what type of reflection would you call that?
A. I would call it a seam weld reflection.
Q. Crack like?
A. No, a seam weld reflection not a crack-like reflection.
Q. Not a crack?
A. No.
Q. Okay. And why on this reflection would you go the total length as opposed to two individual lengths?
A. Yeah, that's -- yes. Yeah, that's a good question. It's not right. I should divide it into two indications.
Q. Okay.
A. That's right. Yeah, um-hum. Okay.
MR. NICHOLSON: Even if it's a long seam or how --
MS. SENF: Yeah, because it is a long seam that's why I would say it's just one indication, yeah, so --
MR. JOHNSON: It's not a reportable feature.
MS. SENF: Yeah, so -- yeah, it's a non-reportable, no need to have two boxes, so --

MR. PIERZINA: And it's non-reportable because why?

MS. SENF: Because it's just the reflection of the long seam.

MR. CHHATRE: See by default I thought -- this is Ravi -- that long seam reflections are always reported by the program.

MS. SENF: Yeah, but reported means it doesn't go to the report.

MR. CHHATRE: Right. I mean --

MS. SENF: It doesn't go to the final report.

MR. CHHATRE: But this (indiscernible) but I'm saying you'll see those pixels on the screen, whereas in other cases where there was only background you didn't see anything.

MS. SENF: Um-hum, yeah.

MR. PIERZINA: But in that -- again, this is Brian. In that area of 29 feet you've got some high amplitude reflection, right?

MS. SENF: Um-hum.

MR. PIERZINA: Especially, you know, in the --

MS. SENF: Yeah, that's fine. When I go to the next sensor I see the same here, so it seems that the long seam is not really straight, that there -- that it's slightly deviating and I get some higher reflections and then lower reflections, higher again. This is a normal reflection of the long seam. And when I look at both sensors now, 2-20 and 20-19, it's corresponding here. These stronger reflections are visible here and these strong

reflections are visible here, so it's --

MR. FOREMAN: So does that mean that --

MS. SENF: -- it's corresponding.

MR. FOREMAN: Does that mean that the actual DSAW weld has an edge so you're getting a stronger corner effect from the actual weld itself?

MS. SENF: Yeah, this is -- but this is what we always expect.

MR. FOREMAN: Right.

MS. SENF: Or this is how the algorithm works, right? It does have a nice weld cap and because of that shape we get the LW-C. We identify it as a long seam and we record the neighboring two sensors.

MR. FOREMAN: Right.

MS. SENF: Yeah, um-hum.

MR. FOREMAN: And this is where the analyst earns their money because that's -- you can't just follow the red mark means simply a crack. And that's when it starts getting complicated.

MS. SENF: Yeah.

MR. FOREMAN: For me, anyway. I'm only at level zero.

MS. SENF: Not only for you. We figured that out here. So this indication originally classified as a crack-like, right?

MR. FOREMAN: Um-hum.

MS. SENF: Or the analyst thought it's a crack-like indication, which is not the case.

MR. FOREMAN: Right.

MS. SENF: Good. Any other -- have I told you everything about the sensor or is there something --

MR. NICHOLSON: There was nothing --

MR. PIERZINA: You're having no indications, is what you're saying?

MS. SENF: Okay. Long seam reflections?

MR. NICHOLSON: The long seam reflection.

MS. SENF: Okay. The next sensor it's 2-20, same here long seam reflections, no defect indication. Next sensor 2-21, same here, no defect indications. Long seam reflections only.

And the next sensor is 2-21 and here I see --

MR. KILLORAN: 2-22.

MS. SENF: 2-22, excuse me. I see a crack field indication in the one-and -- in the half skip. It starts at 29.7 feet from the upstream girth weld, length approximately 15 inches, and there is a -- there are some strong reflections with a mean max five amplitude of 45 dB, orientation 93.6 degree.

MR. CHHATRE: So this lies above the weld, right?

MS. SENF: Yes, right. Yeah. So you see -- all the other crack fields we have seen are here below the weld. Here -- and this one here now it is above the weld. It is here.

BY MR. PIERZINA:

Q. So the 45 dB amplitude for the mean max five that we get, what depth bin should that correspond to?

A. That should correspond to the third one, so it is -- 44 would mean it's 2 millimeters so it would be in the 2 to 3 millimeter or -- yeah, corresponding to 25 to 40 bin.

Q. 25 to 40%?

A. Um-hum, yeah.

Q. But the feature was reported as 12-1/2 to 25?

A. Correct.

Q. Do we know why that would be?

A. I can only assume. I cannot --

Q. Well, I think we would probably appreciate your opinion just to know what -- from your perspective why that would be.

A. Um-hum, so --

MR. KILLORAN: Well -- I'm sorry. If she's got a professional opinion, but if she's going to speculate, I mean, I -- distinguish. Just be clear what you're giving. Is it your opinion or are you just speculating?

MS. SENF: It's speculation.

MR. KILLORAN: Okay.

MR. PIERZINA: And that's, that's fine. I think we understand.

MS. SENF: Okay. Yeah.

MR. NICHOLSON: We understand.

MS. SENF: So the analyst goes through all the sensors like this, going this speed, so he sees all the indications. So now he looked at the clockwise and now he goes to the

counterclockwise and normally it ends somewhere here because the analyst exactly knows where he is. He always starts from the bottom and he goes up. And when he's -- so he had to look at these crack field indications on the counterclockwise side and then -- okay, there is a long seam I'm gone -- I'm done, so. And now -- and here, again, another long seam indication, now I'm done. And now there is another crack field now. And so, my assumption is that he didn't even look at this sensor.

MR. CHHATRE: Okay.

MR. FOREMAN: And this is only at the side of the weld?

MS. SENF: So meanwhile --

MR. FOREMAN: Is it?

MS. SENF: -- the colors change. So, this is the new software we use here. The colors change when he's done. So he needs to go through all the sensors until he sees a white line.

BY MR. CHHATRE:

Q. But here -- and this is Ravi, NTSB, question. Since the accident have you -- you meaning GE -- have you gone back to those two analysts --

A. Um-hum.

Q. -- and did you -- not the entire line, but at least for this particular segment --

A. Um-hum.

Q. -- have you discussed with them as to what certain -- why certain -- I mean the discrepancy, you know, how you would

classify and they did at that time.

A. Um-hum, um-hum.

Q. Was that discussed? And I guess -- and I realize some of the things you said you speculate --

A. Yes.

Q. -- or that you are hoping.

A. Yes, um-hum.

Q. But if you have discussed that with them then maybe we can have their interpretation, right? And I thought you -- already did talk to them?

A. Yes.

Q. So --

A. But --

Q. I, I guess what I'm leading to is maybe don't need to --

A. Yeah, I talked to them and I watched them when they looked at the feature and this is exactly what they did. So they went through the sensors, okay, okay, okay, okay, okay with that, okay, okay. But they didn't go to the end and -- so they -- of course they knew, okay, so if Petra is talking to me about these features there is something wrong then. So they moved back and forth, back and forth and I -- okay.

Q. Okay.

A. There is another indication.

Q. So I guess --

A. But they didn't say really, oh, there is another

indication. They just -- oh, okay, I know it's a crack field. But it took them really a while to get -- to go to the end of it, so --

Q. I guess what I'm hitting at is either (a) maybe we can have their interpretation of it. If you -- if I understand, you gave them a blank of these scans and they went through.

A. Yes.

Q. So it's not really 100% speculation.

MR. NICHOLSON: Yeah.

BY MR. CHHATRE:

Q. You had some reasons for what they did, so --

A. Um-hum.

Q. Am I correct in that?

A. Yes, but I have seen that they went through all the sensors.

Q. Right. Sure.

A. Because they know they have to go through --

Q. Right, right.

A. -- all until it gets white.

Q. And that's what -- I understand.

A. But in 2005 -- yeah.

Q. I call (indiscernible) maybe there is more credence to what you are saying than calling it pure speculation.

A. Um-hum.

Q. If there is some basis --

A. They would like --

MR. NICHOLSON: Yeah, if you've watched them go through the process --

MS. SENF: Yes.

MR. CHHATRE: That's what I'm saying.

MR. NICHOLSON: -- it's more than assumption.

MR. CHHATRE: It's a little more --

MR. NICHOLSON: Right.

MR. CHHATRE: -- little more solid than a complete guess.

MR. FOREMAN: But I think what I'm hearing is that she went through the process with the modern software --

MR. NICHOLSON: Right. Yes.

MR. FOREMAN: -- which you keep going until you get a blank screen. In 2005 there it was a judgment call when they saw long seam to think whether that would go to the other side of the long seam. It's not the same --

MR. CHHATRE: Right.

MR. FOREMAN: -- set of cracks.

MS. SENF: I don't want to say that they have -- don't have to go through all the indications, but here, especially here in this feature the -- here's the long seam and here is another long seam indication.

MR. FOREMAN: And that was at the end.

MS. SENF: I wouldn't expect anything after this either.

MR. FOREMAN: Right.
MS. SENF: Yeah, but --
MR. FOREMAN: But there is.
MS. SENF: But there is, yes.
BY MR. PIERZINA:
Q. Well, all right. And so -- and this is Brian again, but -- so we have, we have a 45 dB mean max five, right? And does the analyst know that somewhere there is a 45 dB mean max five reflector?
A. Yeah, he -- so he -- yeah, it is -- it is difficult for features at the long seam because the amplitude we get here, the 45, is for the whole feature. So it could be caused by a crack field indication or by the long seam indication.
Q. Okay.
A. So, difficult for him to tell that there is a 45 dB indication.
Q. Well, so -- and I guess my question is with the 45 dB amplitude feature that puts you in the 25 to 40% bin and the feature was reported in the 12-1/2 to 25% bin.
A. Um-hum.
Q. So that, that is a huge difference. So I think it would be important for us to understand how we got from the 25 to 40% bin down to the 12-12 to 25% bin.
A. Um-hum.
Q. Right?

MR. NICHOLSON: I agree it's important. I don't see how we're going to be able to know that. How are we --

MS. SENF: So, what I --

MR. NICHOLSON: We'll have to talk to the analyst, right?

MS. SENF: Yeah. What I can -- so there is -- there is one indication with the 45.

MR. PIERZINA: Sure. Right at the very end and above the well.

MS. SENF: Right at the very end, yes, and above the well, so it is -- yeah, it's over here. Right, yes. And -- yeah, the only reason why it was only classified to 25 -- 12.5 to 25 is that this indication was not considered for sizing.

BY MR. NICHOLSON:

Q. Well, if it was mean max five --

A. Mean max five, yeah.

Q. Oh, that is -- 45 is the mean max five.

A. Um-hum, um-hum.

Q. So it didn't take the 45 and four other readings and average them. Okay. So, yeah, it should have been reported as 45. So the only answer would be it didn't get looked at.

A. Or he didn't consider it for sizing. At that time it was a manual process the sizing, right? So he went to --

Q. He just discarded it.

A. -- he went through the data as we did, so he looks at

all the crack field indications and looks, okay, what is my maximum amplitude? It's 40, it's 40, 42, then this how he did it in the past.

MR. PIERZINA: Sure.

MS. SENF: Yes.

MR. PIERZINA: Now in 2005 the data that is on the right hand side of the screen that we're looking at today would that be the -- would that have been presented in that same fashion in 2005?

MS. SENF: Yes. Yes, yes.

MR. PIERZINA: So, correct me if I'm wrong, if I'm an analyst and I know up front that I'm looking for a 45 dB reflector, wouldn't -- I would want to find that, right?

MS. SENF: Um-hum. Um-hum. Yeah, but the problem is this value here is for the whole feature and I'm at the long seam. And when I look at the long seam reflections -- here in this case I have 41 dB -- and what do I have here -- 41 dB, 41 dB. So the -- yeah, here I have weaker reflectors, but the analyst -- for features at the long seam though this maximum value is normally corresponding to the long seam reflections and not to defect reflections.

It's not reliable. He doesn't know where it comes from. Does it come from the long seam or does it come from the defect? And normally the analyst is not looking at that value here. Rather in the base material but not at the long seam.

MR. PIERZINA: So --

BY MR. FOREMAN:

Q. I've got another question. If you were analyzing that today under today's rules, would that SCC colony or crack field be part of this one big box or would it be a separate defect?

A. Today, we -- because the two crack fields are located on each side of the weld --

Q. Um-hum.

A. -- on all sides of the weld -- so we would have two boxes.

Q. Two boxes.

A. One box for this one here.

Q. Right.

A. And another box for this one here.

Q. Right. So we would have a big -- we'd have a deep shorter box on either side of the weld that's not associated with the big field on this side of the weld. Yeah?

A. Um-hum.

Q. Right. So it would have been a missed -- and then -- so therefore it wouldn't be missed because there'll be a separate box to go and actually look at it?

A. Yeah, well -- and even if it would be one box the sizing that we use now -- so the sizing algorithm for crack fields is that it only excludes indications which relate -- which do not relate to a crack field. So today the analyst goes through --

let's go back here. I cannot really show that or do that in the data, but what he's doing, he looks at reflections which do not -- are not part of the crack field and they just exclude it.

So -- it's not working here, but they exclude them and excluding -- an excluding frame means it's not considered for sizing. But -- so in this case he would exclude all these indications because this is not crack field. This one here is not crack field. It will be excluded. Just a box with an X in the --

BY MR. NICHOLSON:

Q. Through this up -- this background stuff?

A. So the whole thing I would -- I would just exclude it -- don't use it for sizing because I have lots of reflections here which are not part of a crack field.

Q. Oh, okay.

A. So all the non-relevant indications are excluded.

Q. But previously they would have been included as part of the mean max?

A. Previously it was a manual process, the --

Q. Oh, okay.

A. -- the depth estimation. And since we have it in the software -- so the analyst needs to tell the software which indications are not included for sizing.

Q. Okay.

A. So he would exclude -- no he wouldn't exclude these ones here. Which ones -- he would exclude this one here and this one

here. So even if he wouldn't look at this one here, when he's not excluding it, it will be part of the sizing and then it will be 25 to 40.

MR. PIERZINA: What is the maximum amplitude --

MR. NICHOLSON: Yeah, this is -

MR. PIERZINA: -- reflector in that area, if we can tell? I don't know if we can, but --

MS. SENF: Yes, we can.

MR. PIERZINA: Oh, we can --

MS. SENF: Let's see. Okay. So I -- no, I only see indications with 44 dB or higher and -- yeah, that makes it easier for me -- then one at 46, 44 -- yeah, 46.

MR. FOREMAN: Yeah, because mean max five will be some higher than --

MR. NICHOLSON: Yeah, the bin, right.

MS. SENF: So, 46 is the maximum amplitude, um-hum.

BY MR. CHHATRE:

Q. This is Ravi. I still -- I mean, the point he was making was correct. If he had the number 45, maybe (indiscernible) that's a good check to see that you had looked at all, because even if it is -- as you move away from the seam it's still good to know that, okay, they didn't see -- the program tells me 45 dB max.

A. Um-hum, um-hum.

Q. And indeed I didn't find 45 dB max.

A. Um-hum, um-hum.
Q. They can see there are no -- it's blue black.
A. Yes. Yes.
Q. But as you really can see (indiscernible) makes sense.
A. Yeah, but for 95 of the -- 95% of the indications are at the long seam, right. Always checking so what is the maximum here? So where does the maximum come from? Does it come from a defect or does it come from the long seam?
Q. Right. Can be done.
A. Yeah, can be done.
MR. FOREMAN: Okay. But from my understanding that's on the other side of the weld. That particular piece didn't even fail.
MS. SENF: That's a (indiscernible).
MR. FOREMAN: So if you look at it from another point of view, if we actually called it -- making this one a big feature with a deeper depth than it actually had, right?
MR. NICHOLSON: Well, the difference is what would it have done on the Enbridge side? That's the difference. Twenty-five to 40 would have prompted different actions from --
MR. FOREMAN: I agree.
MR. NICHOLSON: That's (indiscernible).
MR. FOREMAN: But it would have been wrong. It would have been a wrong call because it would have been on the other side of the weld, right?

MR. NICHOLSON: Right.

MR. FOREMAN: I agree it would have prompted different actions and it's a shame it didn't, but -- but it is actually in the -- the point I was making was --

MR. KILLORAN: Well --

MR. FOREMAN: -- it wouldn't be -- and today it wouldn't be incorporated in that long defect. It would be separate defect or a separate --

MR. NICHOLSON: Right. No, that's a good point. Right. It's its own --

UNIDENTIFIED SPEAKER: (indiscernible) you say it would probably be different. What's your basis for that?

MR. NICHOLSON: No. I said that.

MR. FOREMAN: He said --

MR. NICHOLSON: And then I think he --

MR. KILLORAN: But he said you agreed?

MR. CHHATRE: It could. It doesn't mean it would.

MR. FOREMAN: Yeah, I couldn't say it would, but it --

MR. CHHATRE: It could (indiscernible).

MR. NICHOLSON: It may have.

MR. FOREMAN: Yeah.

MR. NICHOLSON: Just --

MR. KILLORAN: Should we take a break?

MR. NICHOLSON: Yeah, I was going to -- I see a lot of people leaving. Let's go off record here and take a break.

(Off the record.)

(On the record.)

MR. NICHOLSON: On the record. This is Petra interview Part 6.

And, actually, we're -- we just covered the 51.6-inch feature, right? We went through all the sensors. That's where we kind of left off. And the revelation here was that we had seen an amplitude of 45 dB in the very last feature on sensor 2-22.

BY MR. NICHOLSON:

Q. So, I think what I need to know from you, Petra, that -- if you'd just confirm for me that back in 2005 because the final report says the feature bin was 12½ to 25%. Seeing a 45 decibel would have -- should have shown this as 51.6-inch long feature and 25 to 40 percent bin; is that correct?

A. That's correct, yes.

Q. And if it had been reported to me an operator is 25 to 40% and I came back to you asking for a profile, what would I have gotten as a profile on that in 2005?

A. So the profile would include all the reflections we see, the ones below the weld also the ones above the weld, but it would not be a profile that is 25% -- 25% came over the whole length. You know, it will be kind of a different shape of profile.

Q. But it would include that 45 dB reading?

A. Yes.

Q. Okay. It would still be reported as the mean max, I

guess is what I'm getting at? You wouldn't have seen --

A. Right.

Q. -- it as 46 dB?

A. No. No.

Q. Okay.

A. I would see as 45.

MR. CHHATRE: (Indiscernible) -- this is Ravi. What if I were to put it as to 2 to 3 millimeters or 3 millimeters?

MR. SENF: In the 2 to 3 millimeters. So the 45 corresponds to slightly above 2 millimeters, or 2.2 millimeters.

MR. CHHATRE: Okay.

MR. SENF: Yeah, um-hum.

MR. NICHOLSON: Yeah, it'd be like, you know, 2.2 millimeters, which would be 30% of wall.

MR. CHHATRE: Right.

MR. NICHOLSON: Which would put it in the 25 to 40% bin.

MR. CHHATRE: Okay. I got 38 was 1 millimeter. And for 26 (indiscernible) millimeter, so --

MS. SENF: Yes. Right. Right. So, I mean, that still would be in spec. So we have a tolerance of plus or minus .5 millimeter on the depths bin. So, even if we call it 12.5 to 25, it's slightly above 25. So, we would still would be within spec. But it's -- the depths ranges are below 1.

BY MR. CHHATRE:

Q. And because we are still on this longer feature, I have

couple of clarification questions that we left off yesterday. And for the record, if there is a crack field and a crack-like feature, the same length and same maximum depth, which would be considered more, I guess, damaging or more serious, a serious flaw?

A. In 2005, it would have been a crack field -- crack-like.

Q. Crack-like.

A. 2011 or '12, it would be a crack field.

Q. Okay. Can you clarify why is that -- why would that thing change? Because both still have the same maximum depth and same --

A. Yes. Right. So, we learned, especially when we -- when we received the dig from -- the first dig from the duo tool is that the characteristic of a -- yeah, the characteristics of a crack field deliver weaker signals, or because of the characteristics of a crack field, the signals are weaker received than from a crack-like indication. And because that we changed our depth sizing algorithm for crack fields, so even if it's the amplitude as a crack-like, we consider it a higher amplitude. So we will make it deeper. So we calculate it deeper even if it's the same.

Q. Okay. So that is why crack field will be more serious or more, I guess, detrimental, if --

A. Right. So, the depth will be deeper and -- and this is now in everyone's head: so, okay, it gets deeper, okay, it is

more serious. Yeah.

Q. Okay.

BY MR. NICHOLSON:

Q. But it's not clear to me, in 2005 why is crack-like more severe, if you will, or why is that --

A. Because it's -- a crack field only consists more cracks and a crack-like is always a long crack. So it's just because of the length. Yeah, we consider it more --

Q. So, in that case it's the overall length is --

A. Um-hum.

Q. -- the more concerning feature?

A. Yeah.

Q. Because the depth would have been the same regardless.

A. Correct.

Q. If I'm an operator and I ask you to profile at 51.6 feature, which you've already indicated profiling is sort of a specialty, and I asked you for the maximum indication in that box area, would you -- can you -- you would have provided that, right? If I said I didn't want the mean max, I want the maximum amplitude or depth?

A. Yeah, I would provide 46 --

Q. 46.

A. -- dB then. Um-hum. One question to that feature, have I given you the interlink length of that feature? I don't think so.

Q. The longest indication?
A. Longest indication, yes.
Q. No.
A. So -- longest indication.
Q. No. We did not get there. That's -- thank you. That's right, we did not get longest indication for deep -- well, we know deepest now. Deep 45.
MR. CHHATRE: I thought you said less than 1 inch and --
MR. PIERZINA: That was --
MS. SENF: For 5567?
MR. PIERZINA: We have 76.
MR. NICHOLSON: Oh, (indiscernible) -- different ones.
MS. SENF: Two-inch, 2 inches.
BY MR. NICHOLSON:
Q. Two inches?
A. Yeah.
Q. Is the longest indication --
A. Yeah, um-hum.
Q. -- out of that whole 51.6? Okay. Where -- can you just tell me where that -- what sensor you pulled that from?
A. Yeah. It was -- what do I see here -- it was sensor 1-18 -- 2-18.
Q. Yeah, okay. And it was located at what orientation?
A. It's located at 100.1 degree. 1001.1.
Q. Okay.

A. Um-hum. Okay.
MR. CHHATRE: At 2-18?
MS. SENF: 2-18.
MR. CHHATRE: But I don't know whether we're giving -- okay.
BY MR. NICHOLSON:
Q. 2-18 was actually when we're -- Petra noted there should have been two indications because there was a gap, right?
A. Um-hum.
Q. So, is that in the first or second indication?
A. In the second.
Q. Okay. Second meaning downstream?
MR. CHHATRE: And that was 40 dB, right, the second deviation was? I thought the orientation was 100 degrees and now you're saying 100.3 or -- that's what it is?
MS. SENF: Yeah. The longest indication was at 100.1
MR. CHHATRE: Okay.
BY MR. NICHOLSON:
Q. The analysis that you just did on that 51.6, that seemed like a very thorough analysis. Is that how a check would be done by a Level 2 analyst? And are they going through sensor by sensor?
A. They have to go through all the sensors again.
Q. Okay.
A. And -- so, in the past they had to measure all the

indications to see what the maximum indication is. Yes, so they do the same work as an analyst, yes.

Q. And very similar to what we're seeing today --

A. Yes.

Q. -- without the interruptions.

A. Yes.

Q. All right.

MR. PIERZINA: This is Brian. Petra, the quality check that was done back in 2005, how much experience did that analyst have at that time?

MS. SENF: At that time I -- 9 to 10 years of experience. So, he's one of our oldest analysts.

MR. PIERZINA: Okay. And he was a Level 2 analyst at that time?

MS. SENF: He was a Level 2, yes.

MR. PIERZINA: Okay.

MR. CHHATRE: This is Ravi.

BY MR. CHHATRE:

Q. Petra, another question, on the depth reports, when -- do you guys get any input either from Calgary office of GE or the operator that when they do the verification or whatever technology GE used, that the actual measured wall thickness and the one that you reported, how closely they matched? Do you get that input or you don't get that input?

A. So, in general, we don't really get the input from

Enbridge if we are right or wrong. So, what we get is -- so, we need to correlate our girth welds to another pipe, right?

Q. Okay.

A. So, normally we get one from (indiscernible). And another has a nominal wall thickness in it.

Q. Okay.

A. So, we can't really correlate it with our wall thickness because there are always differences, right? So, and but this is -- yeah, this is the only comparison that I would say we have between other data and ours.

Q. Okay.

A. But this doesn't really help us to see if our wall measurement is correct or not.

Q. Have you -- and, I know you probably didn't review all of this, but in the review process was there any pipe segment that you recall had a .35-inch nominal wall? Because I think the wall that I remember was 285, 265, something like that. And does that -- I guess, let me back up. Do you know -- before the analysis begin, would the analyst know what the nominal wall for the pipe is? For the pipe diameters, I guess, if you would.

A. No. So, he knows only the things he sees here in our software. Nominal wall thickness is not given in our software, not yet. No.

Q. And for the record, I don't -- I went through my notes and I don't see I got your formal education for the record. It's

kind of our routine we ask everybody to complete -- the formal education you have? I know you have degree, but I don't --

MR. KILLORAN: Formal education.

MS. SENF: Okay.

BY MR. CHHATRE:

Q. I didn't get down the --

A. I worked as a technical designer, technical designer.

Q. Okay. And what -- does that involve a formal education or -- I don't understand what -- I'm just calling it that --

MR. KILLORAN: What universities did you go to, Petra?

MS. SENF: No, it's not a university. So we have a different way how to learn that in Germany. So it is part-time working in a company and part-time going to school again.

BY MR. CHHATRE:

Q. School, okay.

A. Um-hum.

Q. Thank you. Was that -- would it be equivalent to high school, two years college, or -- well, the system in your case as a member of (indiscernible).

A. Um-hum.

MR. FOREMAN: Is that like a technical college?

MS. SENF: Yes, it's rather technical, technical school.

MR. FOREMAN: A technical institute?

MS. SENF: Technical school.

MR. FOREMAN: It's not a university, but it's --

MS. SENF: Not a university but --
MR. FOREMAN: -- a technology --
MS. SENF: Yeah, um-hum.
MR. FOREMAN: -- institute?
MS. SENF: Institute, yes.
MR. CHHATRE: Okay. That's only (indiscernible).
MS. SENF: Um-hum. Um-hum.
MR. NICHOLSON: And you are a, I'm sorry, technical designer?
MS. SENF: Um-hum.
MR. NICHOLSON: What is that; like a PAL CAD (ph.) or CAD?
MS. SENF: PAL CAD, yeah.
MR. NICHOLSON: Okay. With Pipetronix or --
MS. SENF: No. No. With our company.
MR. CHHATRE: Okay. That was -- I didn't meant to deviate from what we were doing, but I just wanted to get those two things taken care of.
BY MR. PIERZINA:
Q. This is Brian. Seeing as long as we're backing up a little bit, I did also want to have you distinguish the change in your responsibilities from the team lead position to the technical lead position, if it --
A. Okay. So, in 2006, the structure of the analysis team has changed. So, at that time we had -- oh, we started with a

global analysis manager. At that time it was Sean Kelly (ph.) in Calgary and now it's Clint Garth. And we had a technical lead. That time it was Ralph Fava (ph.). I was a team leader, so -- and though the responsibility for the analysis team changed as well, so I had -- so all the elements now were my direct reports, the direct reports for the team leader. Yeah, it was in the middle of 2006 when it changed. And so my responsibility as a team leader was to leading all the analysis projects; so, the inspections we did, and supervision of all the analysts.

And when I moved on to lead role, that meant that I was not -- excuse me, not ending up -- being responsible for operation of project, but to make sure that all the process which are in place are correct, to develop new processes, to work with software and software improvements. I have two direct reports now. These are the trainers we have ultrasonics: one WM, wall measurement, trainer and one USCD trainer, an EMAT trainer. And -- yeah, so it's rather the -- Clint is the production side and I'm the quality side of that job.

Q. Okay. Thank you. I think that --

MR. CHHATRE: This is Ravi.

BY MR. CHHATRE:

Q. So, do you do -- do you supervise any of the (indiscernible) of these like we just did? Are you not divorced from this type of activity, doing the analysis?

A. Can you say that again?

Q. Well, I -- now, the analysis that we just went through as analyst Level 2 or Level 3, whatever the case may be.

A. Um-hum.

Q. Now, in your position you no longer do the analysis?

A. Right. Right.

Q. Okay.

A. So, I rather take care of all the issues we have later on.

Q. Okay.

MR. NICHOLSON: Can we -- you know, we don't have a whole lot of time today and I think there's one other person we want to get in, so maybe if we can just plow through these last two features and --

MR. CHHATRE: I think there's only one, right? Five?

MS. SENF: No, there's two.

MR. NICHOLSON: I've got two.

MR. CHHATRE: Oh.

MR. KILLORAN: Two.

MR. NICHOLSON: And then we can maybe finish up with some other background questions for Petra.

MS. SENF: Okay. The right feature it is area ID 154-005579. It is located approximately 31.18 feet from the upstream girth weld. The orientation is 101 degrees. It is classified as a crack-like indication less than 12.5% deep; overall length 40.14 inches.

MR. NICHOLSON: 4-0.?

MS. SENF: 40.14 inches.

MR. CHHATRE: Can you repeat the indication or location that we have? I missed that.

MS. SENF: So the -- the start distance of it?

MR. CHHATRE: No, no.

MR. FOREMAN: The orientation.

MS. SENF: Orientation?

MR. CHHATRE: No, no, the location for the number 5 -- what are of the box, how you identify the box itself.

MS. SENF: So, the area ID is --

MR. CHHATRE: Yeah, area ID, yeah.

MS. SENF: 154-005579.

MR. CHHATRE: Okay.

MS. SENF: Um-hum. Okay. First sensor clockwise side is sensor 1-5. And I see some crack field indications. They start at 32.3 feet from the upstream girth weld on a length of 13 inch. And the mean max five amplitude is 33 dB and orientation is 99.1 degree.

Next sensor is 1-6, and I see that LW-C, the long seam center and some reflections from the seam weld as well. No defect indications.

MR. CHHATRE: I'm trying to -- would that be -- the number 1-5 was that one-and-a-half skip, half skip?

MS. SENF: That was in the half skip, um-hum. Sorry, I

didn't say that.

So, back to 1-6 on the long seam indication, no defect indication.

Next sensor is 1-7. I see only long seam reflections, no defect indication.

MR. NICHOLSON: So, it's LW-C plus?

MS. SENF: Yeah, it's, rather, LW-N. So LW-C is just the short part of, so --

Next sensor would be the 1-8. I only see some weak background signals, no defect indication.

MR. CHHATRE: I believe you explained that earlier. What does LW-C and LW-N means again?

MS. SENF: LW-C means it's a long seam center and LW-N is the neighbor of the long seam center.

The next sensor is 1-9, and I see reflections of a crack field in the half skip. It -- yeah, actually, I see two indications. One of them -- the first one is at 31.18 from the upstream girth weld.

MR. NICHOLSON: Say it again. 31?

MS. SENF: 31.18. The length here is 8 inches. Mean max size amplitude: 38 dB. Orientation 92.9 degree.

The second indication, also a crack field in the half skip. It starts at 32.5 feet from the upstream girth weld. Length here is about 25 inches. The mean max five amplitude is 35 dB; orientation 92.9.

The next sensor is 1-10. I see some weak reflection. They could -- part of them are background reflection, others might be some very, very weak reflections of the crack field. I'll take one of it. It is -- it starts at 34 feet from the upstream girth weld. It's 6 inches long; mean max five amplitude 33 dB; orientation 91.3.

The counter-clockwise side is -- let's see. First sensor 16-29. Some weak reflections at 32.3 feet from the upstream girth weld. Most probably crack field reflections but very weak in the half skip. 26 dB mean max five amplitude. Orientation 106 degree.

MR. NICHOLSON: You said 26 dB, correct?

MS. SENF: Um-hum.

MR. NICHOLSON: Thank you.

MS. SENF: Next sensor is 16-30. Some weak crack field indications. It starts again at 32.3 feet from the upstream girth weld. Mean max five 32 dB. Length -- sorry, I don't see that. Length 3 inches. And orientation 104.9 degree.

The next sensor is 2-16. I see reflection from the -- from a crack field with a little gap in between. So, the first one of it is at 32 feet from the upstream girth weld. Length 8 inches. Mean max size amplitude 34 dB. Orientation 103.2 degree. And the other indication it is start at 32.7 feet from the upstream girth weld; 3 inches long; mean max five 33 dB; orientation again 103.1.

BY MR. CHHATRE:

Q. Now, are these half skip, one-and-a-half skip? Both, I mean, 1-16 is 30 and --

A. In the half skip.

Q. One-half.

A. Half skip.

Q. And what about 16-30? Was it also half skip?

A. Yeah, both of them are half skip.

Q. Okay.

MS. SENF: The next sensor, it's 2-17. I have three indications of crack fields, all of them in the half skip. The first one starts at 40.14 feet from the upstream girth weld.

MR. PIERZINA: I'm sorry, that -- how far from the upstream girth weld?

MS. SENF: Oh, excuse me. 31.18 then with -- 31.18.

MR. CHHATRE: Not 40. --

MS. SENF: No. No. That was the length.

MR. FOREMAN: So, question. Why is a black line there? Is there not more of it to the left?

MS. SENF: Well, the -- yes, but this was covered by a previous area.

MR. FOREMAN: Previous area, okay.

MS. SENF: Yeah. Um-hum.

MR. FOREMAN: Okay.

MR. PIERZINA: When you talk about the previous area,

are you talking about the previous feature that was just discussed?

MS. SENF: Yes. Yeah, so more or less. Let me see.

MR. FOREMAN: Oh, the previous sensor?

MS. SENF: So there is a little gap in between them, yeah.

MR. FOREMAN: Oh, right.

MS. SENF: Right. But so here in this case -- let me see what happened here. Here we have -- so there isn't really a real crack field indication so the analyst concentrate on red to red at that time. So, this sensor is not necessarily the one he used for the length sizing. He used other sensors for it. Let me see which one he used. Yes, he used this one here. So, he does have the main indication, everything which is here, everything (indiscernible) and so that's why he didn't even consider it for length sizing. And the other area starts over here.

BY MR. PIERZINA:

Q. Okay. And what kind of distance are we talking about between those where you just drew that?

A. Three inches.

Q. Okay. Well, you kind of got -- it looks like -- all right, maybe make -- erase the yellow box, if you could, that you have there and draw a box around the upstream feature, not from that one, but just -- that feature there, draw what you would around the crack field that you see there.

A. You mean like that, or --

Q. Okay. Why don't you, why don't you go a little bit farther downstream? Yeah, there you -- there.

A. Um-hum.

Q. Okay. So what -- so and what kind of distance are we talking now between the black line and the yellow line?

A. You mean here?

Q. Yeah, right there.

A. Yeah.

MR. FOREMAN: That was 3 inches, isn't it?

MS. SENF: Yeah, 3 inches.

MR. PIERZINA: Still 3 inches? All right.

MS. SENF: Um-hum. Still 3 inches, yes. Um-hum.

MR. FOREMAN: Can you put a kind of box on and been discounted? You think I would never have had a box on that area that Brian just asked you to --

MS. SENF: No. The previous box is somewhere here.

MR. FOREMAN: What?

MS. SENF: The previous box, the upstream box.

MR. FOREMAN: Oh, right. That was their previous --

MR. PIERZINA: Yeah, that's the box that we had close to the 45 dB.

MR. FOREMAN: Right. Okay. So it was covered, right.

MR. PIERZINA: (indiscernible) just about right there, right?

MR. NICHOLSON: Oh, okay. This is -- these are your 45 dB indications; is that what --

MS. SENF: No. No, they're --

MR. NICHOLSON: From the other --

MS. SENF: The 45 is -- where do I see it -- here. This is the 45 indication from the previous box.

MR. NICHOLSON: Oh, okay.

MS. SENF: Um-hum.

MR. NICHOLSON: You're on a different sensor but you're at the same location? Just --

MS. SENF: Yeah, because -- it's the same sensor, but I'm just in a different box, so --

MR. FOREMAN: Just the next stop.

MR. NICHOLSON: Oh, you just went to the --

MS. SENF: Right. Yeah, um-hum.

MR. NICHOLSON: -- the other box, okay.

MS. SENF: Um-hum.

MR. PIERZINA: But that is --

MR. NICHOLSON: So you just measured that out from here to there (indiscernible), right?

MS. SENF: Um-hum. Yeah. So and at that time the rule was to box from yellow to yellow, but meanwhile it is box it from green to green. So, the one box would have ended here and maybe end the other box, end it right at that feature here. So there wouldn't have been a gap in between today.

MR. PIERZINA: It would have been one big long --

MS. SENF: Yeah. So, let's -- why don't we look at this -- it's easier to look at. So that would have been this box here, from here and -- I don't see everything. Can I --

MR. FOREMAN: Would he (indiscernible) just took the seam weld away?

MS. SENF: No. That doesn't really happen. (indiscernible) already -- that doesn't happen. But so one box would be somewhere here and the other box would be really -- yeah, I cannot draw two boxes, but the other would be something like here.

MR. NICHOLSON: So they would not be one box?

MR. FOREMAN: And they would have been separated?

MS. SENF: No, they would be still separate boxes.

MR. FOREMAN: And that's because of the 3-inch you have nothing in between?

MS. SENF: Not necessarily. It really depends how it is displayed on the B scan, right? In the B scan it's the easiest way to adjust it to the length and it might be perfectly visible in a (indiscernible).

MR. FOREMAN: No, because of the compression of the -- yeah.

MS. SENF: Yeah.

MR. PIERZINA: Sorry to interrupt.

MS. SENF: Okay. No problem.

MR. NICHOLSON: 2-17 is what we were on.
MS. SENF: Okay. 2-17.
MR. NICHOLSON: First indication 31.182.
MS. SENF: Right. Mean max size amplitude 32 dB. Have I told you the length?
MR. NICHOLSON: No. No.
MS. SENF: It's 4 inches long. And the orientation is 101.5 degree.
The second one is 32 feet from the upstream girth weld.
MR. CHHATRE: Thirty-two?
MS. SENF: Thirty-two feet.
MR. CHHATRE: Feet? Okay.
MS. SENF: Yeah. Five inches long. Mean max size amplitude 36 dB and orientation 101.6.
The third indication is at 32.8 feet from the upstream girth weld. Mean max five amplitude 34 dB. Orientation --
MR. NICHOLSON: Forty-two?
MR. FOREMAN: No.
MS. SENF: Thirty-four.
MR. KILLORAN: 3-4.
MR. NICHOLSON: Oh, 3-4, sorry.
MS. SENF: And orientation 101.5 degree.
MR. FOREMAN: What's the length of that one?
MS. SENF: All right. And the length, the length is 4 inches.

MR. CHHATRE: How many inches?

MS. SENF: Four inches. The next sensor --

MR. CHHATRE: I have a question.

MS. SENF: Um-hum.

MR. CHHATRE: The field distance is -- these are real close. Wouldn't that be a crack field?

MS. SENF: Well, this is -- what we see was one sensor, right? And so we have to consider all the sensors. The crack field, it's -- so you see it here on the 3D scan. We have -- can we see it here really good? So the orientation is slightly different in a crack field, so one sensor might not see the whole picture. One sensor might only see a part of it, but the other sensor sees the rest of it. So, all of them need to considered then.

MR. CHHATRE: Okay.

MS. SENF: Yeah. So, I would assume here that maybe here in between there are really weak signals, which wasn't reported, but it still (indiscernible).

MR. FOREMAN: So, Ravi, I mean, it's -- what you do and to check all the sensors is it one continue crack, one result, or is it three cracks?

MR. CHHATRE: Right.

MR. FOREMAN: And this is an individual crack, not --

MS. SENF: Next sensor would be 2-18. Looking at the other sensors, I would also call it an external crack field in the

half skip. Start distance is at 32.3 feet from the upstream girth weld. Mean max five is 232 dB. Orientation 100.1 degree.

MR. FOREMAN: And length?

MR. NICHOLSON: Length?

MR. FOREMAN: 100.1.

MS. SENF: Thanks. Five inches long. And --

MR. CHHATRE: What is the sensor -- 20?

MR. PIERZINA: Five inches.

MR. CHHATRE: Five inches.

MS. SENF: Five inches. Um-hum.

And the next sensor is 2-19. I see some weak reflections from -- they are background -- yeah, background reflections. It's a neighboring sensor again. That's why some data were recorded here. No defect indications visible.

Sensor 2-20, the sensor collect -- recorded reflection of the long seam. No defect indications.

Sensor 2-21, it's an LW-C. Only the reflection of the long seam is visible. No defect indications.

And sensor 2-23, a crack field reflection visible at 34.1 feet from the upstream girth weld. Length 3 inches, mean max five amplitude 35 dB. Orientation 92.1 degree.

Now, these were all the sensors. Now, I'm looking for the longest indication.

MR. PIERZINA: So, did they do both directions at this one?

MS. SENF: Yes. Um-hum.
MR. PIERZINA: Where did -- where was the 42 dB amplitude, the maximum amplitude? So, I didn't see us get into the --
MS. SENF: Well, it's not coming from a defect indication. Well, this one here is 38. So, I need to take it back and --
MR. CHHATRE: Well, we don't have (indiscernible) --
MS. SENF: Forty-two.
MR. CHHATRE: Forty-two.
MS. SENF: Well, this time the 42 comes from the long seam.
MR. PIERZINA: All right. So then help me understand why -- so 42 dB corresponds to approximately 1.8 millimeters?
MS. SENF: Um-hum. Yep.
MR. PIERZINA: Right?
MS. SENF: Um-hum.
MR. PIERZINA: So why is that not a defect?
MR. FOREMAN: It's coming from the weld cut.
MS. SENF: It's a weld cut. It's -- so it's just a reflection of the cap. It's not a defect indication.
MR. PIERZINA: All right. So, let's say -- okay, is it right in the center of the weld or is at the toe of the weld or where is it that we're seeing it?
MS. SENF: It's -- let's see. Well, this is a drawing

of the DSAW weld and so we get reflections here from that part of it, from this part of the weld cap and also from this part of the weld cap. Now, the 34 degree, given that -- or, I'll reflect it here from that edge.

MR. PIERZINA: Okay. And how would that be different if there was a, say, 1-millimeter toe crack coming from --

MS. SENF: Here? Up here?

MR. PIERZINA: From right there, yeah.

MS. SENF: From here?

MR. PIERZINA: Yeah.

MS. SENF: So this sensor wouldn't see it at all. This sensor here. So, this is the clockwise sensor. This wouldn't see the toe crack, but the counterclockwise sensor would get a nice reflection here, (indiscernible) --

If there is a toe crack, I wouldn't see that with this sensor here. This sensor only gives me a signal back from the weld cap.

MR. PIERZINA: Okay.

MS. SENF: But not from a cracking indication.

MR. PIERZINA: Okay. So, now, what's the orientation of that 42 dB reflector?

MS. SENF: The orientation is 96.5 degree.

MR. PIERZINA: 96.5 degrees. Okay. So that's the bottom toe of the weld?

MS. SENF: It is counterclockwise or the other side --

no, at the top. At the top. Ah, yeah. Yeah, because we are the counterclockwise, so --

MR. PIERZINA: But the degrees don't change, right?

MS. SENF: So, the one on the long seam -- so, here is 95 -- or 96 degree. And when I go for the down, I go up -- go down to 98, so --

MR. PIERZINA: Right. I thought we had the -- didn't we have the center of the long seam basically at 96 degrees?

MR. FOREMAN: We did. Where the start -- where the diamond is on the screen --

MS. SENF: Yeah, I don't -- you see where the diamond is here?

MR. PIERZINA: Um-hum.

MS. SENF: And these are -- this is the long seam reflections. So, it's --

MR. PIERZINA: A little bit, okay.

MS. SENF: A little bit.

MR. FOREMAN: All right. So, the cut, the end of the cut.

MS. SENF: Yeah. Um-hum. Right.

MR. FOREMAN: Each from the center of the weld, right?

MR. PIERZINA: Um-hum.

MS. SENF: So we have only --

MR. FOREMAN: From each side.

MS. SENF: So, we have just one diamond for it, right?

So and it can vary over the 12 meters of pipe length slightly, 1 or 2 inch.

MR. NICHOLSON: So the longest indication, deepest indication, that's what we were --

MS. SENF: Yeah, the longest indication, I have to look for it.

MR. CHHATRE: It looks like (indiscernible) nothing, right?

MR. FOREMAN: I think there's three of them. If she can do that, fine.

MS. SENF: So 2 inches is the maximum, what I have.

MR. CHHATRE: Which one?

MS. SENF: The longest indication. Yeah, the longest indication was seen in sensor 16-30 and it's 2 inches long.

MR. NICHOLSON: And the orientation?

MS. SENF: Orientation is 105 degree.

MR. CHHATRE: So, in 2-24 it is (indiscernible) data?

MS. SENF: Right. Right. Um-hum.

MR. NICHOLSON: And the deepest indication would have been what, then, of all that?

MS. SENF: Okay. The deepest indication is in sensor 1-9.

MR. CHHATRE: Thirty-eight.

MR. PIERZINA: Thirty-nine.

MR. CHHATRE: No, 38, I think.

MS. SENF: Thirty-eight.

MR. PIERZINA: So, then, 38 would correspond to 1 millimeter. And that is -- okay, approximately what percent?

MS. SENF: So, I have --

MR. NICHOLSON: 13.7 for 2851.

MR. PIERZINA: So this one was your --

MR. NICHOLSON: It says less than --

MR. PIERZINA: -- says less than --

MR. NICHOLSON: -- 12 (indiscernible). Did I do that wrong? It wasn't on here divided by 25.6 -- oh, it should be 25. --

MS. SENF: Um-hum. So, the reason for that is this is one pixel only, right? Or two -- it's a very, very short indication with this high amplitude. All the other reflections I have are with lower amplitude. So, I would not necessarily use only that pixel for that sizing, because I have to have -- I have to look over the whole feature and there the amplitude was always weaker. So, that time we also had the rule --

MR. NICHOLSON: But that's a min max -- that's a mean max of five already, right?

MS. SENF: Right. But we need to have a certain length for it for an indication to use it or to consider it for --

MR. NICHOLSON: Oh, okay.

MS. SENF: -- depth sizing. I guess I show the graph yesterday and the pass we said, okay, we need 20 millimeter of

length. Then we use it for depth sizing. And we max five in the path and (indiscernible) -- yeah.

MR. FOREMAN: It's not (indiscernible) showing four, but the minimum max (indiscernible) --

MR. NICHOLSON: So what is -- how long is that when you just happen to do this.

MS. SENF: Yeah, just trying to do it here.

MR. FOREMAN: It's just (indiscernible).

MS. SENF: So in (indiscernible) it's 1 inch. Let's go to millimeters.

MR. CHHATRE: 25.4

MS. SENF: It's 8 -- 13 millimeters. So, it's --

MR. NICHOLSON: Well, in (indiscernible) --

MS. SENF: It's a rounding issue. It was inches, right? So it's either 1 inch or it's nothing. And when it's more than nothing, it is an inch. So, it is -- it is below 20 millimeters and that's why it wasn't considered for that size.

MR. NICHOLSON: Below 20?

MS. SENF: Below 20 millimeters.

MR. NICHOLSON: I thought 30 was the threshold. Twenty?

MS. SENF: For the crack field sizing we use 20 millimeters.

MR. NICHOLSON: Oh, okay. So, what is the deepest indication that you would have reported, that would have been reported?

MS. SENF: I guess it's also in this -- it doesn't look -- it would have been the same sensor, at sensor 1-9, and it's 35 dB.

MR. CHHATRE: Okay. And (indiscernible) I got 38 dB also.

MS. SENF: Yes. That was on the left. The indication on the left is 38 but this is too short for sizing and on the right-hand side that feature it does 35, and this would have been used for sizing.

MR. CHHATRE: Okay.

MR. NICHOLSON: So, on the 51.6-inch feature where you have 45 dB deepest indication, was that on a feature that was long enough to have been considered a real indicator?

MS. SENF: It's real indicator, right. So, this is the 45.

MR. FOREMAN: Which is the (indiscernible) --

MS. SENF: This is the 45. And here you see we have not only the one pixel we have here; we have many indications. And that (indiscernible).

MR. NICHOLSON: So that was -- okay. It wasn't a matter of length and -- okay. Okay.

MR. CHHATRE: Now, would that feature get all that? Like when I pass here, would that be a number of (indiscernible)? You are saying it's only one, but if you are matching one-and-a-half skip, will that be a good number then?

MS. SENF: It's too short for even a -- even if it's two sensors, it's too short for -- at that time it was too short for using the sizing --

MR. CHHATRE: But not (indiscernible)?

MS. SENF: Meanwhile we use every pixel, yeah.

MR. NICHOLSON: Okay. Any other questions? We have one more feature. Just one, relatively small.

MR. CHHATRE: Which one is that, now?

MS. SENF: Okay. I have to go back to -- so, the every ID is 154-006743. The feature is located at 36.82 feet from the upstream girth weld. It was classified as crack-like, less than 12.5%. Length: 27.76 inches.

MR. NICHOLSON: And what was your orientation, did you say?

MS. SENF: I'm sorry. I didn't tell you that. The orientation was 98 degrees.

MR. FOREMAN: What did you say the length is?

MS. SENF: The length was 27.76 inches.

MR. CHHATRE: And 154 or just 54-00643?

MS. SENF: 154. It's always 154. Everything's from the same section.

MR. CHHATRE: Okay.

MS. SENF: Um-hum. Um-hum. Okay. So, first sensor is -- on the clockwise side it is sensor 1-5, and I -- and there are indications of a crack field in the half skip. It starts at 37.6

feet from the upstream girth weld. Orientation: 99.4 degree. Length: 4 inches. And mean max five amplitude 34 dB.

MR. CHHATRE: Can you repeat the length and degrees?

MS. SENF: So, it was 4 inches long and 34 dB.

MR. CHHATRE: Okay.

MS. SENF: The next sensor is sensor 1-7. It's LW-C, so I will see the long seam reflection.

Next sensor is 1-8. It's a neighboring sensor, that's why I see some weak reflections of the long seam. No defect indications.

The next sensor is 1-9. I see some long seam reflections and I also see a crack field in the one-and-a-half -- in the half skip. It starts at --

MR. NICHOLSON: In the half or the one-and-a-half?

MS. SENF: In the half. In the half skip. It starts at 36.82 feet from the upstream girth weld. The length is -- the length is 18 inches. Mean max five amplitude 35 dB. Orientation 92.8 degrees.

The next sensor is 1-10. Also see a crack field in the half skip. It starts at 36.9 feet from the upstream girth weld. Length 16 inches. Mean max five amplitude 34 dB. Orientation 91.2 degree.

The next sensor is 1-11. I see indications of -- two indications of a crack field. The first one is in the half skip. It starts at 37 feet from the upstream girth weld. Five inches

long. Mean max five 31 dB. Orientation 89.7. The second indication I see a crack field reflection in the half skip and in the one-and-a-half. Pretty weak. It starts at 37.7 feet. Length 8 inches. Mean max five amplitude 29 dB. The orientation, it goes from 89.9 to 91.4. That's one continuous reflection over the time of flight.

MR. FOREMAN: That's unusual -- (indiscernible)

MS. SENF: Yeah, it's just -- because it is a wider crack field than --

MR. FOREMAN: Yeah.

MS. SENF: Yeah, it's just this place. I would have checked this place. The width of the feature will tell, not (indiscernible) severity.

The next sensor I see some weak reflections. Cannot really tell if they are caused by a crack field or some background noise.

MR. FOREMAN: This is from 1-12?

MS. SENF: Yeah, 1-12. Sorry for that. Sensor -- okay, these were the clockwise sensors. Counterclockwise 16.28. I see some weak reflections, mainly background signals. No real defect indications.

Sensor 16-29, I see some weak crack field indications in the half skip and in the one-and-a-half skip. I start with one-and-a-half skip. It starts at 37 feet from the upstream girth weld. Length: 3 inches; 26 dB mean max five amplitude;

orientation 106.3 degree. And the indications in the one-and-a-half skip (indiscernible) --

(Noise interruption)

MR. NICHOLSON: Hold on for a second.

MR. NICHOLSON: Sorry. These are very sensitive.

MS. SENF: Um-hum. Um-hum.

MR. NICHOLSON: Please continue, please.

MS. SENF: Okay. It starts at 37.3 feet from the upstream girth weld. Mean max -- length 4 inches. Mean max five 25 dB.

MR. NICHOLSON: Hey, I'm sorry. Too many numbers. The mean max was what?

MS. SENF: Mean max was 25 dB. Length was 3 inches and orientation approximately 104.4 degree.

The next sensor is 16-30. I see some weak reflections of a crack field mainly in the one-and-a-half skip, I would say. It starts at 37.5 feet from the upstream girth weld. Length 4 inches. Mean max five 25 dB. Orientation 102.9 degree.

Next sensor 2-16. I see crack field indications mainly in the half skip. Start at 37.3 feet from the upstream girth weld. Length is 6 inches. Mean max five amplitude 37 dB. Orientation 103 degrees.

Next sensor is 2-18. Here I have two indications. The first one, it's an external crack field in the half skip. Starts at 35. -- 37.5 feet from the upstream girth weld. Four inches

long. Mean max five amplitude 36 dB. Orientation 100.1 degree.

The second indication starts at 38.5 feet. Length 7 inches. Mean max five amplitude 38 dB. Orientation 99.8 degree.

MR. NICHOLSON: Is this -- they were both crack fields?

MS. SENF: Both crack fields, both in the half skip.

MR. PIERZINA: Petra -- this is Brian. Petra, could you explain why with this crack field being sized at 38 dB that the feature would be reported less than 12½ percent?

MS. SENF: It's right at the border, that's why. So, it's -- if it's just a few pixels of 38, so then you need to make the decision is it now (indiscernible) 10% of it was -- or 70% (indiscernible) was it, right? So it was one anomaly there.

MR. PIERZINA: One anomaly record would be 15%.

MS. SENF: 15%. Um-hum.

MR. PIERZINA: I guess that's where the wall thickness kind of comes in to play.

MS. SENF: Um-hum. Um-hum.

MR. PIERZINA: Well, actually, even with 285 wall I see a 13.8%.

MR. NICHOLSON: Yeah, 13.8, right, would be your 1 millimeter.

MS. SENF: Um-hum. Yeah, so it's borderline. So the analyst needs to catch it or is it a long reflector or not, or is it -- does it go over the whole length of the crack field or not? So, it's -- yeah, it's up to the analyst to decide if he's putting

that into the less than 12 part or above 1 part.

MR. NICHOLSON: Well, wasn't -- the 38 dB, was that the same issue we just had on the other one? Was it a short reflection?

MS. SENF: Um-hum.

MR. PIERZINA: That's a -- there's a -- there are two more red pixel in this one.

MS. SENF: Yeah, there are more pixels. All of them are also below 20 millimeters, so the -- the long pixel itself. So this might have been the reason why it didn't choose -- well, let me do a zoom on it that we can have a closer look to it. Oh, which one was it?

MR. NICHOLSON: It's 2-18.

MS. SENF: 2-18. Okay. 2-18. Here we are. So, I'll go -- okay. So, here these pixels -- there's one pixel it's 5 millimeter and another one it's 9 millimeters. Again, that would be too short for it. So, when we look and zoom in it, it is -- looks different, right? So -- and just having these few indications, I would also -- would have recommended the analyst to put it in the less than five.

MR. PIERZINA: Even with a mean max five of 38?

MS. SENF: Yes. Because (indiscernible) the whole length of the crack field, right? And if there are only two pixels of it, it's not enough to rate it much deeper or deeper than -- oh, just rate it deep because it's two pixels. So -- two

short pixels.

MR. PIERZINA: So, I have to ask the question. Okay, how many pixels does it take, then?

MS. SENF: So, it is 20 millimeter length. So, that was the rule at that time. So, one pixel is 3 millimeters, so it takes six or seven pixels.

MR. NICHOLSON: One pixel is 3 millimeters?

MS. SENF: Um-hum.

MR. NICHOLSON: Is that what you said?

MS. SENF: Yes. Um-hum.

MR. NICHOLSON: Yeah, that's right. So -- right.

MS. SENF: Um-hum. So, it's six or seven shots in a row with a decent amplitude and then we'll take it.

MR. NICHOLSON: But, again, that was 2005.

MS. SENF: Yeah.

MR. NICHOLSON: Now they do use the --

MS. SENF: Now we do.

MR. NICHOLSON: -- smaller pixels.

MS. SENF: We're smarter today, yes.

MR. NICHOLSON: So, you just said you would tell the analyst to put in 12½ percent bucket.

MS. SENF: At that time.

MR. NICHOLSON: At that time?

MS. SENF: At that time, yeah. Not today; at that time I would have told him that.

MR. PIERZINA: So, today one pixel max depth, that's what's required?

MR. FOREMAN: Yeah. It's a big change.

MS. SENF: So, and we don't even ask the analyst to think of it. So, it's just -- the software tells you it is 1 to 2 millimeter or 12.5 to 25 (indiscernible). So for the analyst it is difficult to figure out what the mean -- what the maximum is. So, he gets -- this way he has the mean max five. So, and when he goes over it with the box like this, he always gets a mean max five. It's difficult for him to identify the maximum of it. But the software can do that for him, right? He doesn't need to question the results from the software. Or he shouldn't downgrade it because of his feeling. We don't (indiscernible). So, based on his experience and conditions --

MR. PIERZINA: I understand, but I think this may -- I guess, let's get through this last feature then I just would have a question related to your perception of, you know -- so, as a --

MR. NICHOLSON: Let's go off the record until Ravi gets settled here.

(Off the record.)

(On the record.)

MR. NICHOLSON: Okay. Let's go back on the record.

MR. PIERZINA: As a vendor, with a client in a relationship, there are significant impacts to undercalling or overcalling features. And I'm sure a constant tug-of-war as to,

you know, send -- you know, calling something -- you know, over calling features sends them into areas that they maybe didn't need to go. Under calling features can lead to overlooking a critical feature.

MS. SENF: Um-hum. Yep.

MR. PIERZINA: So --

MR. FOREMAN: There's no question, yet.

MS. SENF: Um-hum. Um-hum.

MR. PIERZINA: Right. So, I guess the question I would have for you is, as an analyst or as in your experience, you know, over many years of analyzing CD results, have you seen periods where analysts, you know, are maybe encouraged to, you know, push, you know -- being pushed one way or the other to, you know, push a -- you know, call feature less if it's borderline to call it one way or the other, I guess, would be my question?

MS. SENF: Um-hum. Yes. So those really -- when we started with analysis of CD data, so it was rather you don't look at individual pixels, always look at the whole feature. And there was -- I would also say there was kind of a tendency rather to undercall features, not to consider every pixel. And today I would say it's - so, of course, we want to be right with our call. But with our new sizing (indiscernible) for crack fields, that's (indiscernible) tend to overcall features slightly. Yes.

MR. PIERZINA: Have you seen a difference between, say, crack-like features versus crack field features in the tendency to

undercall or overcall?

MS. SENF: We saw the tendency and we were told from client that there's a tendency to undercall SCC. So, we didn't get that feedback for crack-like indication. But the ratio between verified crack fields and crack-like features is quite big. So, most of the features which are verified by the client are crack fields.

MR. PIERZINA: Okay.

MS. SENF: For the time period for undercalling I would say is really before we invented the new sizing algorithm for crack fields. So, prior to 2008 there was rather a tendency undercalling crack field features. Not the others, but just crack field features.

MR. CHHATRE: This is Ravi, NTSB. As you're using the (indiscernible) correctly, you said -- from what I understand pretty much means (indiscernible). Is that --

MS. SENF: Yeah. So, we started with a new algorithm in 2008. So, from 2008, yeah.

MR. CHHATRE: 2008. So, nothing has been changed from 2008 to as we speak, correct?

MR. FOREMAN: I'm sorry, you said nothing has been changed?

MR. CHHATRE: Yeah, you guys (indiscernible) I'm merely asking what happen in 2005 and now. So, I guess my question for clarification is now means everything after 2008 or now meaning --

MS. SENF: Slightly different. So, we invented the new sizing algorithm for (indiscernible). So, we used it for every tool inspection. If it was Enbridge or (indiscernible), whatever. So, we used it for each inspection because it was a new tool and this new sizing algorithm was used. For the traditional CD tool, we did not use the new sizing algorithm for Enbridge.

MR. CHHATRE: Okay.

MS. SENF: So, we told Enbridge that we have this new sizing algorithm but they told us, well, when you change your sizing algorithm now, we are not able anymore to compare the old and the new result, so we won't have that for our traditional CD data. So, and we -- meanwhile we use it after that failure on Line 6B. Enbridge asked us last year -- was it last year or was it -- end of 2010, beginning of 2011, they asked us all to use that new sizing algorithm for Enbridge.

MR. CHHATRE: Okay.

MS. SENF: And to make it even more complicated, we have another new tool. It's called the CD Plus. It's the same (indiscernible) as we used for the CD tool, but the electronics is new. And for this tool we always used the new sizing algorithm as well, also for Enbridge. So, it's just the traditional tool for Enbridge we used the old algorithm until we started with it last year with the new algorithm, yeah.

MR. CHHATRE: Thanks.

MS. SENF: Okay.

MR. NICHOLSON: But they hadn't done any CD runs from 2005 --

MR. PIERZINA: Other lines.

MR. NICHOLSON: Oh, I got you. Other lines.

MS. SENF: Other lines.

(Simultaneous conversation.)

MR. NICHOLSON: (indiscernible) on 6B there was --

MS. SENF: Yeah, just on Line 6B we did that -- the next inspection 2010. Um-hum.

Okay. So, we are finished with sensor 2-18, I guess. I go 2-18.

The next sensor is 2-19. I see a crack field indication in the half skip. It starts at 11 -- oh, excuse me, that's another trait.

MR. NICHOLSON: Yeah.

MR. PIERZINA: It starts at 38.5 feet from the upstream girth weld. Length 7 inches. Mean max five 38 dB.

MR. CHHATRE: How much?

MS. SENF: Mean max five 38 dB.

MR. CHHATRE: 38, okay.

MS. SENF: Um-hum. And orientation 84 -- 98.4 degrees.

MR. FOREMAN: Again, that's a very small pixel.

MS. SENF: Yeah, it's a short -- yeah.

The next sensor is 2-20. It's a long seam sensor and I only see seam weld reflections, no defect indications.

MR. CHHATRE: One question. Your crack field indication, is that one-half skip 38.5 feet, would you expect always for this indication to have a counterclockwise sensor or clockwise sensor max or it's not necessary, to classify that as a defect?

MS. SENF: No, I don't really need to clarify in counterclockwise. What I would like to have is that I would like to have from clockwise, for instance, half skip and one-and-a-half skip. This is what I would like to have.

MR. CHHATRE: Okay.

MS. SENF: But I don't really expect it for crack fields.

MR. CHHATRE: Okay.

MS. SENF: So crack fields are normally -- some of them are also seen in the one-and-a-half skip, but most of them are only seen in the half skip.

MR. CHHATRE: So, I thought you need to see it on at least on two sensor to meet your (indiscernible)?

MS. SENF: Um-hum.

MR. CHHATRE: I guess, no (indiscernible).

MS. SENF: Um-hum.

MR. CHHATRE: So you've got only seeing it on one sensor, is it (indiscernible), right?

MS. SENF: Yeah, that's right. Yeah.

MR. CHHATRE: So, I guess, that's what I -- my question

is do we need to see it either on two different sensors, either clockwise and (indiscernible) clockwise -- counterclockwise? Or we need to see it on one-and-a-half end -- one-and-a-half skip?

MS. SENF: So, for a linear indication, notch-like or crack-like, it is enough to see it from one side clockwise or counterclockwise half skip and one-and-a-half skip.

MR. CHHATRE: Okay.

MS. SENF: For a crack field, the crack field is always wider, a wider feature. So, there might be two sensors which have seen it in the half skip, and that's fine.

MR. CHHATRE: You see --

MS. SENF: Yeah, that's -- yeah.

MR. CHHATRE: You see somehow two of --

MS. SENF: Yeah, I still need some confirmation because one sensor is not really enough for me to tell me what it is.

MR. CHHATRE: And (indiscernible) you only have one. You only have one half skip; you don't have one-and-a-half skip. And you also have really small --

MS. SENF: Yeah, so and these are the crack field indications. I only expect them really in the half skip.

MR. CHHATRE: Okay.

MS. SENF: Yeah.

MR. CHHATRE: Thanks.

MS. SENF: You're welcome.

Yeah, 2-20, we have done that. The next one is 221.

It's LW-C, only the long seam reflections visible, nothing else.

Sensor 2-22, there are -- oh, what is that? Okay, so there are two very weak crack field indications. The first one starts at 37 feet from the upstream girth weld. Length 6 inches. Mean max five 29 dB. Orientation 93.5.

The second one starts at 37.7 feet. Four inches long. Mean max five 28 dB. Orientation 93. -- what is -- 93.4 degrees. External crack field --

MR. NICHOLSON: Now, can we go -- I'm sorry. Can we go back? The dB was 28 or 38?

MS. SENF: For the -- 28.

MR. NICHOLSON: Thank you.

MR. CHHATRE: And this one, half skip?

MS. SENF: It's half skip, yes.

Next sensor is 2-23. Two crack field indications in the half skip. The first one starts at 37, roughly -- yeah, 37 feet. Six inches long. Mean max five 36 dB. Orientation 92 degrees.

And the second one starts at 37.7 feet. Seven inches long. Mean max five 38 dB. Orientation 92 degree. And again, 38 dB is quite a short pixel.

MR. CHHATRE: Question. In 2-22 and 2-23, do you believe that is really separate cracks or they are the same seen by two different sensors?

MS. SENF: So, it is one crack field, but it was detected by several -- by two different sensors. So, the crack

field is wide and two different positions of the crack field were detected by the sensors.

MR. CHHATRE: No, that's what I understand. We are looking for (indiscernible) in that crack field, are these two sensors seeing the same crack, the same flaw?

MS. SENF: No, not -- because both of them see it in the half skip. So, you can only see it in the -- at the same position when one sensor sees it in the half skip and the other one in one-and-a-half skip. So, two neighboring sensors don't really see the same defect at the same position.

MR. CHHATRE: Because all these numbers are matching so closely, thought maybe they are the same flaws in the crack field.

MS. SENF: Not the same flaws in the crack field. The same crack field, yes, but different --

MR. CHHATRE: But in a crack field you can have different --

MS. SENF: -- different (indiscernible). Different cracks, yes.

MR. CHHATRE: -- multiple cracks.

MS. SENF: Yes. Um-hum.

MR. CHHATRE: You know, you have one 37 degrees -- or 37 feet. Lengths are comparable. DB's are -- dB's are not comparable, but --

MS. SENF: Yeah. So, it's the same crack field but different, different cracks.

MR. CHHATRE: Okay.

MS. SENF: Yeah. Um-hum.

MR. CHHATRE: Fine. Thank you.

MS. SENF: Um-hum. So, the next one is 2-24. Crack field external in the half skip. It starts at 36.9 feet from the upstream girth weld. Six inches long. Mean max five 30 dB.

MR. CHHATRE: What is number?

MS. SENF: 30 dB. And orientation 90.4 degree.

Next one is sensor 2-25. Crack field in the half skip, very weak. It starts at 37 feet from the upstream girth weld. Three inches long. Mean max five 25 dB. Orientation 88.8 degree.

Now, these were all the sensors for that feature. Now I'm looking for the -- get closer here -- 30. Yeah, the longest indication is an inch. And --

MR. NICHOLSON: Is less than an inch or -- I mean, how does -- that's your threshold, right?

MS. SENF: Yeah, it's -- yeah. I would rather --

(Simultaneous speech.)

MR. NICHOLSON: (indiscernible)

MS. SENF: It's less than an inch, and --

MR. NICHOLSON: Less than an inch?

MS. SENF: I believe so. Yeah, I'll take this one here. Less than an inch and it's in sensor 16-30. And the orientation is 105.1 degree.

MR. NICHOLSON: Okay. The deepest indication was on 38,

but those would not have met your threshold.

MS. SENF: Um-hum. Right.

MR. NICHOLSON: So, your deepest indication without -- deepest indication meeting threshold would have been what?

MS. SENF: 33 -- so, it is 36. 36 dB and this is in sensor in 2-17.

MR. CHHATRE: I have 38 dB -- 38.5 dB in --

MS. SENF: Yeah, but that pixel was not long enough for sizing.

MR. CHHATRE: Okay.

MR. NICHOLSON: Okay. And just -- I know you had to assume this. I know you weren't there at the time. But in 2005, the only rationale you can assign to the reason that there was a crack-like call on these is just consistency. Because you didn't see any toe cracks in this feature. You didn't call out any toe cracks in the previous feature.

MS. SENF: Correct.

MR. NICHOLSON: Okay.

MS. SENF: Yeah, so this is the only information I have.

MR. NICHOLSON: Consistency?

MS. SENF: Consistency, yeah.

MR. PIERZINA: This is Brian. And I think you discussed a reluctance to change something once it's reported, but would you expect the quality checker if they feel -- you know, when they're checking these reportable indications, if they feel strongly that

this is a crack field and not a crack-like that they would recommend reclassifying the feature?

MS. SENF: The quality checker for sure. Yeah, so if he gets it on -- this data on the screen and he needs to look at it, he needs to change the feature type (indiscernible), yes. It's a must.

MR. FOREMAN: Geoff Foreman here. This particular -- I don't believe this particular feature was reported. Anything less than 12½ percent is not reportable to the contract, although we give it at Enbridge anyway if we saw it. So, to the standard report in these (indiscernible), it probably would be because it's deeper than half a millimeter.

MS. SENF: Um-hum.

MR. FOREMAN: So it would be included. But anything less than half would be not be reported. So, we would get right down on the left -- the last, especially the last one, when we get right down on the minimum threshold, the minimum was reporting threshold because it's supposed to be greater than 1 millimeter and longer than 16 millimeters.

MR. NICHOLSON: So, it's not reportable via the contract?

MR. FOREMAN: By the contract, yeah.

MR. PIERZINA: But yet --

MR. FOREMAN: But it was reported, right?

MR. FOREMAN: It was reported.

MR. PIERZINA: But given that it was reported, would it have been quality checked?

MR. FOREMAN: Yes.

MS. SENF: So, at that time, in 2005, we didn't -- so, when there was a feature and it was classified as crack field less than 12.5, it was reportable feature.

MR. FOREMAN: Was or was not?

MS. SENF: It was a reportable feature. Even if it was below the spec, it was a reportable feature and it needed to be checked by an analyst. Today, so we discriminate a little between -- we have two different type of features below spec. So, we have the features below 1 millimeter. So, below one millimeter means it's somewhere between .5 and 1 millimeter. And we also have the ones which are below 1 millimeter but they are also below .5. And we rated them at below spec. These ones are non-reportable.

So, in this picture here it will be classified as quite a few below 1. But then we will add a rating which means it's below spec because it's really below .5 millimeter. And this will be checked just frequently, so the spot checks we have.

But also the ones which are above .5 millimeter or equal to .5 millimeter, still will be checked for 100%.

MR. PIERZINA: Okay. No, I'm just trying to get a picture in my head. So, in this particular pipe joint we have six features reported, all crack-like, but all which look more like

crack fields.

MS. SENF: Um-hum.

MR. PIERZINA: And so I'm trying to put myself in the quality checker's position and I'm trying to understand why the quality checker would not have questioned the classification to change it to crack field?

MS. SENF: I need to go off the screen for a moment. So, yesterday we talked about a check if we have -- where the analyst needs to fill in these many features have been there prior to my check and these many features have been there after my check. You asked for that list, right?

MR. NICHOLSON: I forget. Was that a -- that's a new list or that's a 2005 --

MS. SENF: That's a 2005. So, that's our --

MR. NICHOLSON: -- checklist? Okay.

MS. SENF: -- project list. So today we call it a QMS. So, this is a mandatory document. It starts at data entry or data processing to the final report. So, it is not anonymized [sic]. That's why I have (indiscernible) to remove two columns where the names are in. But so -- see where it is.

MR. FOREMAN: Technical (indiscernible).

MR. FOREMAN: Huh?

MR. FOREMAN: Technical (indiscernible).

MS. SENF: Okay. So this the listing we used at that time to make sure that all the features have been checked. So we

are in section 154. So, these two columns, inspected and completed. That's misleading, but -- so when the analyst is going through the data, he might not be sure about what some calls. So, he can rate the feature as -- inspected it means someone has to look at it again; I'm not sure about it. So it's not completed, please look at it. And so there were six inspected features in it and there were 2375 features in it which were completed. So the analyst was sure about the classification. So -- and so there were six crack fields before -- or after analysis there were six crack fields. After quality check there was no crack field in any more.

MR. PIERZINA: So, that means that six crack fields that were initially called by an analyst were changed by the quality checker as not crack field?

MS. SENF: Correct. Because when I --

MR. PIERZINA: Do we know what they may have become?

MS. SENF: Yeah. So, the next one here is crack-like features. We had several crack-like features in that section and now we have six crack-like features after the quality check. So, these numbers here -- so, there were six crack fields before. They disappeared. But there were no crack-like indications at all and now there are six crack-like indications. So, for me, it can only mean this is our pipe joint where he changed everything from crack field to crack-like.

MR. PIERZINA: So, the Level 0 or Level 1 analyst called

them crack fields and the quality checker called it crack-likes?

MS. SENF: Yes.

MR. PIERZINA: Okay. Well, that's --

MS. SENF: No, this is what I can read out of this document here.

MR. PIERZINA: And, of course, we can only -- we don't -- we're talking about area -- or section 154.

MS. SENF: Right.

MR. PIERZINA: So that's 1½ kilometers.

MS. SENF: Right.

MR. PIERZINA: We've only looked at one pipe joint with six crack-like --

MR. CHHATRE: How many features?

MS. SENF: So let's see what I can -- mean max five, I can look at all the crack-like and crack-field indications I have.

MR. PIERZINA: Well, you can get us to that pipe joint.

MS. SENF: I can bring it to that pipe joint, yeah. So --

MR. PIERZINA: That would be these.

MS. SENF: So, in total, 623 crack fields or crack-like indications were analyzed in step 1. And when we go to the list, in section -- I have to go through the --

MR. NICHOLSON: 2-173.

MR. CHHATRE: This is a real (indiscernible) document.

MS. SENF: It is. And so, we had a nice one in 2005 and

2006. In 2012 it's even better.

MR. CHHATRE: This is a (indiscernible) --

MS. SENF: All the things we learned go into that document, right? All the checks we need to know, we need to do.

So, okay, we are here in 155. We have only six --

MR. NICHOLSON: 154?

MS. SENF: 154, excuse me. We have six crack-like indications. And these six crack-like indications are all in the same pipe joint. And all of these six crack-like indications are in 2-17, instead of 20.

MR. CHHATRE: And that pipe joint will be a rupture pipe joint?

MR. FOREMAN: This one?

MS. SENF: Yes.

MR. FOREMAN: A ruptured pipe?

MS. SENF: Yes.

MR. CHHATRE: Okay.

MR. PIERZINA: But, okay, but do we know that these were initially classified as crack field?

MS. SENF: I cannot tell that. But I can see that the quality checker had at the end six crack-like indications and at the beginning he had six crack fields.

MR. PIERZINA: Oh.

MS. SENF: So, this is --

MR. PIERZINA: Okay. That was my question.

MS. SENF: Yeah.

MR. PIERZINA: So --

MR. NICHOLSON: This has to be it, right?

MS. SENF: Yeah.

MR. PIERZINA: All right. This is just --

MR. NICHOLSON: They were in that same before.

MR. PIERZINA: Right. Because they're the only one -- right. So, this confirms that the six features on that pipe joint were classified as crack fields by the Step 1 analyst.

MS. SENF: Um-hum.

MR. NICHOLSON: Level 0.

MR. FOREMAN: The trainee.

MS. SENF: The trainee, yeah. Trainee.

MR. PIERZINA: And changed to crack-like by the flaw detector.

MS. SENF: Right.

MR. NICHOLSON: Level 2, 10 (indiscernible)

MS. SENF: Level 2 (indiscernible).

MR. NICHOLSON: Have we requested this document?

MR. CHHATRE: Not yet. I think it's on the (indiscernible) I think this is very useful. We can -- to this (indiscernible) level (indiscernible) we can kind of go back and (indiscernible)

MS. SENF: So, meanwhile we don't ask the analyst to do that here for us, to tell us how many crack fields have been there

before you started with it and how many have been there after. Because -- so we track a lot in our software meanwhile in our database. It is quality check that -- and we didn't really use these statistics, so it's just for these kind of events now that we have to go back and look.

MR. CHHATRE: So, (indiscernible) section 154 there is six crack fields that change to crack-like features.

MS. SENF: Um-hum.

MR. CHHATRE: And segment that rupture also had six crack-like features that were changed to crack-like features.

MS. SENF: Yeah. Only had six crack-like indications now. I have only six crack-like indications now, yeah.

MR. CHHATRE: Okay.

MR. NICHOLSON: Did we already talk about these other columns out here?

MR. CHHATRE: Not yet.

MS. SENF: No, we did not. So you see the different feature types we have. It's crack field, crack-like, notch-like. At that time we had metal loss; inclusion-like, geometry, installations, not decide-able (ph.). So, when we really cannot tell what it is we use the feature type crack not decide-able and we add a comment to it. So, we don't use it anymore for Enbridge. We give always the most severe call on it. So, when we -- in the past we would have said, okay, it's crack-like or it's a weld indication. So, today we say it's a crack-like indication. So

Enbridge asked us to choose the most severe feature type for it. So -- because they didn't like the not decide-able feature type. So tell us -- give us the most severe one. So, it's a conservative call.

MR. CHHATRE: All right. But it is -- but (indiscernible) section?

MS. SENF: Um-hum.

MR. CHHATRE: It's 1½ millimeters long and the total of 2375 features.

MS. SENF: Um-hum. Yes. And most of them are in the last column here, irrelevant features. So, which are -- yeah, may be the reflections off the long seam.

Okay. Now, that means here he changed 18 features. He made 18 changes on it. So, what did he change? He changed 6 here and 6 here. That makes 12. Another one here, 13. Here one, 14. And he also changed 4 here. Yeah. And so he checked all inspected. He checked all the completed. He checked the relative position, internal/external. He had doubled-checked it again. And he also checked the radial position, you know, relative if the long seam or base material and radial of internal or external. Then he needs to check is there any installations, if they are correspond to the pipe book. And he needs to do the spot checks on the geometry and the relevant features at that time.

MR. PIERZINA: So, the idea of changing the crack fields to the crack-likes, the quality checker, in your mind would that

be an attempt to be conservative or an attempt -- you know, or not?

MS. SENF: So, it's rather consistency. This is what I think.

MR. PIERZINA: Consistency?

MS. SENF: The consistency, yeah.

MR. PIERZINA: And you said that, but --

MS. SENF: Um-hum.

MR. CHHATRE: Now, go back to Brian's earlier question, the QC work is done before your draft report goes to the customer, right?

MS. SENF: Correct. Yeah. Um-hum, correct.

MR. CHHATRE: That's what I thought. So --

MS. SENF: It must.

MR. CHHATRE: -- making that change is not a problem?

MS. SENF: Not at all, no. This is the reason why we have the quality check. You need to make sure that everything what the analyst did is right, yes.

MR. CHHATRE: But once it goes to customer in draft form, then really this is in your mind you won't change?

MS. SENF: Yeah. So, minor change would not change, but major things need to be changed for sure, yeah.

MR. PIERZINA: And this is Brian again. So, the question I would have is do the changes that are made by the quality checker get fed back to the Step 1 analyst so they know

what changes were made to their initial --

MS. SENF: Changes only go back when they have made a mistake, really. Then we give that back. So, in some cases they will -- if it's really a minor thing, so the analyst call it a notch-like and then the quality checker says, yes, but it's a weak one, it's one below the reporting threshold. So, these kind of minor things wouldn't go into it.

So, now also changing it from crack field to crack-like, if it's only one pipe joint, I don't think it will go -- it would go back. If he sees a trend that (indiscernible) that's wrong all the time, he would send it back. But if it happens only once, we wouldn't send it back. Because crack field and crack-like at that time wasn't really a mistake. Today it is a mistake, but at that time it was not a mistake.

MR. PIERZINA: Yeah, that would be my question then, is it necessarily wrong what the Step 1 analyst did, and I think we might all agree that it wasn't wrong and he was probably right.

MS. SENF: Um-hum. Yeah.

MR. NICHOLSON: And in the blind test, the Step 1 analyst was consistent in calling the crack (indiscernible), but your Level 2 actually reversed his opinion this time, right?

MS. SENF: Yes, right. So, he was really sure or confident with his classification of the crack field.

MR. CHHATRE: This is Ravi. I thought you said in the blind test both of them referred that as crack field.

MS. SENF: Yes, right.

MR. PIERZINA: Crack field.

(Simultaneous speech.)

MS. SENF: And so there was no question about the analyst. So, the analyst did it right all the time. The quality checker did really have a confidence that this was a crack field, yeah. Um-hum.

MR. NICHOLSON: Interesting. So, we can request this with the names removed?

MR. FOREMAN: Would that be a screen shot or is that part of the software?

MS. SENF: It's not part of the software. It's more --

MR. NICHOLSON: It's just an Excel spreadsheet.

(Simultaneous speech.)

MS. SENF: It's a separate --

MR. FOREMAN: He just wanted the screen shot that you're looking at now, basically.

MR. NICHOLSON: No, I'd rather have the sheet. Can you just delete those two columns and -- can I have just what I see here, whatever -- I didn't see what you took out, but --

MS. SENF: Um-hum.

MR. NICHOLSON: Can I just have this and the columns that are sensitive you just delete?

MS. SENF: Yeah, I can do that, um-hum. So, this --

MR. NICHOLSON: Because it's easier for us to take the

real data and put it in (indiscernible) --

MR. PIERZINA: Before we lose that, if you look at the next section down, 155, we see 2-22 changes. So, let's see, what are we seeing here? We're seeing the --

MR. CHHATRE: (indiscernible) changed.

MS. SENF: So, 12 of the crack-like -- 12 crack-like features were at the end 4. Forty-four notches became 10 notches. One inclusion-like became no inclusion-like. 102 geometries at the end 49. So, it seems that the analyst was quite conservative in his calls and lots of things had to be corrected by the quality checker.

MR. PIERZINA: So, now this will be a different analyst and a different quality checker?

MS. SENF: Most probably.

MR. PIERZINA: And this would be --

MS. SENF: Most --

MR. NICHOLSON: She'd have to look at the columns she took out.

MR. PIERZINA: Oh, yeah. (indiscernible) it would -- well, it would just be interesting to -- never mind.

MS. SENF: I can have a look at --

MR. NICHOLSON: Well, you know, that would be good to know. Could we -- could you assign a code to the level -- you know, the checkers and the analysts when we get the sheet? Telling (indiscernible) --

MR. FOREMAN: I think we're getting -- I think we're treading onto the privacy concerns even with a code assigned. I mean, we can take a look at it, but --

MR. NICHOLSON: Okay.

MR. FOREMAN: Yeah, I was going to say, A, B, C.

MR. NICHOLSON: Well, I guess --

MR. FOREMAN: Right. That's what they're talking about in terms of the code.

MR. FOREMAN: Yeah.

MR. CHHATRE: I guess what Matt is saying we don't need to know the names. But if we can have --

MR. FOREMAN: No, I understand that.

MR. CHHATRE: -- A, B, C, D, E or whatever you want to do.

MR. FOREMAN: I understand that.

MR. NICHOLSON: Okay. I'll leave that to the attorneys.

MR. FOREMAN: I mean, first of all, we'd have to check with the German data privacy officer because he's essentially the person that makes that call.

MR. NICHOLSON: Okay.

MR. FOREMAN: He's more powerful than a speeding bullet.

MR. NICHOLSON: Let's just talk, I mean --

MR. FOREMAN: He is the German data privacy officer, and he is imbued with a certain -- considerable authority under German law, trumps even the lawyers.

MR. CHHATRE: We'll respect you on that. He still has to follow the law. I mean, it doesn't matter how powerful he is. He can't make his own laws. So, whatever the laws of Germany says, he has to follow.

MR. FOREMAN: Well, but -- we're on the record. I'll explain it off the record.

MR. NICHOLSON: All right. Okay. But you understand the request?

MR. FOREMAN: We understand the request.

MR. NICHOLSON: You'll look into that?

MR. FOREMAN: Right.

MR. CHHATRE: So, I guess we have finished that segment that is in rupture with all --

MR. FOREMAN: Yeah, we've covered all features.

MR. NICHOLSON: (indiscernible) I appreciate you taking the time to do that.

MR. FOREMAN: Can we try and wrap up in 15 minutes or so because if you want to get the other person --

MR. CHHATRE: Yeah. Yeah.

MR. NICHOLSON: All right.

MR. CHHATRE: I think we should.

MR. NICHOLSON: Brian, do you have anything else for Petra?

MR. PIERZINA: I wouldn't mind if it's okay with everyone else if Petra just sat in with us and we just brought in

the desk engineer, just in case we -- you know, not knowing --

MR. FOREMAN: No, that's fine.

MR. NICHOLSON: Can we get an answer to the last question now that the screens are off? Can you simply tell us if 155 was examined by --

MR. PIERZINA: Anybody that was the same as 154?

MR. NICHOLSON: -- the same analyst? Or is that not -- see if you can give us a --

MS. SENF: No, it was examined by -- oh, also by a Level 2 analyst, but not by the same analyst. It was checked by the same quality checker.

MR. NICHOLSON: Okay. So different Step 1 analyst --

MS. SENF: Analyst --

MR. NICHOLSON: -- same quality checker.

MS. SENF: -- and same quality checker, yes. And so there is a good reason -- so, the analyst which did the analysis on it, he was quite conservative. When I read his name, oh, yeah, yeah, sure. He's not long with us, because he never changed his behavior in conservative analysis. He never really was confident enough to give a call that, okay, this feature is nothing. So, he would always over -- not sure, not sure.

MR. PIERZINA: More comfortable letting somebody else make that decision, huh?

MS. SENF: Yes, right.

MR. NICHOLSON: Did you say he's no longer --

MS. SENF: No, he's no longer with us.

MR. NICHOLSON: With you. Oh, okay.

MS. SENF: Yeah, so --

MR. NICHOLSON: So, too conservative is a bad thing in the analyst world.

MS. SENF: Both of it.

MR. NICHOLSON: That sounds --

MS. SENF: Both of it.

MR. NICHOLSON: Both extremes? Okay.

MS. SENF: Both extremes, yes. So, and that -- so, it's -- an analyst analyzes between 600 and 800 features a day. So, that means he has to make 600 to 800 decisions per day. And if you're reluctant to do a decision --

MR. PIERZINA: Well, you know it pretty fast, I guess, huh?

MR. FOREMAN: He never progressed beyond (indiscernible) in any case it's because of natural progression on it.

MR. NICHOLSON: Yeah, right.

MR. FOREMAN: So, should we go off the record?

MR. NICHOLSON: Let's go off the record.

MR. CHHATRE: Yeah, off the record.

MR. NICHOLSON: Let's see, are we finished now, quick? Or no more questions? Ravi?

MR. CHHATRE: No.

MR. NICHOLSON: Okay. Brian?

MR. PIERZINA: (indiscernible)
MR. FOREMAN: You can be checking your notes. Let's go here.
MR. CHHATRE: You realize we are on the record, but --
MR. NICHOLSON: No, we're not off the -- I wasn't off the record yet. We will conclude --
MR. CHHATRE: No, thank her for being so patient with us.
MS. SENF: My pleasure.
MR. FOREMAN: I'm sorry, did you say your pleasure?
MS. SENF: Yeah, my pleasure. Yeah, I said that.
MR. FOREMAN: A pleasure to be done.
MS. SENF: It's like giving a training. So, I did that in the past and I -- yeah.
MR. NICHOLSON: Excellent. Okay, at this point I think we'll go off the record and conclude the interview with Petra. Thank you so much.
MS. SENF: You're welcome.
(Whereupon, the interview was concluded.)

CERTIFICATE

This is to certify that the attached proceeding before the

NATIONAL TRANSPORTATION SAFETY BOARD

IN THE MATTER OF:	ENBRIDGE - LINE 6B RUPTURE IN MARSHALL, MICHIGAN Interview of Petra Senf
DOCKET NUMBER:	DCA-10-MP-007
PLACE:	Calgary, Alberta, Canada
DATE:	January 12, 2012

was held according to the record, and that this is the original, complete, true and accurate transcript which has been compared to the recording.

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Anne VanDereedt
Transcriber