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: STEVEN BOTT

Enbridge Headquarters
Edmonton, Alberta
Canada

Thursday,
December 8, 2011

The above-captioned matter convened, pursuant to notice.

BEFORE: MATTHEW NICHOLSON
Investigator-in-Charge

APPEARANCES:

MATTHEW NICHOLSON, Investigator-in-Charge
Office of Railroad, Pipeline, and
Hazardous Materials Investigations
National Transportation Safety Board
[redacted]

BRIAN PIERZINA, Accident Investigator
Pipeline and Hazardous Materials Safety
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Audits and Inspections
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RAVINDRA CHHATRE
Integrity Management Group Chair
National Transportation Safety Board
[redacted]

MATTHEW FOX
NTSB Materials Lab
National Transportation Safety Board
[redacted]

I N D E X

I N T E R V I E W

MR. NICHOLSON: Okay. This is NTSB Pipeline case number DCA10MP007, Enbridge Energy July 2010 crude oil release in Marshall, Michigan. These are the Integrity Management Group interviews being conducted at the Edmonton, Alberta, Canada, at Enbridge headquarters. Today is Thursday, December 7th, 2011 --

MR. CHHATRE: 8.

MR. NICHOLSON: 8? December 8th, 2011. This interview is being recorded for transcription at a later date. Copies of the transcripts will be provided to the parties and the witness for review once completed.

For the record, Steven, please state your full name, with spelling, employer name, and job title.

MR. BOTT: My name is Steven Bott. S-t-e-v-e-n, Bott, B-o-t-t. I work for Enbridge Pipelines and I'm a materials engineer in the crack programs.

MR. NICHOLSON: Okay. For the record, please provide a contact phone number and e-mail address.

MR. BOTT: [redacted] and my e-mail address is [redacted]

MR. NICHOLSON: Okay. Steven, you're allowed to have one other person of your choice present during this interview. This other person may be an attorney, friend, family member, co-worker, or nobody at all. If you would, please indicate whom you've chosen to be present with you during this interview?

MR. BOTT: I've chosen to have no one at all.

MR. NICHOLSON: Okay. We'll go around the room now and have each person introduce themselves for the record.

I am Matthew Nicholson, spelled M-a-t-t-h-e-w, N-i-c-h-o-l-s-o-n. I'm the NTSB IIC. My phone number is [redacted] My e-mail is [redacted]

MR. FOX: This is Matt Fox, M-a-t-t, F-o-x, NTSB Materials Lab, and the number is [redacted] E-mail is [redacted]

MR. JOHNSON: Jay Johnson, Enbridge Pipelines, [redacted] Cell: [redacted]

MR. PIERZINA: Brian Pierzina, PHMSA Central Region, B-r-i-a-n, P-i-e-r-z-i-n-a, [redacted] and my phone number is [redacted].

MR. CHHATRE: Ravindra Chhatre. That's R-a-v-i-n-d-r-a. Last name Chhatre, C-h-h-a-t-r-e. I am Integrity Management Group chair on this accident with NTSB. My phone number is [redacted] E-mail: [redacted]

INTERVIEW OF STEVEN BOTT

BY MR. NICHOLSON:

Q. Okay. Steven, I think to begin with, maybe you could give us sort of a brief background, educational experience, when you came to Enbridge, positions you've held at Enbridge, that sort of thing?

A. Sure. So I graduated from U-of-A with a bachelor of

science in materials engineering. During that time I was part of the core program, so I had 8 months of experience at a steel making and pipe making facility in Regina, and then I also had 8 months experience within the integrity group at Enbridge. After graduating in 2005, I returned to Enbridge and was part of the corrosion programs, and I stayed there until 2010 when I moved over to the crack program.

Q. Okay. So you said 2005 you started with Enbridge? And that was on the corrosion side?

A. Yeah.

Q. So you spent 5 years there?

A. Yeah, 5 years there.

Q. And then went to the crack group?

A. I moved to the crack group in January 2010.

Q. So what were your responsibilities in the crack group in 2010? Can you talk about that a little bit?

A. So when I started in 2010, I was assigned several lines to look after. To be honest, I can't remember the full list right now, which lines that was.

Q. Okay.

A. And I was also assigned to the sleeve inspection program at that time.

MR. CHHATRE: I'm sorry. Which inspection?

MR. BOTT: Sleeve inspection program.

MR. CHHATRE: Okay.

MR. BOTT: So it's a program to inspect sleeves that we've previously placed on a line for repairs.

BY MR. NICHOLSON:

Q. Explain that sleeve inspection program. How would you go about doing that?

A. Well, for the most part, because we can't use our in-line inspection tools to inspect sleeves directly, typically, for the most part we do opportunistic digs. So anytime we're doing any other kind of work on the line, if we expose a previously installed sleeve, we'll have the NDE guys inspect the welds and the general condition of the sleeve. So we'll record that and track it, as well if we think we have specific problems or specific issues, we'll target specific sleeves to expose them and to inspect.

Q. But if you can't see them with ILI, how do you know to dig? If they're not opportunistic, how do you --

A. Based on the types of sleeves, the history of that type of sleeve, how long the sleeve's been on the line. In the past, since the '80s actually, Enbridge has done extensive inspections. So almost all of our sleeves that we have on have been inspected since they've been put on, but we just like to keep that going.

Q. So there must be a database or some way to track for these sleeves. Are they on the alignment drawings or how do you guys inventory all the sleeves?

A. Our technical records group keeps track of all the

sleeves they put on, and so we get our data from them. Many of the ILI tools can also see the sleeves where they're welded to the pipe as well, so we can -- we have a good idea where they are.

Q. Okay. But before you said your ILI tools could not see the sleeves, so --

A. They can't inspect them for flaws, but they can see where they're welded to the pipe.

Q. Okay. And then can you talk to us a little bit -- I think you did have 6B as one of your lines assigned to you in 2010; is that correct?

A. Yeah. So, in May 2010 our line assignments were updated and at that time 6B was assigned to me then.

Q. And can you tell us what sort of inspections or analysis you would perform on 6B when you arrived?

A. So in May 2010, because it was near the end of the inspection cycle, a lot of the dig programs, inspections, trending was already completed when I took over the line. When I took over the line, the previous subject matter lead on the line just --

Q. Who was that?

A. It was Ivan Hubert (ph.).

Q. Okay.

A. He went through the fact that he had recently updated his analysis and had sent some digs out just to check for SCC growth rates, and so I didn't do a lot more analysis in that area because we had already just sent out some digs. And then I also

had an opportunity in June to go down to the region and go to some line 6B digs. But I didn't do a lot more analysis past that point because it was near the end of the inspection cycle. We were expecting a new tool and Ivan had just kind of sent more digs out, so --

Q. You were expecting another tool run? Is that what you're saying?

A. Yes.

Q. Yeah, okay. A 2010 tool run?

A. Yes. The crack tool was actually in the line at the time of the incident.

Q. So that's the one that was slated for a 2009 run?

A. Originally I think so, yeah.

Q. Okay. So I think one thing we asked you to do today was to take us through the CorLAS software and just maybe show us -- actually, we're interested in the actual 2005 crack indications, if there's a way we could pull some of those up and maybe walk through how they get into the CorLAS system and analyze. Is that possible?

A. Okay, yep. So we have two versions of CorLAS. They use the same equations in the background.

Q. Okay.

A. We have an Excel version that we use. We didn't have it at the time of Marshall, but we do now. But we can use -- if we're going to just use an elliptical or rectangular flaw shape.

So we can't put a profile into this.

Q. Okay.

A. So that's one set. And then the other software -- and this is the software that we had at the time and that we still have, which is kind of a DOS-based system right now. We are -- this is the version that we can put profiles in. It can also do rectangular or semi-elliptical type analysis.

Q. Okay. This is the DOS version here?

A. Yes.

Q. Okay. So in the DOS version you can enter profiles?

A. Yes.

Q. But in Excel you have two options?

A. The Excel is just a more simplified version --

Q. Okay.

A. -- that goes much faster.

Q. But in 2005 -- whoever then -- Ivan would have analyzed his 2005 run using the DOS?

A. Yes.

Q. Okay. Okay.

A. So, yeah, I can actually use the profile. Let me just look at what the feature number is so I can verify the profile.

Q. Well, what would have been typical in 2005? Would you have used a profile or --

A. The steps that we went in 2005 were we would generally still use the rectangular flaw shape using --

Q. Okay.

A. -- the max bin depth, and then only if it goes below hydro test pressure --

Q. Um-hum.

A. -- then they would request a profile from GE.

Q. Okay.

A. And then use the profile to refine the analysis, so there.

Q. Okay. So you always start with the rectangular, compare it to hydro --

A. Yeah.

Q. -- if it fit? If it's less than hydro, then you come back and do a --

A. That was the process at the time, yes.

Q. Okay.

A. Now we actually don't use the profiles. In 2008 they actually changed their process for making profiles. Before, they did it more manually. It was a hands-on process. The ILI vendors would use our expertise to build us profiles. Now they've made an algorithm to do it automatically, so it still gives a profile and we can still use it. We just haven't validated that yet. So now at this time we're just using the rectangular for most things.

Q. Okay.

A. So --

MR. NICHOLSON: Was there a feature, Matt Fox, that you

wanted to see?

MR. FOX: Well, I know the 9.3-inch long feature was profiled on the ruptured joint, so maybe we could step through the process from, you know, the initial analysis, you know, what was done there, and then the profiling and then how that analysis proceeded to -- you know, on that particular feature.

MR. BOTT: Okay. So I just have to look up the profile data. So I believe I have a feature number in here. So what this is, is historically when we only could use a DOS version, because you have to manually input everything, we designed some macros to do the input for us. So I'm just looking at which file is associated with the feature so I can use that file.

BY MR. NICHOLSON:

Q. So, I'm sorry. Is this linked to the DOS? Does this actually export data out into --

A. No, it doesn't. It's just --

Q. It's just for you?

A. It's just to help us set up the files.

Q. Okay.

A. Yeah. Okay. So this would be what the input file looked like. That goes into DOS, the DOS version. So it has the wall thickness, some material inputs, the profile. So in this case you start with the rectangular-shaped profile, so this is the rectangular shape. We have to -- because of the way the input works, we can't actually make a straight rectangle, so what we do

is we add 0.01 inches on either end just to zero -- go back to zero. But essentially this would be the rectangular portion.

Q. So these are X/Ys? Is that what we're looking at?

A. Yes.

Q. Okay.

A. Yeah. This would be the length in inches and this would be the depth in inches.

Q. Oh, okay. Length and depth.

A. Yeah.

Q. So go up to the top. What's all this other stuff; L batch?

A. This has to do with the program, the DOS version. So 1 and 12, that's essentially inputs. So if I go to here --

Q. Oh, okay.

A. Yeah. And so if you see, if you go to 1, then there's --

Q. I see.

A. -- inputs. So that's just a reference for the program --

Q. Okay.

A. -- to know which inputs to use.

Q. So 2 is your material choice?

A. Oh, yeah. Sorry. Yeah, so this is where all the material properties would be input to.

Q. Okay. And what was 1 on the previous page?

A. Data entry.

Q. Oh, okay.

A. Yeah.

MR. CHHATRE: Who does this input?

MR. BOTT: Whoever is the subject matter lead for the line does the input for the -- so I hadn't done it for 6B.

MR. NICHOLSON: Well, I mean it's your position, though; right?

MR. BOTT: But it's my position, yeah, my level.

MR. CHHATRE: And this is Ravi, NTSB.

So if somebody has done already for 6B, you don't go back again and do that?

MR. BOTT: Not necessarily. If we had up -- if we update the processes, that would require a change in the inputs to this, then we would go back and redo it.

MR. PIERZINA: So, Steve -- this is Brian.

Back on your entry sheet for that flaw, the wall thickness was 285?

MR. BOTT: Yeah.

MR. PIERZINA: Could you run it both at 285 and 250 to see what the difference in the failure pressure is?

MR. BOTT: Yeah.

MR. FOX: And as far as the depth, real quick, on that .14, where does that come from?

MR. BOTT: So this is a reassessment. This is what Ivan

had done. He did two sets. Let me check the other one. He might have been doing a sensitivity analysis. I can't say.

MR. JOHNSON: And Ivan is out this week. He's on a cruise, so we can't bring him in to ask questions.

MR. FOX: No problem. On a beach --

MR. BOTT: Oh, so it's the same. So I'm not -- normally the depth would come from the ILI call.

MR. FOX: So for this it should be 40 percent; right?

MR. BOTT: Yes.

MR. FOX: Since it was in a point in that bin. So, 40 percent of 285 is .114.

MR. BOTT: So he might have been adding bias to that, because the bias on this line was --

MR. FOX: Uh-huh.

MR. BOTT: -- .026 inches for that bin, but I can't confirm that.

MR. PIERZINA: It does add up, doesn't it?

MR. BOTT: Yeah.

BY MR. NICHOLSON:

Q. But that's the -- so that's the -- we're in the file that was the original assessment?

A. No. That was the reassessment.

Q. Oh, I see. Okay.

A. Yeah. The original assessment -- yeah. I have to go in --

Q. Does this stay untouched, the original assessment?
A. It should. It's just --
Q. So when you do a reassessment, you do a copy --
A. Yeah.
Q. -- into a new folder? Okay.
A. Yeah. I just have to find the -- where the old CorLAS. So the original -- okay. I'll just use original file here.
MR. CHHATRE: This is Ravi.
What does this left column mean? What is it telling you, 2-70 and --
MR. BOTT: This is just the file names. So we don't -- the file name -- because we use a macro to generate the file names, it's difficult to include the feature number from the ILI vendor. So that's what this Excel sheet had, was -- so you can see for this file, this feature number from the ILI vendor, we've used this file name.
MR. CHHATRE: Okay.
MR. BOTT: And that's just to help with the input and output, so -- so, here. Here's the original, so here's the 40 percent.
MR. CHHATRE: Okay.
MR. BOTT: I'm just going to save this. So with the CorLAS version -- that's in DOS -- the files have to be in the same folder. So I'm just going to move this so I can show you how it works. So how we input a batch file is -- number 3 is batch

file input, and then we have our number, our file number. Just make sure I have it right. Okay. It might be just -- so this is a -- at the time we had Version 2. I think it's at 2.25, so that might -- why it's not working. So I can just reformat the file quick. So we'll just save this in here.

MR. FOX: What's the 681? I mean, you've got a 9681.

MR. BOTT: Oh, thank you. That's the MOP or --

MR. FOX: Okay.

MR. BOTT: I believe.

MR. FOX: That might be the --

MR. BOTT: Yeah. When you're using a rectangular flaw, I don't think it makes that much of a difference, but if we're using a profile, it does make more of a difference, for sure.

Okay. So now we've loaded in the data, so I can show you -- I have to I press 5 -- to -- oh, sorry about that. Save that again. To -- we want to use the file length versus depth, so you can see that it's got the same length and depth in there as the batch file. And if we go to data entry, you can see under 2, Alloy Name, so it has the same yield strength, ultimate strength, all of the inputs that were the same in the batch file.

So then we use the effective flaw analysis. So it puts out a bunch of flow strength equations right off the bat. If we go to press number 2, so that's a toughness dependent chart. So this is how -- we've put in the rectangular feature, and then CorLAS uses a -- simulates to model of the same area as that

rectangular feature.

MR. CHHATRE: Can you go back?

MR. BOTT: Yeah.

MR. CHHATRE: Okay. So based on that model, CorLAS is telling you what the design pressure is, what the failure stress will be?

MR. BOTT: Yeah. So this is for flow strength, flow strength dependent. So if we want to check if it's toughness dependent, like if it's a crack, then if you press 3 it does the critical pressure from the crack.

MR. PIERZINA: So did you just say that if it's a crack, you use a toughness dependent formula?

MR. BOTT: Well, what we would do -- and it's easier to show in the Excel version. What we do -- I'll just use what's in here, example data. So what we would do is when we pull out our data, you get the flow stress and the fracture toughness, and you use -- you would use the minimum of these. So almost always they're either the same or the fracture toughness is lower because it's dependent on that. So, for instance, if we made this one deeper, then you can see the fracture starts to become lower. It's no longer equal, so -- so, in this case if we look at it, it's 7088 was the fracture dependent, and then in the flow stress -- there's different methods, but the flow stress, if you use effective area, the pressure is 832 failure pressure. So it does make a slight difference on this feature.

MR. PIERZINA: Wait. I'm sorry. It's 832?

MR. BOTT: Yeah. The design pressure includes a safety factor. So if you go to the line below, failure pressure, it's 832 based on flow stress. So that would be like a blunt flaw type failure.

MR. CHHATRE: And you have maximum stress pressures coming with like 75 -- 72-percent (indiscernible)? Is that why you're using it? Just below that you're --

MR. BOTT: Yes. So that would be the design factor. What we do is we take the failure pressure and then do the safety factor calculations outside of this software. We don't use the software. I mean, it's -- this is just kind of some standard outputs it gives, but what we do is we take this failure pressure, put it back into our assessment file, and then calculate the safe operating pressure.

MR. CHHATRE: And how do you do that?

MR. BOTT: We use a 1.25 safety factor for crack --

MR. NICHOLSON: Well, I'm just looking at the report from 2005. It looks like 895 was the value entry. CorLAS predicted failure pressure at depth profile 1.

MR. FOX: It's the profile.

MR. BOTT: Oh, it might be the formula for --

MR. NICHOLSON: Oh, that's what the -- is that with a profile? Is that the difference?

MR. BOTT: Yeah.

MR. NICHOLSON: And it's got "as issued 789".
MR. FOX: Yeah.
MR. BOTT: Yeah.
MR. FOX: So that should be the --
MR. BOTT: So that's this 788.76.
MR. NICHOLSON: Yeah, okay. There you go. Cool. Okay. And then the other is if you went back and actually profiled it?
MR. BOTT: Yeah.
MR. NICHOLSON: I see.
MR. FOX: So what -- I guess in the prior view you had there --
MR. BOTT: In the --
MR. FOX: Or -- oh, wait. You had the 789.
MR. BOTT: Oh, sure. Yeah.
MR. FOX: So that's essentially the failure pressure for an equivalent semi-elliptical --
MR. BOTT: Yes.
MR. FOX: -- profile? Okay.
MR. BOTT: Yeah. We use a rectangular flaw shape to start with, but --
MR. FOX: Right.
MR. BOTT: -- the models use a --
MR. FOX: The model converts that into a semi-elliptical. Okay. And then -- so then in the next -- and then what was the next slide, the data on the next --

MR. PIERZINA: Actually, before we get off of that slide --

MR. NICHOLSON: Yeah, yeah.

MR. PIERZINA: -- the equivalent flaw equals .145. What does that tell you?

MR. BOTT: So that's the depth of the equivalent.

MR. NICHOLSON: The maximum depth of the semi-elliptical?

MR. BOTT: Yes.

MR. NICHOLSON: Okay.

MR. FOX: Oh, where is that?

MR. BOTT: This one right here. So the depth that we put in, max was this depth --

MR. FOX: Okay.

MR. BOTT: -- the 40 percent. But the equivalent flaw, that's the semi-ellipse. That's what --

MR. CHHATRE: That (indiscernible) flaw, is it semi-elliptical?

MR. BOTT: Yes.

MR. PIERZINA: So when you run those numbers, you're not doing any bias at all; right?

MR. BOTT: No.

MR. NICHOLSON: And then you took -- what's the maximum safe pressure? And that's with your factor of safety?

MR. BOTT: So, yes, we could use this program to

calculate that. What we do is we take the 788 and then add a safety factor outside of this program. So we would multiply this by our safety factor, yeah.

MR. PIERZINA: So that design factor of .72, is that a 1.39?

MR. BOTT: Yeah. That's just a standard thing that's in the software, yes.

MR. NICHOLSON: But that doesn't come out on this worksheet here that you guys fill out. So you don't use that 567?

MR. BOTT: No.

MR. NICHOLSON: You're only curious about the actual burst pressure --

MR. BOTT: Yes.

MR. NICHOLSON: -- failure pressure?

MR. BOTT: Yes.

MR. NICHOLSON: Okay.

MR. BOTT: We do apply our own safety factors with that 788 or 789 outside of the software.

MR. CHHATRE: And how is that developed, safety factor?

MR. BOTT: Pardon me?

MR. CHHATRE: How the safety factor is developed. Where do you get a number or value?

MR. BOTT: Sean could clarify more, but I believe the safety factor of 12.25 is sort of equivalent to the 125-percent hydro test logic, so that's why we use the same safety factor.

MR. NICHOLSON: So if this 789 is less than hydro, what would you do?

MR. BOTT: So the 789 is less than hydro, so we -- or a 1.25, which is our dig criteria. So we then go and ask the vendor for a profile.

MR. NICHOLSON: Oh, okay. That's right. Okay.

MR. BOTT: Yeah. So --

MR. FOX: Now, the data on the next slide that you had showed, now, this was showing, okay, the block profile. And then you also show an effective area in that, then?

MR. BOTT: Yeah. So this model, you can use it for corrosion as well, for blend, yes.

MR. FOX: Oh, okay.

MR. PIERZINA: So if you used it for corrosion, would you use the .72, the same factor?

MR. BOTT: Yes.

MR. PIERZINA: But not for a crack?

MR. BOTT: For crack we use .8.

MR. PIERZINA: Yeah.

MR. FOX: So for the crack -- sorry. Did you have more?

MR. PIERZINA: Oh. So -- and did you say Sean is the best person to discuss why --

MR. BOTT: Yeah.

MR. PIERZINA: -- why you've used a different safety factor for a crack versus corrosion?

MR. BOTT: Yes. Sean would be the best. Like I said, my understanding is that has to do with -- we relate back to hydro test, and the hydro test is 125 percent or .8 safety factor.

MR. FOX: So this slide here where we're looking at the effective area method and the B-31-G method, essentially you don't do work with this on the crack side?

MR. BOTT: No.

MR. FOX: If you're analyzing a crack, okay.

MR. PIERZINA: So, and these calculations that we're seeing now are based on a 285 wall thickness, right?

MR. BOTT: Yes.

MR. PIERZINA: I haven't captured any of these numbers that we're looking at here.

MR. NICHOLSON: Well, I was actually just thinking that. Why don't you -- can we just save this out to a text file or a CSD and then you can --

MR. BOTT: Yep.

MR. NICHOLSON: -- run it as a .25 and we can bring them up together?

MR. BOTT: We can save.

MR. FOX: That would be better than me trying to write those numbers down.

MR. NICHOLSON: Yeah. I wasn't going to even attempt.

MR. BOTT: Okay. So what I'll do, if you want to run it as a .25, so open the original file. I'm going to save it as

something else. Oh, don't want to save it as --

MR. FOX: Just follow right along here, Brian.

MR. PIERZINA: Oh, yeah.

MR. BOTT: Call it 1-2. And we'll -- I can change the properties of this file. So we want to have 250 wall. That's 40 percent. So that's -- I believe that's 100 even.

UNIDENTIFIED SPEAKER: Oops --

MR. BOTT: All right. We'll just run this one. So again, this is the shape.

MR. NICHOLSON: So even though you put it in as a rectangular profile, it converts it to --

MR. BOTT: Yeah. But it's more conservative than just putting it as a semi-elliptical profile right off the bat.

MR. NICHOLSON: Okay. Oh, okay.

MR. BOTT: Because it's still using a semi-ellipse, but it's a more severe semi-ellipse than if we just made the semi -- the max depth of that semi-ellipse, so --

MR. NICHOLSON: Okay. So it drops to 693?

MR. FOX: So then we get a 693.

MR. PIERZINA: From 789 down to 693?

MR. CHHATRE: 07- --

MR. FOX: 0694.

MR. NICHOLSON: Yeah. Call it 690- -- a 95 --

MR. FOX: That's a pretty significant drop, then.

MR. NICHOLSON: Ninety-five pound drop.

MR. BOTT: Yes.

MR. FOX: And the equivalent flaw is 125.

MR. NICHOLSON: But does it change the outcome? Because your next step is to get a profile; right?

MR. BOTT: Yes.

MR. NICHOLSON: Even at 693.

MR. PIERZINA: This one that we're looking at is actually the defect that didn't fail; right?

MR. BOTT: Yes.

MR. PIERZINA: This is the 9-inch --

MR. BOTT: It's the 25-to-40 nine-inch --

MR. NICHOLSON: It's the deepest one, right.

MR. BOTT: Yeah.

MR. PIERZINA: And still, that's a -- I think it was mentioned that the 285 to 250 wall thickness didn't affect the failure pressure that much, but -- and maybe it doesn't on a profiled defect, you know, versus the maximum. I'm not sure, but -- did you save this screen?

MR. BOTT: I sure can, yeah.

MR. NICHOLSON: And just go ahead and go to Outlook and send that to jay.johnson.

MR. BOTT: Yep. I can do that for sure.

MR. FOX: So the "Z" at the end of the file indicates that's the output file?

MR. BOTT: Yes. That's just traditionally what I've

kind of done.

MR. FOX: Could we take a look at -- well, I don't know whether we want to go to the profile and then come back and --

MR. NICHOLSON: No.

MR. FOX: -- take a look at the rupture section or look at the rupture section with this first and then go to the profiling.

MR. CHHATRE: I would go to rupture section first.

MR. FOX: All right.

MR. BOTT: Sure.

MR. FOX: Let's take a look at the rupture section.

MR. PIERZINA: Yeah, then I kind of got a flavor for --

MR. FOX: Yeah. Yeah, just -- yeah, see the same analysis for the rupture.

MR. BOTT: Okay. I'll just have to grab the data for that.

MR. CHHATRE: And this program has been internally developed, or you guys bought the software from somebody?

MR. BOTT: CorLAS was developed by PRCI for PRCI members, and then the Excel version we paid DNV to develop for us to make it faster for us to use.

MR. CHHATRE: Your Excel version is not as friendly for the profile and --

MR. BOTT: No. We can't use the profile, so it does have some limitations. But most of the time we just are using the

rectangular flaw shape.

MR. PIERZINA: This is for a mass amount of information --

MR. BOTT: Yeah.

MR. PIERZINA: -- crunching; right?

MR. BOTT: Yeah, exactly.

MR. PIERZINA: So while you're doing that, Steve, I don't know if you can multi-task or not here, but -- so when they did the initial batch in 2005, that's on the reported values without bias; right?

MR. BOTT: Yes. The maximum of the bin depth, yeah.

MR. PIERZINA: Okay. And today when you do that initial check, are you adding a bias into your first run?

MR. BOTT: Yes. We're doing both, actually. We'll do it as reported and with the bias added.

MR. PIERZINA: Okay.

MR. BOTT: And so I think with the profile -- or, sorry, with the bias added, we help that to use -- to help or guide our "D" selection, so --

MR. CHHATRE: What is your bias again? How do you find your bias?

MR. BOTT: So on a new run it would just be the tool -- a measurement error quoted by the vendor, which is .5 millimeters or 0.02 inches. Once we have a lot of trending, then we're able to adjust that based on our trending, so it may change.

MR. CHHATRE: But you're essentially increasing all dimensions by that much error, or you're --

MR. BOTT: Yeah. We focus on increasing the depth.

MR. CHHATRE: Okay. So only on depth you increase that by that much bias?

MR. BOTT: Yes. Okay. So this is what this one looks like, so you can tell it's longer and more shallow. So it's a little bit different shape.

MR. NICHOLSON: So I guess the predicted critical pressure is what goes back into the feature assessment worksheet, though; right?

MR. BOTT: Yes.

MR. NICHOLSON: So, I'm showing 858 here.

MR. BOTT: That's interesting.

MR. NICHOLSON: Am I looking at something wrong or did we enter it --

MR. BOTT: I will check. All right.

MR. NICHOLSON: Are you seeing it?

MR. BOTT: You know, you know what, I can even check his original file and see if it's in here. So, yeah, 858. Yeah, we might have entered something differently.

MR. FOX: What do you (indiscernible)?

MR. NICHOLSON: Oh, yeah. What did we -- did you --

MR. BOTT: This is the original file.

MR. NICHOLSON: No, I know, but --

MR. BOTT: Yeah.

MR. NICHOLSON: -- did we use the .25 when you built yours or -- well, it wouldn't have been --

MR. BOTT: No.

MR. NICHOLSON: Yours is higher, so --

MR. BOTT: Yeah, it's higher. So I've got to figure out what I did here. 52 --

MR. PIERZINA: Was there a fracture and toughness value that maybe was in this --

MR. BOTT: Yeah, that's -- that's the only thing I can think of. Just open this guy up and check everything again.

MR. NICHOLSON: What's the 4-1 under "outside"? You've got a 4-1, then just had a 4?

MR. BOTT: Yeah. That -- I wonder that's it. I had that on the other ones, though.

MR. NICHOLSON: Oh.

MR. BOTT: Didn't make a difference.

MR. NICHOLSON: I don't know what it means.

MR. BOTT: I think it's just for how the --

MR. NICHOLSON: What selection?

MR. BOTT: -- profile is put in, so it shouldn't make a difference, but I'll try. Yeah. It doesn't even work with the --

MR. NICHOLSON: Yeah.

MR. BOTT: -- one now because of the new software. That's very interesting. We've got 30, 285, 681. Look at the

results sheet here. Yeah, the toughness is the same. Wall thickness is the same. Everything's the same.

MR. CHHATRE: For 285 thickness?

MR. BOTT: Yeah.

MR. CHHATRE: Yeah.

MR. BOTT: Well, you know what -- yeah, it's different. I can save it. I'll open it. Maybe this file. So we compare the original file to the new one.

MR. FOX: What's FS? Yield stress?

MR. BOTT: Flow --

MR. FOX: And FS? Flow stress?

MR. BOTT: Flow stress.

MR. FOX: Those are different.

MR. BOTT: That's probably why that -- we had a different flow stress equation. Okay, I know how to fix it. So the original one used the yield strength plus 10,000 PSI, and this one's -- or, sorry, the original one used the average between the two. This one's using 10,000 plus yield strength, which is the difference. So, 3. So I just -- we'll just change that. This should give us the same answer.

MR. NICHOLSON: Well, I don't understand what we're doing. What's the yield plus 10? Why would I use one over the other?

MR. BOTT: Typically below about X 70, we'll use yield plus 10,000 PSI.

MR. NICHOLSON: Okay.

MR. BOTT: And above we'd use the average, because then they get so close together that if you add 10,000 PSI, you're already at your ultimate tensile strength.

MR. NICHOLSON: Oh, okay.

MR. BOTT: I believe historically, though, when we run our profiles and our old files through the DOS version with our macro, I think it might automatically choose just the average between the two, even though our process document says you can use plus 10,000, and plus 10,000 will generally give you slightly higher values.

MR. NICHOLSON: So is 2 the average? Is that what you're saying?

MR. BOTT: Two's the average, yeah. So if I pick that one, then we'll save it, then run that feature again. Now you've got 857.84. So, 858.

MR. NICHOLSON: Okay. So he had used an average?

MR. BOTT: Yes.

MR. PIERZINA: That's the way it was done in 2005?

MR. BOTT: Yes.

MR. PIERZINA: Could you redo that with the 250?

MR. BOTT: You bet.

MR. PIERZINA: Did you save that to a --

MR. NICHOLSON: Well, did he need to? You already had the original file. As long as we get that captured so we can --

MR. BOTT: Yeah, I'll still save it.

MR. NICHOLSON: -- see before and after.

MR. BOTT: Yeah, I'll still save it and I'll append the data so you actually have the difference between the different flow stress equations, since we looked at it.

Okay. So I will change the wall thickness here to quarter inch. Do you have a calc -- can you figure out what a quarter -- 25 percent of quarter inch is? Just make sure I have it right.

MR. CHHATRE: .06 --

MR. PIERZINA: 25, huh?

MR. FOX: Yup, 0-6-2-5.

MR. NICHOLSON: Um-hum.

MR. BOTT: 0-6-2-5? Thanks. So you get 750.

MR. PIERZINA: Well, yeah, that's a pretty significant change. And that's using a flow stress 59,000?

MR. BOTT: Yes.

MR. PIERZINA: We should be able to check it.

MR. BOTT: Yes.

MR. NICHOLSON: So, let's see, what is the result? It's 108 less? 758, is that what we came up with?

MR. BOTT: 750.29.

MR. NICHOLSON: Which would be less than hydro, so you would have gone to a profile.

MR. BOTT: Yes. We would have asked for a profile then.

MR. NICHOLSON: But when it was 285, we were 858, so we didn't need to go to -- well, shoot. Only you'd run it as a .25; right, then it would have triggered -- well, it would have triggered a profile, but then you'd run the profile and --

MR. BOTT: You might have gotten a pressure higher than --

MR. PIERZINA: Well, and at that point you're asking for two different profiles on the same joint and --

MR. NICHOLSON: Well, what's wrong with that?

MR. PIERZINA: Well, that just, you know -- it kind of raises the --

MR. NICHOLSON: Oh, I see what you're saying. Yeah.

MR. PIERZINA: -- interest level of that pipe joint probably at that --

MR. NICHOLSON: Yeah, you're right. Then you've got two features you're asking for profiles on. Does that send off any triggers for an analyst or is that just part of your work?

MR. BOTT: Yeah. I mean I can't speculate, but possibly it would have, right. It's hard to say.

MR. NICHOLSON: Yeah.

MR. CHHATRE: But, I mean, once you get the profile -- this is Ravi -- if the profile doesn't show you that much depth, what will you do? What is a profile going to tell you?

MR. BOTT: Well, in the past we used the profiles to refine the analysis, so the assumptions going into using a

rectangular flaw with a max bin depth, they're typically quite conservative, so they would use the profile to try to -- because especially if you have a lot of features that are all the same bin depth and you're using the max bin depth for them all, there's not a lot of gradient there. So that's why they would go to the profile, to try to elevate some over others.

MR. PIERZINA: Just to rank the features --

MR. BOTT: Yeah, for sure.

MR. PIERZINA: -- in a better --

MR. BOTT: Yeah. If you -- for example, if you take two features that are almost the same and they're reported just max bin depth and length, then you get the profiles and one pressure doesn't change much and the other one goes way up, well, then obviously you're a lot more concerned about the one that doesn't change much. So that was the logic path there.

MR. FOX: What was the effective depth for at the .285 thickness, and the CorLAS predicted effective --

MR. BOTT: I will just open the results file for you. For this feature that we're working on right now?

MR. FOX: Yeah.

MR. BOTT: Yeah. 0.09 inches.

MR. FOX: Okay.

MR. PIERZINA: What's that; equivalent flaw?

MR. FOX: That's the elliptical flaw.

MR. BOTT: Oh, sorry. That's with the previous

definition of flow stress. Oh, yeah, it's the same. That makes sense, yeah. Flow stress is --

MR. PIERZINA: Equivalent flaw depth?

MR. BOTT: Yeah. So we're putting in --

MR. PIERZINA: Okay.

MR. BOTT: -- a rectangular-shaped flaw.

MR. PIERZINA: Right.

MR. BOTT: So the software still -- the models are still based on a semi-elliptical flaw. So it approximates the area, but that makes the ellipse deeper because it's not rectangular.

MR. CHHATRE: Essentially (indiscernible) by about 50,000?

MR. BOTT: In this case, yeah.

MR. NICHOLSON: Okay, yeah. The .071 is your original depth as a rectangle.

MR. BOTT: Yes.

MR. NICHOLSON: I gotcha.

MR. CHHATRE: You use a rectangle because that is how you get the data from GE, or --

MR. BOTT: Yes. They give us a depth and a length, so that's -- we use a rectangular shape from that.

MR. CHHATRE: Now, does the width of the indication makes any difference to your calculations?

MR. BOTT: No. We don't use it in our calculations, no. I mean for a crack-like feature, it actually has -- it's just the

width of the box they put around the feature, so it has no meaning. For a crack field feature where there's a field of indications, that is the width of the feature, the area that the features are within, but we still just use the max depth and the length. We don't consider the width.

MR. NICHOLSON: That's what I was going to ask next. A crack field goes into this as what?

MR. BOTT: We'll still use the rectangular max depth for the whole length, the entire length.

MR. NICHOLSON: The entire box?

MR. BOTT: Yeah.

MR. NICHOLSON: Okay.

MR. FOX: Now, in the comparing to the hydro pressure or stress -- or, I guess that's the stress, the hydro stress. Was that value calculated for the .285 thickness when you're looking at, you know, comparing the stress value here to the hydro stress value?

MR. BOTT: No. It would have been based on nominal properties. So, for instance, if the hydro test pressure was -- for instance, if it was 850 PSI, that's what we'd use. We wouldn't adjust it because the wall thickness was different.

MR. FOX: Okay.

MR. NICHOLSON: The hydro's the actual --

MR. BOTT: Yeah.

MR. NICHOLSON: -- hydro test.

MR. BOTT: Yeah.

MR. FOX: Oh, okay. So it was in each joint. Depending on the elevation and everything, it's going to affect the pressure on that hydro.

MR. BOTT: Yeah, for sure.

MR. FOX: So -- right.

MR. NICHOLSON: So you can batch multiple features into CorLAS; right?

MR. BOTT: Yes. Well --

MR. NICHOLSON: And get --

MR. BOTT: The version we had at the time, the original version, we couldn't. You could only do kind of like I'm doing it. So we actually had a macro that would run it for us and put each feature and take the results out for us.

MR. NICHOLSON: But your new one you can batch?

MR. BOTT: Yeah. So this one, although I've never done it because we don't use profiles as much anymore, I think you can batch profiles into this.

MR. NICHOLSON: Well, I guess what I was getting at is can you take -- I mean, that was pretty interesting, those two features. Why not take all seven of them? Because we're just running them through --

MR. BOTT: Yeah.

MR. NICHOLSON: -- as rectangles; right? So we could really just take all seven and run them through this 285 and run

them through 25 --

MR. BOTT: Yeah.

MR. NICHOLSON: -- real quick in that Excel one; correct?

MR. BOTT: Yeah. We could do that answer, yeah.

MR. NICHOLSON: To look at the --

MR. BOTT: Yeah, if you'd like to do that.

MR. NICHOLSON: Yeah. I mean instead of just piecemealing this, let's --

MR. BOTT: For sure.

MR. NICHOLSON: -- cut to the chase.

MR. PIERZINA: Sean did say you were pretty good.

MR. BOTT: I've used Excel a lot. Whether that's good or not, I -- okay. Well, there's only six.

MR. PIERZINA: I think there was one added, a 9.3.

MR. NICHOLSON: 9.3; 14-1.

MR. BOTT: There. Right here. So we're missing one or we got --

MR. NICHOLSON: Oh, I think you got -- I see them all there.

MR. BOTT: Okay. Just making sure.

MR. PIERZINA: So there's six?

MR. NICHOLSON: One, two, three, four, five, six. Yeah, I show six.

MR. BOTT: Okay.

MR. NICHOLSON: If I said seven, sorry. How'd you know which bin to use originally?

MR. BOTT: Well, this one is a 40.

MR. NICHOLSON: You just remember?

MR. BOTT: Yeah. And this is 12-1/2.

MR. NICHOLSON: 40, 12-1/2, 25, 25. Okay.

MR. BOTT: Yeah. Because we're using the tops of the bins. So then what we can do is we can take this guy. That's here, six features.

MR. PIERZINA: When you get the profile from the vendor, are you getting -- you're not getting a percentage depth at that point? You're getting an actual depth; right?

MR. BOTT: Yes.

MR. PIERZINA: And when they initially analyze their tool results and get those, they're actually -- they're getting the actual depths, right, but they're reporting in percentage bins?

MR. BOTT: I believe so, yeah, because now -- I know with the most recent runs they -- we've asked them to report in depths.

MR. PIERZINA: Depth bins; right?

MR. BOTT: Yeah, rather than percents.

MR. NICHOLSON: Do you put the hydro pressures in column "D" there? Is that available on there?

MR. BOTT: Yeah, it might be in here.

MR. PIERZINA: Can you also -- can you insert a couple other columns, one for 1.25 safety factor and one for 1.39 safety factor?

MR. BOTT: You bet.

MR. CHHATRE: Well, why would you add 1.39 to that?

MR. PIERZINA: That's a typical 72 percent.

MR. CHHATRE: I see. And 1.25 will give you --

MR. PIERZINA: 1.25 is what Enbridge uses --

MR. CHHATRE: Okay.

MR. PIERZINA: -- for cracks. 1.39 is what the regulations require for corrosion.

MR. CHHATRE: Not for cracks?

MR. PIERZINA: Correct.

MR. CHHATRE: Regulation has any safety factor for cracks?

MR. PIERZINA: Correct.

MR. BOTT: Oh. Oh, I see what you mean. Do you want the actual safety factor or just --

MR. PIERZINA: No. Just what those failure pressure values --

MR. BOTT: Okay.

MR. PIERZINA: -- are for -- actually, I think you misunderstood me. Actually, I was wondering, using those calculated failure pressures for the 285 and the 250, what the safe working pressure count --

MR. BOTT: Yeah. The safety factor directly from those features is.

MR. PIERZINA: Yeah.

MR. BOTT: Okay. Sorry about that.

MR. PIERZINA: No, that's fine. I wasn't very clear.

MR. FOX: Now, I guess I'm wondering where the numbers came from for the .285, because it's not matching up to what we have from the original results, like for the -- in the first feature at 11, you know, we had 789 versus 792 there. Could be a rounding error?

MR. BOTT: It could be, because we can't choose some of the material inputs in here.

MR. FOX: Oh, okay.

MR. BOTT: They just use correlations from the pipeline steel. So, like the strain hardening rate would be slightly different, stuff like that.

MR. FOX: So it's a difference in what we were able to do in the DOS software --

MR. BOTT: Yeah. We can change a lot more variables.

MR. FOX: -- as far as adjusting some of the variables?

MR. BOTT: Yeah.

MR. NICHOLSON: And they're all within a pound or two.

MR. FOX: Yeah. I mean, it's close. It's close. The differences in the -- I think we saw that with the difference in the flow stress definition.

MR. BOTT: Yeah.

MR. NICHOLSON: Yeah. Let's save that.

MR. FOX: So there actually would have been in that case -- if it had been analyzed at the quarter inch, there would have been three features that would have then triggered a -- would have triggered --

MR. BOTT: Profile.

MR. FOX: -- profile.

MR. NICHOLSON: Can you just highlight those three --

MR. BOTT: Yep.

MR. NICHOLSON: -- just so they stand out a little bit?

MR. CHHATRE: He's able to say about 100 PSI.

MR. NICHOLSON: Yeah. They're all essentially deltas.

MR. CHHATRE: Yeah, 110, yeah. It's close.

MR. PIERZINA: It's consistent.

MR. NICHOLSON: 100 to 108, I think. Or 95 to 108. Okay. Thanks, Steven.

MR. BOTT: Yep.

MR. NICHOLSON: That's great. You guys want to do a profile or is there more you want to do with this currently?

MR. PIERZINA: No.

MR. NICHOLSON: And you mentioned wanting to do a profile, I think.

MR. FOX: Yeah. I think it might be -- you know, I mean that's the procedure that was in place at the time.

MR. NICHOLSON: Yeah. From this you would go to the profile.

MR. BOTT: Yep. Yeah, for sure. What we can do is we can do a profile, for sure, yeah. I'll just have to track down.

MR. FOX: Maybe we could get it -- I don't know how long it would take. Would it take long to profile those three that would have triggered at the quarter --

MR. BOTT: The other two, it might take longer.

MR. FOX: I guess we have the profile data on the --

MR. BOTT: Yeah. I have profile data --

MR. NICHOLSON: Oh, do you have the --

MR. BOTT: -- but we have to set the files up so they -- the format they give us, the profile data isn't something we can just stick straight into CorLAS. But we --

MR. FOX: Well, I guess, we could -- if we can demonstrate with the 9.3, and I think we have the results of the other one.

MR. NICHOLSON: Do we have the profile for 51?

MR. FOX: It was run after the fact.

MR. BOTT: Yeah. I'm sure we have it around --

MR. NICHOLSON: Okay.

MR. BOTT: -- somewhere.

MR. CHHATRE: (Sneezing) Allergies, ah. I think I'm allergic to you.

MR. FOX: I would like to think it's me, Ravi.

MR. CHHATRE: Oh, no, no, no. You are not (indiscernible) at all.

(Laughter.)

MR. NICHOLSON: Still on the record.

MR. CHHATRE: Yes, we are.

MR. BOTT: Okay. So, yeah, we do have the profile for the 25 to 40. Okay. So I believe this will be the results one.

Yeah. So here's the original results one from this profile. Here's the 895. And then I will find the input file. So I'm going to show you how that would have been done, maybe. Oh, that's okay. I can use this profile information to generate a new input file. So once you have the profile formatted in the input file, it's the same process. You just load the file in to the DOS version and run it.

So in this case, the profile was just one depth, so it doesn't actually look any different than our box data would have, other than it's not as deep because we've got the actual depth rather than the top of the depth.

MR. CHHATRE: This is Ravi. Question: What additional information profile is giving you that we don't have for here?

MR. BOTT: So in this case, other than the different -- like the actual max depth, it hasn't given us a lot more information because they just gave us one depth for the profile. But typically a profile, rather than having to use one depth for the whole length, we're able to actual -- use the different depths

along the length of the crack for a crack field feature.

MR. PIERZINA: And what kind of increments do they give you that?

MR. BOTT: Generally, I believe it's just whenever it changes, they have a data point.

MR. CHHATRE: I don't think I understand. Can you elaborate more?

Do you understand?

MR. NICHOLSON: No. I mean. I'm still a little confused. You're entering a profile --

MR. BOTT: Yes.

MR. NICHOLSON: -- that's not rectangular now?

MR. BOTT: No.

MR. NICHOLSON: Okay. But it's still converting it to a semi-elliptical --

MR. BOTT: Yes, it will.

MR. NICHOLSON: -- flaw?

MR. BOTT: Yes.

MR. NICHOLSON: Okay. So it still -- yeah, it still converts it to -- it takes the area of the flaw and converts it to a semi-ellipse.

MR. FOX: So for the 9.3-inch long defect, it just gave you the one depth across --

MR. BOTT: Yes.

MR. FOX: -- the entire defect, but like for that 51-

inch profile after the fact, that one had varying depths over the length of the --

MR. BOTT: Yes.

MR. FOX: -- 51-inch. So it takes that and converts it into some other -- a semi-ellipse that --

MR. BOTT: Yeah. So it takes the profile and converts that area into an ellipse, yeah.

MR. CHHATRE: Do you have an example for us? I mean, do you have any example that shows how it could be different than what I'm seeing so far? And all I'm seeing every time is a rectangle --

MR. BOTT: Yeah. No, for sure.

MR. NICHOLSON: Do you want to try and draw it or --

MR. CHHATRE: Well, if you can draw it, that's fine, too.

MR. BOTT: I can either draw it or I can just -- we can do a profile.

MR. CHHATRE: Oh, yeah.

MR. NICHOLSON: Sure.

MR. BOTT: We have all these profiles, I'm sure. Sure, we'll just open one. Let's find one that's on (indiscernible) --

MR. CHHATRE: You guys might -- I don't think I got it.

MR. BOTT: Okay. So, I'll quickly, will show --

MR. PIERZINA: Do we have the profile that was done on the -- you know, after the fact, done after the incident on the --

MR. BOTT: We do.

MR. PIERZINA: -- ruptured --

MR. BOTT: For sure.

MR. PIERZINA: -- feature?

MR. NICHOLSON: That didn't really look that difficult to build. It looked like it was just a series of points along the length and then a corresponding depth; right?

MR. BOTT: Yeah. I can definitely do that one. I think the trickiest part will be finding where we have the new profile stuff, because I know we have it. To be quite honest, I'm not sure where we would have stored that, but I'll look quickly.

Oh, that's field data. Yeah, I'm sorry. I'd have to track it down for you. But I can draw it on the board --

MR. CHHATRE: Yeah. That is fine.

MR. BOTT: -- if that would make it easier.

MR. NICHOLSON: Please. Why don't you (indiscernible).

MR. BOTT: Sure.

MR. NICHOLSON: If you need to set that -- if you want to set it on this ledge over there, that's --

MR. BOTT: So when we get the original data from the ILI, we'll get -- essentially what we do is we get one depth and we get a length, so we'll assume something like this, which we've demonstrated several times. And then the software does something like this. So when you get a profile that's actually different, what you might get is, you'll get -- say you get something like

that, so -- and maybe the depth's not always the max bin depth rate. Well, it's down here, but -- but that increases our knowledge of the feature, because then we kind of have an idea of the shape and it reduces this area assumption, is the biggest effect, right, because you're only assuming this profile. So then when the software still just makes the same thing, you'll get something more like this possibly.

MR. NICHOLSON: So we're looking at just one side of the pie; correct? This is just one wall? This your pipe wall here? I just want to be sure --

MR. BOTT: Yeah.

MR. NICHOLSON: -- I've got my bearings.

MR. BOTT: Yeah.

MR. NICHOLSON: This is IOD?

MR. BOTT: Yeah. I was just showing it the same as PI in the --

MR. NICHOLSON: Okay.

MR. BOTT: -- software. So, yeah, this is OD at the bottom --

MR. NICHOLSON: Okay.

MR. BOTT: -- where the feature is, and this would be ID.

MR. NICHOLSON: Okay.

MR. BOTT: So, yeah, it reduces the severity of the conservatism of our assumptions, essentially, is what it does.

Because we're actually using what the vendor has told us is the actual shape of the feature.

MR. FOX: Now, for the profiling that was done from the 2005 data, essentially that's just taking that box, the rectangular box, and shrinking it to whatever the deepest indication --

MR. BOTT: Yeah. It appears that a lot of them are like that. Like it was manually done in 2005, and so they made -- for some features they may not have -- they may have decided they couldn't make the call to go as far. I have seen profiles from 2005 where they've gone this far --

MR. FOX: Oh, okay.

MR. BOTT: -- to this level of detail, but it's possible in 2005, for these ones, instead of having the 25 to 40, they said, well, no, the max depth's actually 29 and --

MR. FOX: Now, would you tell them, you know, which ones you want the greater detail on versus the ones that you just want the max value?

MR. BOTT: Sean would have to clarify that, because since I've been in the group, GE in particular, anyway, automatically generates all these for us.

MR. FOX: Okay.

MR. BOTT: We typically don't use them that often, but they do get generated automatically. So they actually go down to this level, because it's a computer doing it, so it's not --

MR. FOX: That's fine.

MR. BOTT: So I'm not sure if previously they had to ask for what level of detail they needed.

MR. NICHOLSON: Any questions, Ravi?

MR. CHHATRE: I'll go outside (indiscernible) --

MR. BOTT: I can go through it quickly again.

MR. CHHATRE: Okay.

MR. BOTT: So, it's a little hard with all my little lines everywhere. But essentially what the tool gives us originally is a max length and a max depth. So we will assume a box, and that's what we do. Now, if we ask for a profile, what happens is -- so in the case of many of the profiles -- one thing we were discussing in this one is actually what we got from the tool was that's the max bin, and they just gave us a square that was what they actually thought it was. So that's one step. Now, what they can also -- what I've seen as well is they'll actually go down to the level where along the length of the reflector, the --

BY MR. CHHATRE:

Q. That's each pixel you are drawing?

A. Yeah.

Q. Or you are drawing a --

A. Well, it's not each pixel. So the multiple sensors will see this part, but it's sort of the depth they've calculated based on their algorithm --

Q. Okay.

A. -- for this part. And, yeah, and they go along and build a profile out of it.

Q. So, now, all these really even correspond to my -- I guess my length is here; right?

A. Yes.

Q. Okay.

A. Yeah.

Q. And so your rectangle, now, is really the depth versus length. I mean, this is the depth?

A. Yes.

Q. And this is the length?

A. Yes.

Q. Now, how does -- if they give you the maximum, your elliptical model of profile goes beyond your box, is where I have disconnect. I don't --

A. Oh, okay. So the reason that is, is because the software and the model uses a semi-ellipse. So if we put in a rectangle, the model converts that area, this amount of area, to an ellipse. But in order for the ellipse to have that much area, because it's a rounded shape, it has to go --

Q. Oh, you -- okay.

A. It has to go deeper.

Q. Okay.

A. Yeah.

Q. So that definitely doesn't mean a whole lot or it does mean something?

A. This depth here?

Q. Yeah -- no, no. I mean, now that you are beyond your box, this really has no special meaning; it's just equal to the other (indiscernible)?

A. It's the same area.

Q. Okay. So I thought that ellipse is going to be used when more depth than you actually are measuring, and that's why I was confused.

A. It does give you more depth and it -- because of stress concentration, it does give you a slightly lower -- like if you were to model the same area as a square and as this, this might give you a slightly less -- lower pressure because it's deeper. But the -- it wouldn't change much, but it's more conservative than just assuming this, where you'd have your ellipse with the same depth as the maximum. Because then it has less area, so obviously your fail pressure will be higher.

Q. So what we are losing by taking a more blunt crack versus a more sharp crack? I mean the one that you are doing there, the dash line is a more sharper crack, whereas --

A. Well, I'm not drawing the shapes accurate.

Q. Okay, okay.

A. It's the same semi-ellipse.

Q. Okay.

A. Yeah.

Q. I'm sorry. Yeah.

A. Yeah. Sorry about that. It's the same semi-ellipse. It's just which -- how much area it encompasses. And so what we get by going to the profile is there's less area, so you have a smaller feature.

Q. So that ellipse is giving you a more conservative number and a higher number than the actual number in depth?

A. A higher number, yeah, than actual number.

MR. CHHATRE: Okay.

MR. PIERZINA: And so, Steve, you said that you're not using the -- currently not using the vendor-generated profiles because you haven't validated them yet, but wouldn't they still be of value as far as ranking features, or --

MR. BOTT: Yeah. So they could be, yeah. So essentially what -- and I believe it was 2008 is when they switched to automatically generating those, and so in most cases since then we haven't used the profiles. We've just gone with the maximum bin depth and dug everything that met our criteria. So now that we're adding, you know, bias to our fitness for purpose calculations, we may start looking at them again just as a way to rank features again.

MR. NICHOLSON: Matt Fox, anything you'd like to see in CorLAS, or are we done?

MR. FOX: I can't think of anything at the moment. I'm

good with the CorLAS demonstration.

MR. NICHOLSON: Mr. Chhatre?

MR. CHHATRE: I mean, I might be contacting you guys again over the phone, but I don't think -- I mean, I feel I understand what is being explained, but I'm not sure I retained the whole thing, but --

MR. NICHOLSON: Okay.

MR. CHHATRE: It looks reasonably simple to do it.

BY MR. NICHOLSON:

Q. Yeah, I just want to clarify, though, when I asked you about the SCC, you said this is the same program you used for a crack field, it's just -- and you input it pretty much the same way.

A. Yes.

Q. You use the box for the length and the maximum depth.

A. Yeah.

Q. Can you profile a crack field?

A. No. They don't give us profiles for crack fields.

Q. Okay. All right. So there's nothing else you really change. It's just how it's --

A. Yeah.

Q. The same program, the same way.

A. Yeah.

MR. CHHATRE: So essentially what I understood from yesterday was a crack profile and crack, they treating

(indiscernible) same, pretty much. The way you're handling the data, it's essentially the same.

MR. BOTT: It's very similar to doing a crack field.

MR. CHHATRE: Whether it's crack or it's crack field, no difference.

BY MR. NICHOLSON:

Q. Do you have to apply any other kind of, you know, non-quantifiable measures when you look at a crack field that you wouldn't for a fatigue crack?

A. I don't -- not normally.

Q. Okay.

A. Again, like I said, when you start to get a lot of them that are the same, you may look at other things to try to prioritize, but typically when it comes to this is what we're going to dig, we may try to prioritize within that, but that's what we're going to dig, so --

Q. And you trust the characterizations? There's never -- I mean, in this case you call it crack-like and now they're saying it's crack field. There would be no reason typically in your job to question the characterization of a defect?

A. Yeah. So in our -- and I know we're going to get to it, but in our outlier analysis and trending, we do trend the classification.

Q. Okay.

A. And even though we treat everything fairly similar, we

still work with the vendor to try to improve that classification. So we do trend it.

Q. Based on digs?

A. Based on the field.

BY MR. CHHATRE:

Q. I thought you were using the same approach for crack-like field, cracks and --

A. (indiscernible) Yes, we do use the same approach. We grow them all by the same growth rates and -- just in case they do mis-classify something. But, of course, we always want them to get it right. It helps us, you know, characterization the line as a whole and understand the mechanisms, so --

Q. Well -- I'm sorry. This is Ravi again.

But for your analysis, CorLAS, crack-like features, crack, and crack field, they're all analyzed the same way --

A. Exactly.

Q. -- is that correct?

A. Yes.

Q. So what is the (indiscernible) of getting these three different classifications from the vendor?

A. It understands us -- or helps us understand what kind of features may be there. Also, especially in the area of the weld, because they can't really tell if it's in the weld or near the weld. But if they call something a crack field, then obviously it's easier for us to understand it's probably near the weld,

along the edge of the weld. But if they call something a crack-like, it's more likely to be something associated with the seam. So it does -- especially on lines where you'd expect to have features in the seam, like flash weld or low frequency or "W", it does help us kind of understand what's going on with the line and which threats would be there.

Q. So then you're saying the tool will not identify where the weld is?

A. It knows where it is, but because it's a shear wave and it's going in the pipe at an angle and the -- it's getting signals from multiple things on both sides of the weld, they know where the weld is, but it's hard for them sometimes to nail down exactly whether the feature's in the weld or just close to the weld.

Q. In your analysis, you treat it differently, even in the weld was this -- it's on the heated-affected zone or near the weld?

A. No. We will treat everything near the weld as if it was in the weld. So, for toughness purposes; right?

Q. Okay.

A. So when GE reports the location of a feature to us, typically they just have two calls. They have adjacent to weld, and they have base metal.

Q. Right.

A. And so everything adjacent to weld could either be in the weld or just near the weld, and they can't determine, so they

tell us it's close to the weld.

Q. Um-hum.

A. So -- but normally if it's adjacent to the weld or it's a crack field, you'd actually expect it to be in the base material, just close to the weld. Whereas if it's a crack-like, it's more likely to be associated directly with the weld.

Q. And so in your analysis, you treat those things differently?

A. No, we don't, because it's conservative to treat them the same.

Q. Okay.

A. But just for our understanding of what the threats are in the line.

Q. Okay. But otherwise, really it's no different. You treat everything the same way, where -- do the digs?

A. Yes.

Q. The same way, whether it's a crack field, crack-like feature, or a crack?

A. Yes. Yeah.

MR. CHHATRE: Any questions -- I don't have any questions on CorLAS, but I don't have other questions.

MR. NICHOLSON: Oh, of course we do. Yeah. I didn't know if we --

BY MR. NICHOLSON:

Q. Now, you said you flaw check. You are unable to -- you

don't feel comfortable running the flaw check for us?

A. No. We do have some training on fatigue and flaw check, but currently what we -- in our group we kind of have a person who's responsible for us. We give him all our inputs and they do the flaw check for us, and then we use the outputs from that. So I don't actually use the software regularly, so --

Q. You use the outputs from flaw check?

A. Yes. I use the remaining lives generated from the --

Q. Is it in CorLAS or --

A. No. For our reassessment annual determination.

Q. Oh, okay.

A. And the dig selection, yeah.

BY MR. FOX:

Q. So you get involved in the dig selection, then?

A. Yes.

Q. So I guess a question I would have is if you had a joint that had, I guess in this case three features that would have been flagged for profiling or, conversely, say, three features that were near the rupture limit on one joint, would you flag that joint for a dig?

A. It's possible I would. I depends a lot on the line and what we're seeing, and if we're already doing -- like if we selected a large number of excavations already, I might not pick it in, say, like a phase one. But we do consider feature density and distance from the pump station and stuff like that in our

selection criteria. It's likely that if it almost met our fitness for purpose criteria, that we would probably select it based on growth or if we were adding bias to the fitness for purpose, that might flag it, so --

BY MR. NICHOLSON:

Q. If CorLAS is your fitness for purpose --

A. Yes.

Q. Okay. I'm a little fuzzy, then, on the flaw check. Flaw check if your fatigue.

A. Fatigue, yeah.

Q. So would someone else be doing a parallel run of all these features for fatigue?

A. So, yeah. What happens with that is when I get a new run, I will do the fitness for purpose assessment and I will calculate the critical depth for the fatigue analysis, and I will choose what pressure data based on our, you know, pressure monitoring that I think would be most appropriate to use, and I'd put that all into a file that contains all the inputs, and then I send that to someone who then actually runs flaw check for me, and then he gives me the output back and then I use the output.

Q. So I thought there was a dedicated engineer doing the pressure selection.

A. He does the pressure monitoring.

Q. Oh, okay.

A. Yeah. So he -- on a quarterly basis he takes all the

pressure data and calculates the pressure severity each quarter for each line signal. But since it's -- I'm the one that's kind of responsible for doing the analysis for that line. We have guidelines in our process documents that say what we should use for pressure data, but it's up to me to choose which pressure data, which quarter or two quarters to represent, you know, on our fatigue list.

Q. And then can you show us, how do you get the critical depth? Is that through CorLAS or --

A. Yeah. So --

Q. -- Excel, I mean --

A. Yeah. What we do -- and I can just use this file that we already had that I closed. I'll just open it again. So we can use this. Not this one. So we can use this. So right now we've used it for fitness of purpose, but it also outputs critical depths.

Q. Oh, okay.

A. So, because flaw check grows, we grow our fatigue growth by an elliptical shapes, an elliptical shape. We can -- what we'll do is we'll run it once to get out our fitness for purposes assessment, and then we would change the profile to the elliptical shape, and then we would run it and then we take the minimum depth between full stress and fracture toughness, and that would be our critical depth. So that's why -- that's based on whatever pressure we put in here.

Q. Right. That's the depth at which it will --
A. Fail.
Q. -- run or fail?
A. Yeah. So --
Q. At that pressure.
A. -- that's what we grow our fatigue -- when we run our fatigue, that's what we go to, is this depth. So I calculate that.

MR. CHHATRE: So on the very last row here, you're saying that 624 PSI operating pressure, you are -- how is that pressure different now for fatigue? If you look at --

MR. BOTT: It's not, so -- well, we would put our MOP in this column, our maximum operating pressure. So our fatigue, we obviously don't want to exceed the maximum op pressure. So that's how we get our critical depth, is based on that pressure. So I give that and then the other parameters from the feature, and then that all goes into kind of input file and I give that to the other engineer.

BY MR. CHHATRE:

Q. I'm sorry. Can we revisit again, because I don't think I understand with your fitness for service and -- can you explain one more time as to how does that work?
A. Okay. So -- sure. That's not a problem. So we use a rectangular profile for our fitness for service.
Q. Right.

A. So I won't redo it, but we put "R" in here for rectangular profile and we run it, and then we get the results that we would use to decide what we dig based on fitness for purpose.

Q. Okay.

A. And then, because we grow by fatigue --

Q. And what -- I'm sorry. What is the criterion for these numbers? Which numbers would determine a dig?

A. A safety factor of 1.25 or 0.8. However you want to say it. So if this was your MOP, then anything that was less than 1.25 times MOP we would dig.

Q. Okay. Where is that number in the column, 1.25 times MOP?

A. We don't -- this is just the assessment file. We have another file that we store that in.

Q. And that number is automatically imported?

A. We import it to the other file, yeah.

Q. So for each number you are to go back at that file and look at the number or -- I'm sorry.

A. Here. What I can do is --

Q. Show me an example.

A. Yes, I sure can. That will make it easier. I'll show you the same one that Sean was showing you yesterday, I think. So we have a file that we call our crack assessment file, --

Q. Okay.

A. And that's the ILI results. Then our inputs that we put into that other CorLAS Excel file.

Q. Okay.

A. And then we take the failure pressures that we get out and we put them in here. So that way they're kind of all lined up with their ILI data, and then we also have the MOP in here.

Q. Okay.

A. So then we'll have a -- right here. So, safety factor over MOP. So this -- anything less than 1.25 we would --

Q. Okay.

A. -- sign for an excavation. So that's how that works.

Q. Okay.

A. And then to calculate the critical depth for fatigue, we'd change it to elliptical profile. We run it again, make sure we have the correct numbers in here, obviously. Run it again, and then whichever is the lower of these two numbers is what we'll use for --

BY MR. NICHOLSON:

Q. Where do you get the operating pressure from?

A. So we have these documents called line description documents.

Q. Um-hmm.

A. And they're supplied by our Facilities Management Group, and they have the hydro test and MOP and any pressure restrictions and all that kind of stuff.

Q. Okay. So it has pressure restrictions. So if there was a pressure restriction on that line, --

A. Yeah.

Q. -- that value would be --

A. Well --

Q. You would use that value?

A. No. We'd try to use just the MOP of the line, because that way your analysis doesn't depend on whether that pressure restriction comes off or not, because --

Q. Okay.

A. -- the pressure restriction might be on there for a different -- like a corrosion dig and then they're done. When they finish the corrosion dig, --

Q. I see.

A. -- they might take that off, so you can't use that. You have to use the --

MR. PIERZINA: So the 624, I think, in this case is 72 percent of SMYS; right?

MR. BOTT: Yes.

MR. CHHATRE: Excuse me. (Indiscernible) maximum operating pressure, not the operating pressure. (Indiscernible) is a maximum operating pressure, --

MR. BOTT: Yes. It's a maximum.

MR. CHHATRE: -- not an operating pressure; right?

MR. BOTT: No, no. It's just because this is -- you can

use this software to do any kind of calculations, so they just called it operating pressure, but we put maximum --

MR. CHHATRE: Maximum.

MR. BOTT: -- pressure.

MR. NICHOLSON: Okay. So you give the flaw check guy the critical depth and the pressure cycle?

MR. BOTT: Yep.

MR. NICHOLSON: And he gives you years to failure, which goes back in this worksheet?

MR. FOX: And you give him the flaw length, too.

UNIDENTIFIED SPEAKER: Yeah.

MR. FOX: Length and critical depth for each flaw?

MR. BOTT: Yeah. I give him the length and then the -- you know, the grade and the wall thickness.

MR. NICHOLSON: Who do we need to show us flaw check? I didn't hear a name.

MR. BOTT: Well, Aaron is the one who does it. Sean might be able to show you as well.

MR. JOHNSON: Is that something he can show us here, or has it got to be on his computer?

MR. BOTT: It's got to be on his computer. It's got a hard block, so I believe it's got to be on his computer.

MR. JOHNSON: Is he here today? Do you know?

MR. BOTT: Aaron's here, so -- and he may have a laptop that he can bring up. I'm not sure.

MR. NICHOLSON: Let's go off record here. We're off the record.

(Off the record.)

(On the record.)

MR. NICHOLSON: Okay. Steven Bott interview, part two.

Okay, Matt Fox. I think you had a question.

BY MR. FOX:

Q. My question is, you know, looking at that 9.3-inch feature on the ruptured joint, after that feature was profiled, if a tool bias had been applied, would that still keep that predicted pressure above rupture pressure or the -- met hydro pressure if we had tool bias? So, and this is still with the 0.285 wall depth?

A. Yeah. So the -- I believe the bias was -- I know on the 12 to 25 it was 9 percent. It may have only been the actual tool tolerance on that, so --

Q. Oh, the bias changes by crack depth?

A. Yeah. Typically, especially the 25 to 40 or the 2- to 3-millimeter bin, actually you don't need to add as much bias typically.

Q. Okay.

A. So I should just check and confirm what we used.

BY MR. CHHATRE:

Q. Why is that? The tool tolerance are the same; right?

A. Yeah, but -- so the tool tolerance is always 0.5 millimeters or 0.02 inches. But based on our trending, I believe,

on the 2005 data for the 12 1/2 to 25 bin, it was slightly more than that. Instead of being about 7 1/2, 8 percent, it was like 9 percent, which is -- it was 0.026 inches, I think. But I don't -- I can't recall off the top of my head what it was, so I'm just going to take a look at this trending here. So, yeah. So you can see that here's the different tolerances, so --

Q. (indiscernible)

A. Yeah, can do that. So you can see that the 12 1/2 to 25 has a bit more variability here, so this is actually including post-incident. So if we go to pre-incident, this is what it looked like. So you can see this here. It's slightly above the one tolerance, which is where the 9 percent comes from. So here would be -- it's under the one tolerance, so the minimum we ever add is -- would be one tolerance.

Q. I'm sorry. What are 1, 2 and 3 tolerances? What does that mean?

A. Just the number of tool measurement error bands we would add, I guess, the equivalent. So for -- so plus one tolerance would be adding 0.02 inches. Two would be adding 0.04 inches, because it's two times the tolerance. Three would be 0.06 inches. So, it's just a guide to kind of help visualize it, so --

Q. So it is really the confidence limit? Is that related to the confidence limit, then, like 95 percent confidence, 90 percent confidence?

A. No, this isn't directly related to that. This is --

well, as reported by the vendor, --

Q. Uh-huh.

A. -- they say that it's plus or minus 0.02 inches, I think, 90 percent of the time. So I guess --

MR. NICHOLSON: So each tolerance is 0.02?

MR. BOTT: 0.02 inches. So if we had a feature up at this line, the uppermost one, for our bias, if we confirm that feature was an outlier and we agree with the NDE calls and everything, we would add that much, three tool tolerance as our bias for those features for that run.

BY MR. CHHATRE:

Q. And is your bias always plus/minus or is the biases always on --

A. It's always plus.

Q. Always plus.

A. We won't remove bias. I mean we may -- like if we're always trending way down at the bottom, we may work with GE to recalibrate the run maybe, but we would never just be like, "Oh, no. There's nothing. We can take off depth." We would never do that, for sure.

BY MR. NICHOLSON:

Q. So is the tolerance applied to each specific defect or do you just go across the -- you take your worst case and apply that bias across the board?

A. Typically we'll do it on a bin specific type deal. So

for, you know, the less than 12 1/2, we might have one. Twelve and a half to 25, we might have one.

Q. But that's applied to all defects in the bin?

A. But all features in the bin, yeah.

Q. Regardless of where they might have trended?

A. Yes.

Q. Okay.

A. Yeah. So, yeah, even though we have features down here. So obviously not all of them are going to need this, but --

BY MR. CHHATRE:

Q. So you did the data that (indiscernible) giving you. Then you added this value and made that that depth, either by 0.02 inches, 0.04 inches, and 0.06 inches.

A. Yeah.

Q. -- depending upon some tolerances. So these numbers plotted here, they can view the tolerances; correct?

A. Well, these numbers plotted here --

Q. Uh-huh.

A. -- are what the field has reported as the depth.

Q. But they are not -- they do not (indiscernible) tolerances. So all of them must shift up by that much?

A. They would shift over towards this edge if we added tolerance, because ILI is on the "X" axis.

Q. Okay, okay.

A. So if we added tolerance, they would shift.

Q. They all shift to the right?
A. Yeah.
Q. Okay.
A. So for this one, I'm just going to add one tool tolerance, because that's what our trending would show, so --
Q. (indiscernible) 0.02; right?
A. It was 0.083 before.
MR. PIERZINA: Right. So it should be 0.103 now; right?
MR. BOTT: Yes.
BY MR. CHHATRE:
Q. Okay.
A. I think I may have made an error. Just one sec. I think there might be a typo. That's why I check those, because -- yeah.
Q. That's what I was trying to tell you.
A. Oh, okay.
Q. Yeah. And then you guys all "hoo'd" me. I said, okay (indiscernible).
A. You were right, yep.
UNIDENTIFIED SPEAKER: (indiscernible)
UNIDENTIFIED SPEAKER: Stick to your guns, Ravi.
MR. BOTT: Yeah.
UNIDENTIFIED SPEAKER: It was a 0.25. Which case are we (indiscernible)?
MR. FOX: This is the 9.3-inch crack?

MR. BOTT: Yeah. He had asked for 285.

MR. NICHOLSON: Oh, I'm sorry.

MR. FOX: Yeah, with the 285. Well, yeah. It would be as calculated then if you added the five.

MR. CHHATRE: So it would be --

MR. BOTT: 31.

MR. FOX: 831?

MR. CHARTE: Yeah. Still we have all hydro, we have not?

MR. NICHOLSON: Yeah.

MR. BOTT: Yeah.

MR. NICHOLSON: It's above hydro, so ninety --

BY MR. CHHATRE:

Q. Now -- this is Ravi -- I remember, I guess, him just telling me that -- telling us that after the accident, GE went back and reclassified that defect as a crack field or crack-like feature. I forget what.

A. It was a crack-like originally, and they reclassified it as a crack field based on their new look at it.

Q. But if I understand you correctly, earlier you said your calculations makes no difference, though.

A. It would not make any difference to these calculations.

Q. Whatever your numbers were, (indiscernible)?

A. Yes.

Q. Your treatment was no different?

A. Yes. The only one thing we do different with crack fields is if they have a -- because "G" also reports a longest indication. If that was long, then we would dig it, so that would be the only difference.

Q. But even if that --

A. But it wouldn't be based on this. Like the feature could be way, way above our criteria. But if -- we still would dig if we had a really long longest indication. But that would be the --

Q. But I thought --

A. Yeah.

Q. -- maybe "G" reclassifying were identically different and the crack would have been identified, but the field --

A. Not by this method, no.

Q. So your crack (indiscernible) treat everything same?

A. Yes; yeah. Like I said, unless they reported it with a really long longest indication, that we would have dug.

Q. But it was that changing the indication, not classification; right?

A. Well, crack-likes they don't report along a syndication. They do for crack fields. So it would change, but based on fitness for purpose, all this work, yeah, the crack field, crack-like change doesn't.

Q. So I thought maybe that was a big, I guess, improvement that would have triggered something on your part, but you would

not have?

A. No, not from this point of view.

MR. NICHOLSON: But the longest indication having been bigger than 2 1/2 inch --

MR. BOTT: I think --

MR. NICHOLSON: -- triggers an immediate dig or something?

MR. BOTT: Or not an immediate dig, but it would have meant the criteria that was used for phase one, I believe, that they --

BY MR. CHHATRE:

Q. But they would have still gone to the same calculation (indiscernible) same conclusion?

A. Yeah. No, the longest indication lengthening is -- we just use that as -- if it's a crack field and it has a long interacting length, it could be growing, it could be really active, so we want to dig those. So it's like additional step. It's independent of whatever we think the fail pressure might be.

MR. NICHOLSON: So you're saying the model, you can't really do anything with these anyhow, so we dig them?

MR. BOTT: Or it does -- you know, 99 --

MR. NICHOLSON: Oh, okay.

MR. BOTT: It does do it; right? It does -- we do use them. But it's just another indication. It's a non-quantitative way. It's just like looking for things close to the pump stations

or looking for things with lots of features on the joint. It's just another one of those kind of methods of looking deeper into the data past the numbers.

BY MR. CHHATRE:

Q. (Indiscernible) profile not having changed based on the change in classification, crack-like feature was this --

A. They don't -- they can't do a profile for a crack field indication, so -- They do something called a crack field statistics, which is just where all the indications are in their box, but it is not a profile.

MR. FOX: Could that -- in this case it wasn't -- they weren't able to give you a more detailed profile. Could that be an indication that there was a crack field that they couldn't give that kind of profile or possibly, you know, it would -- because there was a crack field, they weren't able to give a more detailed profile?

MR. BOTT: I can't say for sure, but I don't think that would be the issue because if they've classified it as a crack-like, then their software will treat it as a crack-like. So I don't think that's the issue here. It probably goes back to the fact that they are manually done.

MR. FOX: Okay.

MR. BOTT: Because if they've called it a crack-like, then they should be able to generate the same thing as any other crack-like.

MR. NICHOLSON: Now, when we talked to the corrosion guys, they had two criteria that called for an immediate dig. It was like a 40 percent through -- or 80 percent through wall and a RPR one or less. What's the crack group's criteria, then?

MR. BOTT: So we saturate a signal. So, greater than -- it depends on the vendor, but for sake of conversation, for GE greater than 3 millimeters. They say that they can't determine the difference, the change in depth based on the altitude anymore. They get the saturated back. So if it's deeper than 3 millimeters, they can't tell us how deep it is. So that's an immediate dig.

MR. FOX: What's that correlate to in inches?

MR. BOTT: Sorry. 0.12 inches.

MR. CHHATRE: (indiscernible)

MR. BOTT: Yeah. 0.12 inches. So, about an eight inch close. So it's the -- essentially so they have the bins, now measured in depth. The bins are zero to 0.04 inches, 0.04 to 0.08 inches, 0.08 inches to 0.12 inches. And then, so if it's deeper than that, they just say it's greater than 0.12 inches and that's a priority dig for us. And the other one that we do, we may not dig it immediately, but what we do do immediately is if we have a feature where we do our fitness for purpose assessment and it's below MOP, we'll immediately put on a pressure restriction. And depending on where it is, we'll have to report that to the regulator as a safety-related condition, because obviously with a

0.8 safety factor, if you have to go below that, then you're already -- you're meeting the safety-related condition, reporting criteria typically. So we -- and typically we'll dig those pretty fast, too. Just we'll get out there and dig them right away as well, but definitely we'll put a pressure restriction on right away.

MR. CHHATRE: So (indiscernible) saturation of the (indiscernible) 50-percent wall, --

MR. BOTT: Yeah.

MR. CHHATRE: -- roughly, for this case?

MR. BOTT: Yes, in this case.

MR. NICHOLSON: And I'm using the term "immediate." How are your digs classified? I heard you say -- is a phase one also immediate or --

MR. BOTT: No. A phase one would be just the first set of -- so, yeah, the term "immediate" or "priority" would be something we sent out right as we were -- we found out about it essentially, and we'd get it done, we'd take action. The term "phase one," what I mean is that, is you pick your slate of whatever digs you think you need to do to complete your validation of the tool, and if -- I mean in some cases it might be everything that you think you need to dig right away, and usually we'll give those between a 180- and 365-day timeline to dig. So get them all --

MR. NICHOLSON: You get up to a year to dig?

MR. BOTT: Yeah. So if any features require pressure restrictions, they -- say the safety factor was 1.24 even. We would put a pressure restriction on to restore the 1.25 safety factor right away, so --

MR. JOHNSON: The PHMSA regulations only have timing for defects in high consequence areas, so they're -- you know, if it's not in a high consequence area, there's not a timing on it. Enbridge has put their own 365-day limit on all digs.

MR. NICHOLSON: All digs. Okay.

MR. JOHNSON: The immediate term is also a PHMSA term from the Integrity Management rule, and that criteria is outlined in our own MP manual, which they'll send out an immediate dig as in per the HC rule.

MR. NICHOLSON: Okay, right. So there's a phase one. Then there must be phase two, three or --

MR. BOTT: Sometimes there is, sometime -- there typically is, because even if you've dug sort of everything that meets, you know, our fitness for purpose criteria, whatever, generally -- usually over the life of, say, a five-year cycle, something else will change. Maybe your pressure cycling changes. Maybe you get all your digs back and your trending shows it's -- you know, you need to adjust something. So, typically we'll have a phase two just to take care of stuff like that, keep an eye on growth rates and stuff like that.

MR. NICHOLSON: Do you have time limits on the phase?

MR. BOTT: Those are usually between 180 and 365 days from whenever we issue those as well, so --

MR. NICHOLSON: Okay.

MR. BOTT: The process document says 365, but it depends on how fast you might want data back.

MR. CHHATRE: So the clock really starts ticking for phase one is after you guys identify as these are the dates --

MR. BOTT: Yes.

MR. CHHATRE: -- you want to make.

MR. NICHOLSON: What process document was that?

MR. BOTT: It's PI-38.

MR. JOHNSON: Okay. Just to be clear, the clock starts when the data discovery is made --

MR. CHHATRE: Right.

MR> JOHNSON: -- per the PHMSA rule, --

MR. CHHATRE: Okay.

MR. JOHNSON: -- which is 195.452. So the clock starts. So a clock may start from the date of discovery on a 180-day dig. It may take the Integrity Group 30 days to get that out. That doesn't mean they get 30 -- 180 days past --

MR. BOTT: Yes.

MR. JOHNSON: -- their 30, just so we're clear on that.

MR. CHHATRE: You know, the 180 days date --

MR. JOHNSON: That's from the date of discovery we talked about yesterday. That dig needs to be done. So, as you

know, if it through their analysis it takes them a month, which Steven just talked about to get that done, when that dig goes out, now the execution -- dig execution team has 150 days to complete that. And in their dig packages, which you've seen, they've got the dates, date of discovery, and if it's 180-day dig, here's when it has to be done. So that's in the dig packages, just so we're, you know, clear on that.

MR. NICHOLSON: Yes. Thanks.

MR. CHHATRE: That does clarify it, --

MR. JOHNSON: Okay.

MR. CHHATRE: -- because I thought the clock starts after you guys decide, you know, which was to dig. To me, I was considering that like (indiscernible).

MR. JOHNSON: No. Well, and I think in a way the rule is, you know, determine that your data is good from the tool vendor, and then gear up your forces. Don't be sitting on that data once you've determined it's good. So, you know, that's, I think, a way that PHMSA has pushed us to expedite that analysis to send out the digs.

MR. CHHATRE: So your data (indiscernible) when your QA/QC department says data is good, you proceed (indiscernible).

MR. JOHNSON: Yes.

MR. CHHATRE: Is that when the data discovery is considered --

MR. BOTT: Well, no. Our data discovery is when Sean

proves our dig selection.

MR. CHHATRE: Well, (indiscernible).

MR. JOHNSON: But when the tool -- when the data team says -- and Steven's probably a big part of that. When they say, "Okay, we've looked at this and we went through all of the gyrations," --

MR. CHHATRE: (indiscernible)

MR. JOHNSON: -- and they go, "Yeah, this is go," data discovery. And that's defined in one of the PI documents, so --

MR. CHHATRE: Correct. So --

MR. JOHNSON: Which I'm sure you have.

MR. CHHATRE: So your 365 days also starts from that --

MR. JOHNSON: Correct.

MR. CHHATRE: -- data as well?

MR. BOTT: Yes.

MR. CHHATRE: Okay.

MR NICHOLSON: You said "all the gyrations." You're talking about running the CorLAS models and --

MR. JOHNSON: You know, the things they do to verify that, --

MR. NICHOLSON: Okay.

MR. JOHNSON: -- if the tool's from GE that the data is good.

MR. BOTT: Yeah. So for us, that --

MR. NICHOLSON: Well, that's not him. That's the

program logistics that does the QA, the first step of planning.

MR. JOHNSON: And I just -- I don't know what level Steven's involved with that.

MR. BOTT: So, yeah. Before we send our digs out and we start our timing, we have to do the assessment of the data because the vendor doesn't give us an RPR. We have to calculate that. And we also have to make sure that whatever we're sending out hasn't been excavated before, so that takes a couple days, so --

MR. NICHOLSON: Why would you -- if it's been excavated before and it's showing bad, you want to excavate it again regardless, don't you?

MR. BOTT: Well, typically, yeah, unless it's under sleeve. I mean tools aren't perfect and maybe it doesn't report a sleeve somewhere. So we just make sure we go through out dig history records and confirm --

MR. JOHNSON: And what we had talked about with Saheed (ph.), if it requires digging because of the corrosion field and the cracking and it's already been done before, blasted and coated, then they've arrested that corrosion, so that they're looking at sleeves and to see if it's been recoated.

MR. CHHATRE: Right, but what you are looking at is the data that already was put on the common drive --

MR. BOTT: Yes.

MR. CHHATRE: -- while you're QA/QC.

MR. BOTT: Yes.

MR. CHHATRE: So (indiscernible). Data discovery already has been done; right?

MR. JOHNSON: Yes.

MR. CHHATRE: Yeah, okay. I wanted to make sure. You may want to look at all kinds of things from your perspective, but of regulation, data discovery started; correct?

MR. JOHNSON: Correct.

MR. BOTT: So within the ACA rules, the only comment it says about cracking currently is that you have 180 days to repair it from the time you confirm it's a crack, and Enbridge doesn't consider crack only data. It confirms cracks.

UNIDENTIFIED SPEAKER: Right.

MR. BOTT: So we do make every attempt to determine what we need to dig what we think is a threat, and dig it quickly in a reasonable time frame.

MR. NICHOLSON: So as you said, date if discovery is when your dig package is approved by Sean?

MR. BOTT: Not the dig package. That comes after --

MR. NICHOLSON: Oh, okay.

MR. BOTT: -- all that stuff. As soon as I've determined, based on our dig selection criteria, what I think we need to dig, Sean just reviews to make sure he thinks I did a good job with the selection, and then, yeah, he puts his name and date, and from that, that's when the time starts. So things -- often dig history does come after that. Making the dig packages, yeah,

all the execution, all that stuff happens --

MR. NICHOLSON: So are the dates different for a corrosion package versus a crack package --

MR. JOHNSON: Yes.

MR. NICHOLSON: -- or for a crack ILI versus corrosion ILI?

MR. JOHNSON: The process to determine --

MR. NICHOLSON: Because for the corrosion ILI, --

MR. JOHNSON: -- to say if it's crack-like --

MR. NICHOLSON: -- the vendor's going to give your RPR.

MR. BOTT: Yes.

MR. JOHNSON: Yes.

MR. BOTT: And that's the one step we have to take.

MR. NICHOLSON: So eventually once that comes back from the vendor --

MR. JOHNSON: It's verified, yes.

MR. NICHOLSON: -- and it's been verified, then the date starts there, whereas with the crack, you're saying the crack -- you're doing the analysis on the crack and so it's not until you've finished doing that analysis and verified that it's correct that the date starts there for the crack.

MR. BOTT: That's correct, yeah.

MR. JOHNSON: And then the gray area comes in. It's crack-like. So --

MR. CHHATRE: (indiscernible) because, from what I

understand, you guys take everything, say, "I pronounce this."

MR. BOTT: Yes. We treat everything conservatively.

MR. JOHNSON: So that -- and, you know, they do. The rule is gray, but Enbridge put procedures in place to take the grayness out to say this is when it's going to be dug.

MR. CHHATRE: Okay.

MR. NICHOLSON: Mr. Fox, anything else you'd like to see in CorLAS?

MR. JOHNSON: And whenever you're ready, Aaron is ready, so I just told him.

MR. FOX: No. I think we've covered what I -- my questions.

MR. BOTT: Okay. Let's make sure it's -- oh, I already saved it.

MR. NICHOLSON: You didn't want to see that as a 0.25 wall?

MR. FOX: I think we've already shown even without the bias that what the 0.25 wall would trigger.

MR. BOTT: I don't think it does on -- based on the profile. Could be wrong, but --

MR. NICHOLSON: Oh, yeah, I guess we -- yeah. Or did we -- oh, yeah, the profile. Yeah. So I guess, yeah, let's do that.

MR. BOTT: I don't think we did that before.

MR. FOX: Oh, because you used one-point -- it did at 1.39, but probably not at 1.25, huh?

MR. BOTT: Well, we didn't do the profile for --
MR. NICHOLSON: We didn't do the profile, --
MR. BOTT: Yeah.
MR. NICHOLSON: -- 29 percent, and profile with bias.
MR. BOTT: So did you want to do the profile with (indiscernible)?
MR. NICHOLSON: Yeah, let's do the 29 percent --
MR. BOTT: Okay.
MR. NICHOLSON: -- of 0.25.
MR. BOTT: Well, in this case, because it's a profile, it would be at a 0.083 that they gave us, because it's a profile.
MR. NICHOLSON: Oh.
MR. BOTT: So it's not a percent. It's the actual --
MR. FOX: Well, we should get the bias in that, too.
MR. NICHOLSON: Yeah, get the bias.
MR. BOTT: Oh, okay.
MR. NICHOLSON: Yeah. We already have the -- Well, the profile comes back as a percent, doesn't it, or is it --
MR. BOTT: No. They gave us an absolute depth, which is why now we get our reports --
MR. NICHOLSON: No, wait. Is that -- yeah, is that true?
MR. BOTT: I thought it was.
MR. NICHOLSON: It comes back as an absolute depth on a --

MR. JOHNSON: As a depth, not a percentage.

MR. BOTT: Yeah, I thought it -- I know -- see, it's a little hard, because ever since I started in this group, we've always got stuff in reported as depth bins, and the profiles come with just depths --

MR. NICHOLSON: Well, here, I just opened one up. It says, "Max depth percent wall thickness."

MR. BOTT: But it gives the wall thickness right there.

MR. NICHOLSON: It does.

MR. BOTT: So you --

MR. NICHOLSON: Okay.

MR. BOTT: You'd multiply that wall thickness --

MR. NICHOLSON: Right.

MR. BOTT: -- by that percent.

MR. NICHOLSON: So in essence --

MR. BOTT: I guess --

MR. NICHOLSON: But you could do that on the --

MR. BOTT: Yeah.

MR. NICHOLSON: -- report, too?

MR. BOTT: You could. Well, I guess this is the most conservative way to do it, is the way we did it. Yeah, I thought it came in absolute --

MR. NICHOLSON: And it's 0.285 on a 29 percent.

MR. BOTT: So, 680.51. So that's with quarter-inch wall and including the (indiscernible).

MR. CHHATRE: They still wouldn't have --
MR. NICHOLSON: No. That's --
MR. BOTT: That would have, yeah.
MR. FOX: It's below hydro, but it's not --
MR. BOTT: It's not below MOP, but it is below hydro, and it's below 1.25 as well, I believe, so -- I believe 1.25 in this location is 780.
MR. CHHATRE: So would these actually trigger the immediate date?
MR. BOTT: Not immediate date, no.
MR. JOHNSON: For the phase one date.
MR. CHHATRE: Would it actually go to phase one date?
MR. BOTT: Yes, it would have.
MR. CHHATRE: So that (indiscernible).
MR. BOTT: Yes.
MR. NICHOLSON: Yeah, okay. It would have triggered a phase one because it was lower than hydro?
MR. BOTT: Lower than 125 percent MOP -- of MOP.
MR. CHHATRE: What is that hydro number?
MR. FOX: 796?
MR. BOTT: Yeah, 796. That was right.
MR. FOX: And that was with bias?
MR. BOTT: With bias and a quarter-inch wall.
MR. FOX: So, and did we run this without bias? If we ran that, it would have triggered -- did we run the profile track

without bias?

MR. BOTT: I don't think so, but we can do that quickly.

MR. FOX: With this interval.

MR. CHHATRE: I thought we did.

MR. FOX: Did we do that?

MR. CHHATRE: I thought we did and it wasn't (indiscernible).

MR. JOHNSON: I think so.

MR. BOTT: Oh, possibly.

MR. JOHNSON: Run it again and then you know.

MR. BOTT: Yeah.

MR. JOHNSON: He's that fast. Let's run it again.

MR. BOTT: It won't take very long, yeah.

MR. JOHNSON: Because in a week or two when you go, "Oh, we don't have that" --

MR. NICHOLSON: I hope we're labeling all these text files.

MR. BOTT: I'm writing down what each one is, so, yeah.

MR. NICHOLSON: Oh, okay.

MR. BOTT: So you said the --

MR. JOHNSON: Explain again what you want, Matt.

MR. CHHATRE: (indiscernible)

MR. BOTT: Yeah, I got that.

MR. JOHNSON: The profile, no bias.

MR. BOTT: No bias. Okay. This is assuming that they

gave this number an absolute, though, so --

MR. NICHOLSON: Yeah, exactly.

MR. FOX: Which they would have.

MR. NICHOLSON: No, it's not. It's --

MR. CHHATRE: The percent -- they gave us a percentage.

(Indiscernible -- multiple speakers at the same time.)

MR. NICHOLSON: That's not what this shows. That's not what these profiles show.

MR. BOTT: No, the profiles did show that they were a percent, yes, but it's considerative to do it this way, so --

MR. NICHOLSON: And it's got the 285 wall --

MR. CHHATRE: Well, I mean, the (indiscernible) number.

UNIDENTIFIED SPEAKER: Yeah.

MR. BOTT: 747.41.

MR. CHHATRE: And where's your hydro? (indiscernible)

MR. BOTT: Hydro is --

MR. FOX: 796.

MR. BOTT: -- 796.

MR. NICHOLSON: 796 and 125 and 780, so --

MR. BOTT: Yes.

MR. CHHATRE: (indiscernible)

MR. BOTT: Yes, using the absolute depth. So I guess there's a little bit of uncertainty with -- if they reported in a percent, then the profile would have been 29 percent of .25 or would have been a different value of .25. It's hard to say,

but --

MR. CHHATRE: Assuming "G" had the right number, then (indiscernible). Well, "G" had .35, so .58, it doesn't make any difference (indiscernible). It's still the same number.

MR. BOTT: Yeah.

MR. FOX: So Enbridge requested the profile of this feature and it did not trigger a date; --

MR. BOTT: Yeah.

MR. FOX: -- correct? So was that because it was .285 wall?

MR. BOTT: It's possible, because we did our assessment based on USCD --

MR. NICHOLSON: Yeah, we ran that number and it came back greater than hydro, so that --

MR. BOTT: Yes.

MR. NICHOLSON: Or, I'm sorry. Yeah, the profile came back higher than hydro, because they used --

MR. CHHATRE: Wall thickness (indiscernible).

MR. NICHOLSON: Wall thickness (indiscernible).

MR. FOX: So have we determined that if we've used 0.25 wall, that it would have triggered it, then?

MR. CHHATRE: Yeah. That's what he's showing right now.

UNIDENTIFIED SPEAKER: That's what we're --

MR. NICHOLSON: But the argument is, would he have taken 29 percent of .25 or 29 percent of 285 for his depth?

MR. BOTT: Yeah, because we used 29 percent of 285.

MR. NICHOLSON: We're assuming that you would use this data.

UNIDENTIFIED SPEAKER: Well, why don't we run with 29 percent of --

UNIDENTIFIED SPEAKER: So let's use 29 percent of .25 and see if it would have triggered a dig. Right?

MR. BOTT: Yeah. So, 29.

UNIDENTIFIED SPEAKER: .0725. Okay. So it's 73.

MR. BOTT: Yeah.

UNIDENTIFIED SPEAKER: Well, it only gives you --

MR. CHHATRE: (indiscernible)

UNIDENTIFIED SPEAKER: No.

UNIDENTIFIED SPEAKER: No. We're hoping that --

UNIDENTIFIED SPEAKER: No, we want to --

MR. CHHATRE: Well, they wouldn't have any bias, then.

UNIDENTIFIED SPEAKER: No.

(Indiscernible -- multiple speakers at the same time.)

UNIDENTIFIED SPEAKER: Okay.

MR. BOTT: 779.

MR. NICHOLSON: Oh, it's right on the line. What do you do with that?

MR. FOX: Well, it's less than hydro; right?

MR. NICHOLSON: Technically less than --

MR. BOTT: It's less than hydro.

MR. NICHOLSON: It's less than hydro, but it's also right on the line of your 1.25.

MR. BOTT: Yeah.

MR. NICHOLSON: 780 is 1.25.

MR. CHHATRE: (indiscernible) that number (indiscernible).

MR. NICHOLSON: Well, that's their criteria.

MR. BOTT: Yeah, that's our criteria.

MR. NICHOLSON: It's 1.25 times the maximum allowed. Huh. Well --

MR. FOX: So, what's the answer? Yes or no?

MR. BOTT: Well, it -- because it's so close, like it probably -- like if it -- it depends on -- like the 624 is exactly 624. Is it 623-point like -- I can't say for sure, but it's pretty close. It would have been right on the edge of being dug or not, for sure.

MR. CHHATRE: What about --

MR. NICHOLSON: Phase one?

MR. BOTT: Possibly.

MR. CHHATRE: If computers were (indiscernible). Anything else, then you have --

MR. BOTT: Yeah, but what I mean is --

MR. CHHATRE: (indiscernible) is 1 PSI or 0.1 PSI. Computers wouldn't say that. Human beings (indiscernible).

MR. FOX: But how far do you carry out the significant

figures if it's 99 point --

MR. BOTT: Oh, exactly.

MR. FOX: -- 999? You know, the two significant figures, then --

MR. BOTT: Yeah, that's what I mean. Like I use 624 because that number's in my head, but it could be 621 here and does that not trigger like -- I think it's 624.

MR. NICHOLSON: Well, it's 624 on this sheet, too.

MR. BOTT: Yeah. So it -- yeah, if you're using a computer to filter, it probably would have, because it would have been one point --

MR. CHHATRE: (indiscernible)

MR. BOTT: -- less than 1.25.

MR. FOX: I didn't get it written down for the prior analysis with the 0.083-inch depth and no bias. What was the pressure on that one?

MR. BOTT: Oh, sure. I can -- 747.

MR. NICHOLSON: Well, I haven't been writing any of this down, so if you send it to us, you're going to -- I have a feeling you're going to code each one for us and tell us --

MR. BOTT: Yeah. I will include a Word document that has like a -- this file is just --

UNIDENTIFIED SPEAKER: Cheat sheet?

MR. CHHATRE: (indiscernible)

MR. NICHOLSON: Bias, no bias.

MR. BOTT: Yeah, for sure.

MR. NICHOLSON: All right.

MR. BOTT: I can even re-name the files themselves as well.

MR. NICHOLSON: Okay. (indiscernible)

MR. CHHATRE: Anything else?

MR. NICHOLSON: I don't think we've covered the matrix.

MR. FOX: We'll have to get clarification on the -- with the profile and whether it's a -- how they calculate the profile data. Was that in a PI document, what you would do with that 29 percent?

UNIDENTIFIED SPEAKER: Well, what do you mean, how --

(Indiscernible.)

MR. NICHOLSON: In 2005, you would have just said 29 percent and what did the wall thickness on that profile show.

MR. BOTT: Yes; yeah.

MR. NICHOLSON: Okay.

MR. CHHATRE: Well, I have other questions regarding CorLAS, but I don't go back and forth.

MR. NICHOLSON: I think we are finished with CorLAS. Thank you, Steven.

MR. FOX: Thanks, Steven.

MR. BOTT: You're welcome.

MR. NICHOLSON: Shall we go off the record?

MR. CHHATRE: No. Now I have some questions on the --

MR. NICHOLSON: Oh, okay.

MR. JOHNSON: Oh, some more for Steven. I thought we were going to bring up --

MR. NICHOLSON: Everyone is still on the record.

MR. JOHNSON: -- Aaron.

BY MR. CHHATRE:

Q. Can you tell me again, you're a senior engineer (indiscernible)?

A. I'm not a senior engineer. Just --

Q. Okay. Tell me in your own words how you look at the crack group's function in your daily management. How do you look at your group's function?

A. So our function is to manage the -- most importantly is to manage the crack threat in the group, and we primarily do that by running crack ILI and assessing features and determining date programs and reassessment intervals and supporting field activities. But we could also do that role if there was no way to run crack ILI or if crack ILI for some reason would not be sufficient on a certain line. If we determine that, we would use hydro test --

Q. Okay.

A. -- possibly, or in some cases direct assessment.

Q. And have you done that in the past, hydro test or direct assessment?

A. Since we started running crack ILI frequently, we've

rarely hydro tested unless we were trying to raise our MOP or reverse a line or change the product or something of that nature.

Q. So I guess the short answer is no?

A. Yeah. To -- yeah. We haven't hydro tested to validate ILI specifically.

Q. Okay. And I'm going back to this (indiscernible) the profile. Was there any discussion in the crack group about, okay, so the (indiscernible). Well, let's do hydro?

A. At the time, no, because our reassessment interval was good till 2010. So even though we wanted to run the crack tool in 2009 to get another look at the line, based on the ILI data and the assessment we had done.

Q. So how many months you had between the true start and your drop-dead deadline for the assessment? You gave me years, but I do not know because (indiscernible). December-January scenario or a --

A. Well, we would start from when the -- typically from when the tool is run the first time, which was, I believe, in the Q-4 2005.

Q. (indiscernible)

A. Q-4 of 2005.

Q. Oh, fourth quarter. Okay.

A. So, a ten-year life would give you a Q-4 of 2010.

Q. Fourth quarter of two thousand --

A. Because we use a safety factor of two on our lives.

Q. So almost November, December of --
A. Yeah.
Q. -- 2010. And the tool will start when?
A. The tool was in the line at the time of the incident, so we launched it in --
MR. JOHNSON: July.
MR. BOTT: -- July.
BY MR. CHHATRE:
Q. July 2010?
A. Yeah.
MR. JOHNSON: Yeah. It was scheduled for December of 2009, but was damaged.
MR. CHHATRE: I'm sorry. I didn't hear that.
MR. JOHNSON: It was scheduled for December of 2009 when it was damaged.
MR. NICHOLSON: And maybe Steven can confirm that.
Is that correct?
MR. BOTT: Yes, I believe it was scheduled for late 2009.
MR. JOHNSON: And that's one of your IRs, is that schedule.
MR. BOTT: Yeah.
BY MR. CHHATRE:
Q. Okay. So how much time did you have, December 2009 to the drop-dead deadline to get this thing to run time-wise?

A. Well, it would be, I guess -- from when we actually ran it or from December?

Q. No, no. I mean you had a drop-dead deadline to finish your reassessment.

A. Yes.

Q. And that was fourth quarter 2010.

A. Yes.

Q. And before that, the tool was stuck in the line and had to be sent back and all that, so now when did that happen? When was the tool stuck in the line?

A. In July.

Q. Of 2010?

A. 2010.

Q. Okay. That's what I thought. Okay.

A. Yes.

Q. Now, did the vendor tell you at that time how long it was going to take them to fix it?

MR. JOHNSON: No.

MR. BOTT: Well, sorry --

MR. CHHATRE: They've answered that. If he doesn't know, I can understand that.

MR. JOHNSON: No. Stuck in the line or damaged in the line? We've got our terminologies.

MR. BOTT: Yeah. It's two different events.

BY MR. CHHATRE:

Q. Then explain those to me.
A. Okay. So in late 2009 --
Q. Okay.
A. -- the tool was damaged.
Q. In 2009 the tool was damaged.
A. Yes.
Q. Okay.
A. And I wasn't involved on Line 6B at the time.
Q. Right. You were not there.
A. So all's I know is I became involved in May and the tool --
Q. Of?
A. 2010.
Q. Okay.
A. And at that time the tool was scheduled to be run in June or July of 2010.
Q. Okay.
A. And so then it was run in two thousand -- July of 2010, and that's when the incident happened, which is when it got stuck in the line --
Q. Okay.
A. -- while the line was down, so that would have been six months prior.
Q. And did you have any idea at the time it was stuck that the tool was functioning, just not damaged, damaged, how long is

it going to take you to get that thing out and complete your run?

A. Well, we couldn't get it out until we restarted the line, so we restarted the line, I believe, late September. So that's when we got the tool out. But at that time we had taken restrictions, pressure restrictions, relate --

Q. I'm sorry. (indiscernible) Okay. So --

A. Okay.

Q. July 2010, the tool's stuck --

A. Yes.

Q. -- in the line. And that was 6B?

A. Yes.

Q. Okay. Then what --

MR. JOHNSON: Stuck because of the Marshall incident.

MR. BOTT: Yes.

BY MR. CHHATRE:

Q. Oh, stuck because of the Marshall incident.

A. Because the line was down.

Q. Okay.

A. Yes.

Q. Okay.

A. So it was stuck there until we started the line back up in late September, I believe.

MR. JOHNSON: Correct.

BY MR. CHHATRE:

Q. Okay. Let me back up. Why the run was not complete at

that time. I understand the Marshall incident would have put a stop on it.

MR. JOHNSON: Battery life.

MR. BOTT: Yeah, battery. Yeah, we couldn't use that data because the tool died in the line and it sat in there for months.

MR. CHHATRE: Okay.

MR. BOTT: So the data that came out the other end wasn't usable.

BY MR. CHHATRE:

Q. And then in 2009, late 2009, was there any discussion, "The tool is stuck. We do not know when we'll get it back. Can you get the tool back?," or --

A. So all the activities related to when the tool was down in 2009, you'll have to either talk to Sean or Vaughn (ph.), because that was before --

Q. Okay. Before your time.

A. Yeah.

Q. Well, you didn't see any documentation when you joined the group when you were involved?

A. Well, I didn't see any -- I didn't actually look at any documentation about discussion that happened at the time the tool was damaged. I just know that when I joined the group it was scheduled again, yeah.

Q. Okay. Now, other question since you were in the

corrosion group also, so maybe you can answer some (indiscernible).

A. I can try.

Q. What documentation do you guys have with the corrosion group in terms of the schedule digs, the dig locations, dig packages, all in terms of -- when you were talking about cracks, it could be stress (indiscernible), so what kind of interaction do you guys have for any run, before run?

A. We don't have a lot of direct interaction with them for scheduling runs or doing digs, although when we select digs, the -- so, for instance, if we selected digs for a crack run -- from a crack run, before we send those digs out, the corrosion guys will review the location to see if there's anything nearby that they would have interest excavating while we're at that site. So we do do that. And we also do threat integration, so we integrate the tool data together.

Q. And do they do the same for you guys when they decide to dig a location?

A. Yeah. When they decide they're going to dig a location, we'll look to see if there's any features nearby.

Q. That's kind of a gentleman's agreement or is there a protocol that requires you to do that?

A. There's a process document for it, yes.

Q. So you have to do it. It's not a choice.

A. Yeah. It's not a choice, although it's a -- it's not a

choice to look, but depending on what's there, it is a choice whether you actually extend a dig site to --

Q. Okay.

A. Yeah.

Q. And do you have any input in tool selection as an engineer?

A. I do have some input, although it's difficult with crack tools. Until recently, essentially there was only one tool that you could run. But, yeah, I have some input if we would like to run one tool, because now they have the phase-to-ray tool.

Q. So if the tool's not available for whatever reason, scheduling, tool breakdown, cost, how would you go about doing the crack assessment of the pipeline?

A. So if the tool is -- in the event I assume that it would be delayed. That's what you're asking; correct?

Q. No. I'm saying (indiscernible). As an example, if you had to finish a crack on the run -- a crack assessment in the fourth quarter of 2010 and "G" comes back and says, "Gee whiz, our tool is somewhere in Japan and it's not going to be available for another year," what do you do then?

A. So, first of all we'd check with other vendors. There are other vendors that have crack tools that we have run before.

Q. And which other? Do you know? Do you have any name?

A. Well, NDT, I think, is the only one.

Q. The only other choice?

A. Yeah. And so we try there. If they also couldn't help us out, probably the next step would be -- I mean it depends on how long until the next -- you could get the tool. All right. If it was a few months, what you could do is redo your fatigue analysis to determine what kind of pressure restriction you might have to take to get you the extra couple months. So that would be one option, would be to take a temporary pressure restriction to assure the safety of the line. If it was a long-term issue, --

Q. Um-hmm.

A. -- yeah, hydro testing is an option if there was just no way -- for some reason if the tools were all on the same boat and the boat sank in the middle of the ocean, --

Q. Yeah.

A. -- yeah, something like that, we could definitely --

Q. I guess you also have to prepare for the worst condition. You don't have to prepare for the best condition.

A. Yes. So we do have a process and we -- a guideline document that talks about hydro testing, and so we could --

Q. So in your procedure, hydro is an option?

A. It is an option.

Q. Okay. Have you ever had to do that?

A. No, no.

Q. And you also say, though, the life of over the years almost all -- I'm trying to locate the exact words for you, but those have to be inspected with different digs. Too bad we can't

go back to the tape (indiscernible). You made a comment about almost all the locations have been inspected over a period of time through various dates on various lines.

MR. PIERZINA: I think you were talking about the sleeve inspection program?

BY MR. CHHATRE:

Q. Sleeve inspections, yes.

A. Oh, yeah. So, yeah, for a sleeve inspection, historically since the 1980s we've had a lot of targeted sleeve inspection programs where -- I mean some -- one case -- in the '80s we looked at fillet welds extensively. In the '90s we looked, I think, at seam welds a lot. So, different threats, and --

Q. But I guess the comment was to opportunistic digs.

A. Yeah. So anytime -- quite often if you're going to do a dig, typically -- especially if it's corrosion, it's likely that you are somewhere close by five or ten years ago. Or maybe longer ago; right? So if it's a reasonable distance to extend that dig to expose that sleeve, then we'll do so.

Q. Okay.

A. So that's what I mean by "opportunistic." You're not targeting that sleeve, but you're there, so let's look at it.

Q. Okay. So (indiscernible).

A. Yeah.

Q. So you could extend a corrosion date to look at the

sleeves --

A. Yep.

Q. -- if you want to?

A. Yep.

Q. And what kind of information do you have for those sleeve inspections? Did you have any problem with the sleeves or anything unusual during the inspections that you guys see on the sleeves?

A. I mean I can't make a comment about a specific site or anything. Typically when we do sleeve inspections we don't find anything wrong. You can find things, cracking in the welds sometimes, or --

Q. You mean the cracking in the (indiscernible) welds that you weld the sleeve to the pipe or --

A. Sometimes, or sometimes in the longitude of the weld.

Q. Okay.

A. Sometimes there's like arc strikes from the welding, --

Q. Okay.

A. -- which they buff out. Very rarely do we find issues with the sleeves, though. Because we've had a lot of targeted programs in the past that -- and we have developed our welding procedures quite extensively to put sleeves on, we don't find a lot of issues.

Q. Have you found any weeping or leaking sleeves?

A. Not this year that I know of. Not last year, I don't

think, either. Before that I would have to specifically take it off line and look.

Q. I understand. No, you can only speak to your tenure.

A. Yeah.

MR. JOHNSON: There has been, and Brian can attest to that --

MR. PIERZINA: Yes.

MR. JOHNSON: -- when he was in MNOPS. We've had issues with certain vintage of sleeves with -- like it would be a fill weld cracking. So we did programs, because when you found one or two that were leaking, then we investigated all of that vintage. So over time, like he talks about in the '80s and the '90s and the 2000s, we have done that. And then his opportunistic digs now just continue doing that, so --

MR. CHHATRE: So those sleeves are either replaced or repaired again or the ones --

MR. JOHNSON: In some cases they were repaired. In some cases there was an over-sleeve put on them.

BY MR. CHHATRE:

Q. Where I was going is, do you see any issues, crack issues with your sleeve, if the problem extended beyond the sleeves?

A. No. We've never seen that.

MR. PIERZINA: From the repaired defect?

MR. BOTT: Yeah. No, no. Once you've put a sleeve on

and you've taken the environmental component away and it's just fatigue growth, cracks just tend to grow through all. They won't extend in length.

BY MR. CHHATRE:

Q. It's in weld.

A. Yeah. And then once they've gone through all the sleeves, a pressure contain sleeve, and then there's no longer driving --

Q. Okay.

A. -- for the growth driver.

Q. Now, you said that CorLAS was used with DOS until 2008?

A. Actually until late last year.

Q. Okay. Almost until this year.

A. Yeah. So late 2010 was when we got out Excel version.

Q. Now, what kind of -- with crack mitigation, what kind of cracks you are looking at. Are you looking at --

A. Any axially oriented features --

Q. Okay.

A. -- is what the crack tool's able to detect. So any kind of manufacturing flaws in the long seam, if it's got cracking from those it could see. So, fatigue cracking, stress corrosion cracking, any kind of axially-aligned --

Q. What about circumferential cracks? Do they do that or (indiscernible)?

A. So those are a lot harder to detect, and the MFL -- so

we've worked with GE and we have used that to detect girth weld cracking, but we don't see a lot of -- other than maybe girth weld cracking under specific circumstances, we don't see typically a whole lot of circumferential cracking.

Q. And what is the repair technique for that -- mitigation technique for that when you see a crack in there? What happens next?

A. Yeah. It would be sort of the same as an axial crack. You would remove it by grinding if it was shallow, repair it with a pressure-containing sleeve if you couldn't remove it by grinding.

Q. I believe axial cracks is -- it looks like sleeving is mitigation (indiscernible) technique --

A. Yeah.

Q. How do you really know what's the cause of a crack? Fatigue, corrosion fatigue, (indiscernible) seam? Do you know or doesn't it really matter from a mitigation viewpoint?

A. From a mitigation viewpoint at that site, it's not really important to the repair method. Now, if it's SCC -- and there's a big field of SCC cracks. We can tell that from the picture. If it's in the weld, it's -- sometimes it's harder to tell, although usually you can tell if it was like a lack of fusion or something. But, yeah, as far as mitigating on the whole line, we do try to determine what kind of feature it is based on the field NDE. It may not make a difference to our mitigation

strategy, but it -- we do like to know which threats we're managing on each line, because then that way we know, when we get a new crack inspection in, well, is it seeing the kinds of features that we thought it should be seeing in this line, right, because it's an indication of quality.

Q. But cutting that portion, doing a regular analysis is not going to be done?

A. Not typically. Sometimes if we have outliers, we will, like on Line 6-A or Line 1. This year we did a coupon cutout, so we'll do specific -- if we have a reason to do it, we'll definitely -- if it'll help us expand our knowledge, we'll definitely do it.

Q. And so what's the -- you said Randy (ph.) is cutting that portion where you have cracking. (indiscernible) anyway; right?

A. Yeah.

Q. So either -- you said Randy is cutting that portion and sleeving it for analysis. Is that really a logistical item or --

A. It's mostly --

Q. -- a safety reason? If you do that, are you compromising the safety of the line?

A. It's partially safety. I mean anytime you're dealing with opening up the pipeline, exposing the inside of the pipeline, it can become an issue. It's logistical, too. Every time you cut a piece of pipeline out, there's -- you have to shut the pipeline

down, you have to drain up in that specific location, service interruptions. It's a lot more expensive. So we do it if we have to, for sure. If we feel that we're going to get something, it's going to be --

Q. Using the -- anytime you open a pipe, there's safety issue, but the pipes, how do you open the sleeving?

A. I mean like if you actually -- like so the pipe's, yeah, open. But if you -- if you're actually cutting a chunk of pipe out, so you're --

Q. But by that time you have improved -- to cut the piece, you have to shut the pipeline. I'm interested as to what the safety issue would be.

A. Well, I guess it's not a direct safety issue, but I mean anytime you're doing a cutout, I mean you have to stop the oil and drain up all that stuff, is definitely more risk involved than not doing that.

MR. JOHNSON: With oil it's a sizable thing to stopple a pipe and cut a chunk of pipe out of an operating pipeline.

BY MR. CHHATRE:

Q. Well, here's the only thing I can understand, and I can really see that you have to dig the pipe, stop the flow. That I understand. But you already have a defect in the pipe. That's a safety concern anyway. You already put a sleeve. So cutting a small portion from it and then sleeving it, I (indiscernible) a safety issue out of it.

MR. JOHNSON: We're on different pages. You don't just cut a chunk out. You have to cut --

MR. BOTT: You have to cut out length of pipe.

MR. JOHNSON: A cut out pipe --

MR. CHHATRE: Section.

MR. JOHNSON: -- section.

MR. CHHATRE: Okay.

MR. BOTT: So, typically in order to do that, you have to put stopples on either side, --

MR. CHHATRE: Okay.

MR. BOTT: -- which is more fittings than if you just put a sleeve in the first place.

BY MR. CHHATRE:

Q. So that's a safety issue (indiscernible)?

A. Yeah, and a long-term issue. I mean the more fitting -- you obviously want less fittings on your pipeline, so --

MR. CHHATRE: I guess that's pretty much what I have. I appreciate all this (indiscernible).

MR. PIERZINA: I've got a couple of quick questions, Steve.

MR. BOTT: Sure.

MR. PIERZINA: This is Brian.

BY MR. PIERZINA:

Q. Back to the sleeve inspection program. Is that a written portion of your integrated management system?

A. Yep, yep. It is.

Q. Okay. Do you happen to recall, is it -- where that is located? I don't recall seeing it in the --

A. I don't know if we've given that to you guys as part of this, this investigation. We have given it to PHMSA before, earlier this year, but --

Q. So, yeah. So I guess along with that I -- if somebody can tell us where in the IMS that program is. I assume it's all --

A. I think right now it's -- yeah, it's sitting under the crack management plan right now.

MR. JOHNSON: It's on a different index than that, Brian.

MR. PIERZINA: Oh.

MR. JOHNSON: It's on this particular one, --

MR. CHHATRE: Is that a PI?

MR. JOHNSON: -- which I gave you also.

MR. BOTT: No. It's just called the --

MR. FOX: Number 12 crack program.

MR. BOTT: -- Sleeve Inspection Program.

MR. JOHNSON: Number 12 under Crack Threat Management.

MR. PIERZINA: And what were you looking at there?

MR. JOHNSON: That would be the Index of Documents and Procedures, Pipeline Integrity, 2011.

BY MR. PIERZINA:

Q. And so the results of those inspections are -- how are they provided?

A. Well, typically for opportunistic digs, --

Q. Yes.

A. -- they'll just -- the results will come in the NDE report. So within the NDE report they'll say, "We exposed a sleeve. We inspected the welds. Nothing was found," or, "Something was found," if something was. Although if they ever find anything, usually they'll call.

Q. I see. Okay. So then as far as tracking -- so that NDE report is tracked by girth weld?

A. Yeah.

Q. I'm just trying to visualize how it's tied back to a prior repair, how you can know, you know, whether or not you inspected this sleeve -- you know, this prior sleeve repair.

A. Yeah. So we're still trying to develop a database on that, so I mean we have collected a lot of historical information that we have together and we're tracking all the new information coming in, but we don't have, say, like a spreadsheet that we've said, yes, we inspected this joint in this year, this sleeve in this year. We just have a list of the sleeves and then typically what I've done is for targeted inspections is I've looked through what I -- I pick what I wanted to look at first and then went back and looked up if we've inspected it or not, so --

Q. Okay. And the targeted ones are -- how are you

targeting sleeves?

A. A couple different ways. So we try to do at least one, like PLIDCO, every year.

Q. PLIDCO?

A. It's a bolt-on sleeve --

Q. Okay.

A. -- that we've repaired something with and then welded it on. So we try to do those. And if any other specific threats have been identified, then we'll go after something --

Q. So more directly, I guess, being as I've had a little bit of experience in that, I've felt that somehow you should target ones that may be more likely to be containing oil than --

A. Yes. That's a consideration as well.

Q. Okay. So, and what would -- which ones would be more likely to contain oil, I guess, outside of the PLIDCO repair sleeves?

A. So our ultrasonic tools can detect features under the sleeves. So for a crack tool, if we get like a saturated signal back and it's under the sleeve, that one's more likely to be -- you don't know for sure, --

Q. Sure.

A. -- but it's more likely. If you have a corrosion and it says it's through wall or close, --

Q. Okay.

A. -- obviously that's more than likely.

Q. All right. So that's how you target?
A. Yeah.
MR. PIERZINA: Okay. Thanks.
MR. NICHOLSON: Is that all?
MR. PIERZINA: That's all for me, yeah.
UNIDENTIFIED SPEAKER: I have nothing further.
MR. NICHOLSON: Do we want to go through EI 39? Are there any questions on outliers, unity plots? Brian?
MR. JOHNSON: Or we have Aaron on deck, too, to --
MR. NICHOLSON: Do we want to go into plot -- let's go off the record. Why don't we stop at this point.
(Off the record.)
(On the record.)
MR. NICHOLSON: Okay. Steven Bott, part three.
Steven, you were going to show us the outlier PI, PI-40.
MR. BOTT: Yep.
MR. NICHOLSON: You want to walk us through that, please?
MR. BOTT: Sure. So PI-40's our crack outlier analysis document. So the scope is all instances where the ILI or the NDE crack measurements or fitness for purpose assessments fall out of normal expected ranges. So essentially we're looking for things that we don't count for in our initial assessment of the data or that we wouldn't have accounted for, so -- and we don't just look in crack digs for outliers. We review all digs to see

-- to look for -- it's the same -- I guess the same principle as the opportunistic digs for sleeve inspection. We also look at opportunistic digs for crack -- field crack data as well.

MR. CHHATRE: Now, when you say "we," meaning you go from your group, crack group, or the consultants?

MR. BOTT: So it depends. Typically we're responsible for doing it, but depending on work load, we may have consultants help us with work, and sometimes some of the work they do is trending, yeah.

MR. CHHATRE: So most of the work is done by your group? I mean it's kind of unclear to me as to how much consultants do, how much you guys do.

MR. BOTT: It really depends on the work load at the time. If we can handle it in house, we do, and if we need some support at that moment, then we'll get consultants.

MR. CHHATRE: So what is your experience, kind of an average basis? Would it be like 50-50? 75-20?

MR. BOTT: I think we do more of the work internally, although in some cases, like on Line 6B, for instance, in the new programs, the consultants are doing -- I mean I'm looking at the trending, I'm helping with the trending, but they're doing the majority of the work just because we're doing so many digs on that line. That's more effective for them to have someone doing that. Essentially that's what they do, right, so --

MR. CHHATRE: Is there one consultant doing this or do

you have a group of consultants that any one of those can be doing?

MR. BOTT: I think at the company that we're using right now, there's one or two people specifically that are doing it or at least leading that effort, yeah.

MR. FOX: This is Matt Fox.

Do you -- this is comparing for this outlier analysis, comparing the ILI to the field NDE; correct?

MR. BOTT: Yes.

MR. FOX: Do you look at trending from multiple ILI runs to look for outliers as well?

MR. BOTT: We do that a bit. It's difficult to do with the crack tool, or at least more difficult to do than the corrosion tool. One of the thing -- one of the challenges is often when you go to the field and you dig, an indication from the crack tool, it ends up not being a crack. So you want to be careful when you're comparing ILI to ILI that you -- one or the other or both, you know, may not be reporting the classification correctly. You might find corrosion a lot of the times. Like, for instance, crack fields. A lot of the things we'll just find corrosion when we get to the field. So you have to be careful about that. So we don't -- we do compare them, but it's difficult to pull out what you might call an outlier by comparing them, because -- and obviously the technology is improving, their algorithms are continuously improving, so it's difficult. You

know, if you had a feature reported before that was, you know, maybe almost met what something you might dig and then on a new run that just disappears, definitely you probably want to look into it, for sure. But again, that can happen because before they were conservative in their reporting, so -- So we do do a high level look, and in some cases we can drill into it more, but it can be difficult to pull that kind of information out, so --

MR. CHHATRE: One more question. This is Ravi. The consultants, do they send you the raw data and you draw the conclusions, or do you just view the complete package with their findings and conclusions?

MR. BOTT: No. We give them all the NDE data and then they give us the trending. So when we do our trending, we have a big spreadsheet they put all kinds of data in, and they give us -- that's what the plots are generated from, and so they give us all the data that they've pulled out of the NDE reports back.

MR. CHHATRE: But they don't draw conclusions for you?

MR. BOTT: No. Or if they do make any conclusions, they say, "Do you guys see this as well?," that kind of stuff. Oh, yeah.

So there's different kinds of outliers.

The false negative. So that's something that the tool did not report, but it met its detection thresholds that the field NDE reported as a crack feature.

False positive is sort of the opposite, so that's when

the tool reports something there and then the field doesn't find anything or finds something like corrosion that we wouldn't classify as a crack defect.

Under-call. So anytime the inline inspection tool reports a depth less than that of the field. And overcall is the opposite: when the tool has caught something more severe.

MR. PIERZINA: What type of extent does it need to be over or under to meet the threshold?

MR. BOTT: So, yeah, we discuss that right below, but --

MR. PIERZINA: Okay.

MR. BOTT: -- for depth it's -- we use 15 percent. And fitness for purpose, this is one thing we've recently updated. Prior it said -- it was kind of based on, you know, our dig criteria. So if it was -- if we would have dug it, anything we would have dug, what we found not because of the tool. So that's still kind of part of this, but we've also added anything that's on the non-conservative side by 5 percent of MOPs. Essentially what that equation looking thing says.

MR. PIERZINA: Okay. I'm sorry. I didn't realize it was coming up.

MR. BOTT: That's no problem. Yeah. So outlier identification date. So, just kind of what --

MR. CHHATRE: I'm sorry. This is Ravi.

BY MR. CHHATRE:

Q. Why 15 percent? (indiscernible) What kind of data

(indiscernible) promises you?

A. So the 15 percent does have a little bit of historical significance. So where the 15 percent came from originally was essentially the vendor's tool tolerance worked out to, you know, about 7 to 8 percent on a typical wall thickness. And so while we will look at features between -- you know, that are more than one tool tolerance away, the 15 percent is more if the guys are in the ditch and they say that something's more than 15 percent than what we thought it was, we want to check to make sure we're not impinging on our safety factor that we've given them on their safe excavation pressure. So we use a 1.5 safety factor for our safe excavation pressure, but I mean if they find something that's 15 percent or more above what the ILI said, we want to get them to call us so that we can ensure that we have the right pressure restriction.

Q. And what if the vendor promises you an accuracy that -- for any crack?

A. It's plus or minus 0.5 millimeters, or 0.02 inches on the bin depth range, so --

Q. And what about length-wise?

A. Length, I think, is 10 percent, but we find that length is typically -- it usually matches up quite well for crack-like features, and for crack field features, the tool in the field, it's a lot harder to trend that because sometimes the guys in the field will, you know, draw a big circle around everything they see

and call it one thing, and the tool will call it a couple or three. So it's a little harder. They give a specification that's plus or minus 10 percent, I think, of the length, but --

Q. So in terms of percentages, the tool, say like 10 percent plus/minus, you gave me -- in one case you gave me 15 percent in percentage. Other case, (indiscernible). What are the two (indiscernible) in percentages?

A. It depends on the wall thickness. They give an absolute depth for their error for depth.

Q. Okay. I guess I'm trying to figure out is where your 15 percent really overlaps on the other modules, so --

A. So the error of margin they report as probably on a standard wall thickness, typical wall thickness, is probably 7 to 10 percent is what they would quote.

Q. And so you guys give an additional 5 percent?

A. Yeah.

Q. And if that doesn't work out, then you (indiscernible).

A. Yeah. Now, just because -- if it's less than 15 percent, we still might look at it, but this is the stuff that -- like in our NDE scope of work, they have to call us if they find something. This isn't stuff that definitely we're going to take a look at.

So, for responsibilities, project manager. So this hasn't quite been updated to our new structure yet, so it's still in the Materials Technology Group and stuff like that, but -- So

essentially the PM is the one that coordinates. They send the dig package and they're the ones that gets the call from the NDE vendor. The guy in the field --

Q. Document update. We really are interested in the documents that were effective at the time of the accident.

A. Yeah.

Q. Not as much as we are --

A. I know, yeah. So, yeah. So this -- they're responsible for -- so being the point of contact in the office essentially for the field personnel. So the NDE guy will call them and we'll work with the PM just so there's not a bunch of different points of contact, and they also get the field reports in.

So someone in my role would be responsible for generating unity plots; identifying the outliers; completing outlier analysis; reporting progress on the outlier analysis, if there is any; working with the ILI vendor, stuff like that. So our role is to step through the outlier analysis for each feature.

Q. So what happens if your contractor or you guys yourself -- I thought all NDE work was contracted.

A. It is, yes.

Q. Okay. So industry NDE people coming in and telling you guys, whether you are present there or at the office, --

A. Yes.

Q. -- that we have three outliers.

A. Yes.

Q. Now, how do you resolve that with the ILI doing that? Looks like from the description I'm seeing, you put (indiscernible) or absolute accurate measurements?

A. Well, at first we do. It doesn't mean that they stay that way, but at first when -- we obviously -- it could be field related. It could be tool related. It could be we waited three years to do a dig, so maybe it grew. It could be a lot of things, so all's we know at the start is that there's a difference --

Q. Okay.

A. -- and that we have to either resolve that --

Q. Okay.

A. -- or take action because of it.

Q. And so what are the next steps for that, then?

A. So the next step after we get the data is essentially we -- just scroll down a little bit further. It kind of says stuff. But we gather pictures and field data together. We gather input from the ILI vendor from unit. Sometimes the outlier is as simple as, oh, in the uniplot we mismatched it.

Q. I'm sorry?

A. We matched it to the wrong ILI feature. We matched --

Q. Okay.

A. I mean sometimes that's all it is. So you just review the training and you collect all of the data that you can get from NDE guys and from the ILI side. Often with -- another thing that happens quite often with like SCC and crack field features is

because we use the total length to do our assessment, at least the initial assessment from the field, the field guys will take a bunch of fairly shallow minor cracking with a little tiny bit of more severe stuff that the tool reported in the middle, and they'll just call it al one big feature. And so our initial fitness for purpose assessment from the field is really conservative, so that'll trigger an outlier. But then once you go and look at the data and you kind of grab a profile of what was actually there and assess that, that field data that way lines up better. So the next step really is to kind of gather all the data together so you can see it all in one spot.

So then once you've moved past the point where you've screen out, oh, it still looks like an outlier, we've gathered some data, we haven't ruled out any obvious things, that's where it comes to working a bit more with the ILI vendor to see if we can determine a reason or take any additional action. So you have to update your fatigue analysis because of this outlier. Do you have to update your fitness for purpose assessment? Do you have to take any -- do you have to dig -- is that kind of feature, does it seem like it's related to the feature type? Do we have to dig more of those feature types?

So really the way the process is, you make kind of -- you learn about the outlier and then you gather all the data and confirm that it's likely an outlier, not just some sort of process difference, and then you work with the vendor to -- and with your

own systems to take actions, whether that be correcting ILI calls, whether you take pressure restrictions, do more digs, anything like that, so -- So that's the overall process.

Q. So outlier is an indication, but wrong measurements, whether that's false positive or false negative?

A. Yeah.

Q. They are not considered outliers?

A. They are. So a false negative -- but they have different implications. So false positive, the tool is calling things that either aren't there or are just not cracking features. It has different implications because, while we don't like to do lots of extra digs, if we dug a few extra digs to get the cracks, that's not -- it's not -- it's part of the program. So we're getting what we need to get. If it's a false negative -- so it's something that's above the tool threshold, because you find lots -- especially when you're digging SCC, you'll find lots of tiny little scratch stuff on the surface the tool just can't see. But if it's something that meets the protection threshold of the tool and the tool should have saw it, then that's -- yeah, that's an outlier, because then you have to determine what's -- what kind of feature is that. Is it something you would have dug if the tool saw it? Is it -- So it can have different effects.

Q. I mean but what is the (indiscernible) action? I understand --

A. It depends on what the outlier is. Like if the outlier

is a false negative that the tool should have seen, but it's still a relatively benign feature, then maybe, other than doing some additional fatigue or growth analysis on that one -- that size of feature that you found to make sure that that's safe along the whole line with the reassessment entry you have, then maybe that's all you need to do. If it's a under-call by the tool or a large false negative that might actually affect your reassessment tool, then you might have to do more digs, take pressure restrictions, run another tool, any of those.

Q. How many outliers of false negatives do you need to question the ILI run?

A. Generally one, depending on what it is. If we can confirm it's an outlier and we can't come up with like a reasonable explanation about why maybe that's a unique feature or a feature that we just do one or two digs and then we're comfortable, it just takes -- it takes one, really.

Q. And that includes the outliers being under reporting or no reporting at all; right?

A. Yes.

Q. And you say with one we'll question the (indiscernible)? I just want to understand. Were you able (indiscernible) that analysis that you guys are calling and saying, "Well, there's three errors. There are two false negatives and one outlier. We have no confidence in the run."

A. It's not that we won't -- yeah, maybe I said that a bit

long. It's not that we don't have any confidence. It's just that it only takes one outlier for us to take action on that run. So like, for instance, for adding bias to your growth, we'll take the worst outlier. Even if there's everything -- even if you had a hundred features that were all really good, but there was one that was kind of out there, we'll use that one to add bias to our growth.

Q. Well, I'm more concerned about false negative. I mean at least we have wrong dimension. At least you know something is there.

A. Yes.

Q. I mean that's really less no-brainer situation, --

A. Yes.

Q. -- but if the tool doesn't show you anything and you find something that you should have seen in there, you take some (indiscernible), how many of those do you need? Because there may be several that you may never know --

A. Exactly.

Q. -- if the dig is not there.

A. Yeah.

Q. So what triggers the questioning of the entire run?

A. Yeah. So we'll take one false negative and we'll take action on that as well. So --

Q. What action do you take? What action do you take on that false negative?

A. Well, based on the -- it depends on the depth and the length. Like I said, there's lots of things that meet the tool specification that should have reported that and not injurious to the pipeline, in the short term. Like you're already managing that by your growth analysis and everything else by the features you know about. Like we find --

Q. But that is a anomaly you saw.

A. Yes.

Q. Then how -- if you don't see, how do you know they are not injurious to the pipeline?

A. Well, technically, I guess if you didn't see them, you don't know that.

Q. I mean that's why I'm saying how many of those do you need to question the entire run? Whether we are talking to injuries to pipe or not, I'm really wondering how much confidence one should place on the entire runs, then, with a tool that wasn't properly at that time or not or the data is being properly analyzed. You're putting a lot of weight --

A. Yes.

Q. -- on the ILI for crack mitigation.

A. Yes.

Q. So, and my question is what time you guys will question, say that, "Well, this is impacting my integrity of the pipeline"?

A. Yeah. It's --

Q. I mean is that something documented that -- in your

procedure that, look, we are relying on ILI for the (indiscernible) and outliers and all that stuff. Is there something in there that says at a certain stage I should get a question that I'm putting all my eggs in a basket, and the basket is not as reliable?

A. Well, yeah. Like we don't have a statement in our document that says something distinctly like that, but if the outliers that we're finding require additional action, we'll take it, and if we think that the tool run is not a good tool run, then we'll run another tool or we'll take pressure restrictions.

Q. What (indiscernible) that decision? I mean I know you just tell me you'll take action, but I still haven't heard as a tool group person that, you know, if I see three of those, I'll call it a reliable run. Is there some sort of a guideline? And really I'm asking you because so much weight -- we are really depending --

A. Yes.

Q. -- on those tools.

A. No, I understand what you're getting at. And I guess what I'm trying to communicate is that it's dependent on every outlier. So if we find one false negative, we go through our outlier analysis, we work with the vendor, and we determine what we need to do to keep the line safe. So if that means if that specific -- if the properties of that feature that the tool missed give us some indication that the tool run is just not going to do

it for us, then we'll -- that's all it takes, is one.

Q. The reason I'm asking, Steven, and I'm not -- this is the last time I'm going to mention this, but -- and we'll move on. I can understand your course of action when you say the dimensions are under-reported. So you know something is there. You just don't have the accurate numbers on that. My concern is that if the tool guy is telling you that they are only 80 -- whatever the number -- 80 percent of the time we'll see with 90-percent (indiscernible) or whatever the number is.

A. Yeah.

Q. How can you react to something that you do not know exist? You say you are going to react. But my question, how can a person react to something they do not know?

A. No, and that's a good point.

MR. JOHNSON: Well, do they not know? Or the fact that the entire joint is reviewed, it allows you to look for things --

MR. CHHATRE: When I ask you for the interview, I'll ask you that question, but right now I'm asking --

MR. JOHNSON: All right.

MR. CHHATRE: -- Steven.

MR. BOTT: Yeah.

MR. JOHNSON: Sure.

BY MR. CHHATRE:

Q. (indiscernible)

A. Yeah. So, you're right. You don't -- you can't

necessarily manage what you don't know. But the 90 percent of the time or 90 percent confidence is at the lowest detection of the tool. So it only gets better from there. And just because -- if you have one feature that the tool missed, depending on the size and the type of feature it is, doesn't necessarily mean that you -- it would lead you to think that the tool's going to miss a bunch of big features.

Q. Okay.

A. So, while I agree that you can't manage what's not there, every false negative is -- has to be independently evaluated to -- And if we think that there is a chance that we're -- we don't know enough, then we'll manage that by taking another tool run or some other, you know, assessment method. Right?

Q. I understand. I understand. Okay.

MR. FOX: Kind of following along this line of thought -- This is Matt Fox here. Well, the tools are going to give you essentially a probability of detection for any given flaw size.

MR. BOTT: Yeah.

MR. FOX: Do you ever go back and do an analysis of the flaws that were found and flaws that were found and -- you know, that weren't detected, and see if that -- you know, that that -- does that analysis correspond to the probability of detection capability of the tool?

MR. BOTT: Yeah. We calculated a probability of

detection, probability of indication, and a probability of sizing for every run. So we do do that.

MR. FOX: And that includes data that comes from false negatives as well as false positives?

MR. BOTT: Yes.

MR. NICHOLSON: Who performs that analysis?

MR. BOTT: We do. So --

MR. NICHOLSON: Could you bring it up for us?

MR. BOTT: Yep. Let me just see if it's --

MR. NICHOLSON: So you would have done so on the 2005?

MR. BOTT: We didn't have a formal process of doing it in 2005.

MR. NICHOLSON: When did you get a formal process of doing that?

MR. BOTT: Late last year of actually calculating -- like it's not that we didn't do outlier analysis or look into outliers before, but in late 2010 is when our process document --

MR. FOX: Have you done that on the 2010 crack run yet for the Line 6B (indiscernible)?

MR. BOTT: We've started to do that. Actually we're in the process of doing that right now, so -- We don't have any false negatives yet in the 2010 run, so --

MR. NICHOLSON: Now why don't we just take a peek at that document.

MR. BOTT: Yeah.

MR. NICHOLSON: I'm just curious what goes into that.

MR. BOTT: I'll have to get the right one here.

MR. NICHOLSON: Is that the pyramid?

MR. BOTT: No. Let me -- I've got too much stuff open. So within the training document, we --

MR. FOX: Which document?

MR. BOTT: It's PI-39.

MR. FOX: PI-39.

MR. BOTT: Yes. So this wasn't in existence at the time, but it is -- this is what we do now. So we calculate a POD and that's based on the number of features reported, and then for all of the features that were reported in the field, we compare those two numbers, obviously. So if it was not reported by the tool but was below tool threshold -- so, in other words, the tool spec didn't say that the feature would be reported -- we don't count that against the tool in this calculation. But if it is, if it's above that level, then we count that.

Probability of sizing. We use a probative exceedance kind of method. So we don't penalize the tool, at least not in this calculation, if it's being conservative, if it called it deeper than it really was. So we do two counts. We determine the probative sizing at unity, and then the probability of sizing with one tool tolerance added, so --

MR. CHHATRE: Now, this is for the entire run; right?

MR. BOTT: Yes.

MR. CHHATRE: So (indiscernible).

MR. BOTT: Well, everything that we examine with field NDE. Because if we didn't examine with field NDE, we didn't confirm the sizing, but, yeah.

MR. CHHATRE: Okay.

MR. FOX: Steve --

MR. CHHATRE: No, go ahead. Go ahead.

MR. FOX: I just -- I had asked this question of Sean, and maybe you're the better guy to ask it. With trying to correlate internally connected crack life anomalies versus externally connected crack life anomalies, I have this impression that if you evaluated internal versus external separately, you might -- you know, you might find that internally connected anomalies are reported less accurately as externally? I'm just curious if you've done that.

MR. BOTT: I haven't personally done that, so I can't say.

MR. FOX: Or I guess maybe I have some observational --

MR. BOTT: We may have less confidence on the field data, because most external ones you can actually grind a little bit so you know exactly how deep it was, whereas internally you're sizing with UT, so we might have a bit less confidence in the field data. Now, whether the tool -- I couldn't tell you if the -- I've never looked at that, to be quite honest.

MR. FOX: Okay. Yeah, what I was going to say is I

think over the years I've come up with the impression that if the tool is -- the tool is more likely to miss an internally connected anomaly than an external, and that's kind of based on, you know, failures. If you look at, you know, Line 2 or even Line 3 plus 9-12, it just seems like the internally connected anomalies are missed more frequently than the external anomalies.

MR. BOTT: Possibly.

MR. FOX: So I guess -- so the question would be -- personally I think it would be a good idea to do that based on external anomalies versus internal anomalies, and I don't think you're doing that presently.

MR. BOTT: No, we wouldn't do that presently.

MR. CHHATRE: Can you go back up a little bit? And this is Ravi. Yeah, right there.

BY MR. CHHATRE:

Q. What is the second "N"? Number of --

A. So, on the top it's -- "N" is reported, and on the --

Q. Right. Total reported?

A. Yeah. And the bottom is "N" reported plus "N" unreported, and all those "N's" are based on the number of field --

Q. False negative.

A. Yeah. So the "N" unreported would be false negatives.

Q. What about false positive? That's not in here, is it?

A. No.

Q. And that's also part of that tool error; right?
A. It is part of the tool error.
Q. So how do you (indiscernible) for that?
A. We would incorporate a probability of indication, so --
Q. But I mean it's probability of detection; right? The probability of detection is a function of it. You're only going to get something from probability of detection to decide likelihood of further accidents.
A. Yeah, but -- that's true, but if it's reporting things like corrosion that were not actually cracking, I guess, well, if it happened a lot, we would follow up with the vendor and try to improve that. We don't count it against the tool for probability of detection, because it's reporting extra things, so that's why we don't include the false positives.
Q. I mean in the positives you are missing some value data, too. I agree with you. I mean the tool is telling you that there's still corrosion. You don't see corrosion. You don't hold it against them.
A. Yes.
Q. And that's valid, though, because the tool's not supposed to be doing that.
A. Yes.
Q. But between -- even at all of those, then you might have eliminated some cracks also, false positive. That's not getting really --

A. No, no. If we find a crack in the field, it can't be a false positive. It can only be a false negative.

Q. Negative. Okay.

A. Yeah.

Q. Now, the other question on this was, this is all for the digs you actually make.

A. Yes.

Q. And usually you want to do the digs because of crack sizing and that sort of stuff.

A. Yeah, as well as --

Q. You wouldn't go to -- there's no indication (indiscernible) ensure integrity, you wouldn't do that dig.

A. No, although we do check corrosion digs and dent digs and any kind of dig for --

Q. Right, but that's -- because there is some threat to integrity.

A. Yes.

Q. Now, so it's all weighted against -- I mean it's slightly weighted towards indication now being reported, so if all those digs are made for these, for false negative, are you leaving any dig, saying, "Well, gee, the tool's showing us there's no problem. Better go and dig it and find out if there is anything in there." Right now, the way I see it, is maybe it's weighted slightly to all the indications.

A. Yeah. So --

Q. So false negative is getting underrated in the calculations.

A. Yeah. So, while we may not pick a joint that has nothing on it and just go dig it, we probably don't do that. But we do -- when we exposed a joint, even if the feature is three inches long, we'll inspect the whole joint.

Q. Sure, but there it's going to get slightly weighted (indiscernible) indication. So you're going to need to (indiscernible) the contractor for being erroneous in terms of sizing it or under-reporting or over-reporting.

A. No, I understand that, but let's say you had a joint of 40 feet of pipe. And usually that's what we do, is we dig a whole joint. But the feature only takes up six inches on that joint and that's what's reported. We inspect the other 39 1/2 feet of that joint where there's nothing reported to see if there's anything.

Q. I understand, and I'm not saying you should do equal number of digs, but at least do one. Where there is no indication reported, so you go and dig and may confirm that, yes, it is not false negative. Do you follow what I'm saying?

A. Yeah, I follow. I guess -- yeah, I guess just our point of view is that if you're digging up 40 feet for one foot of pipe -- one one-foot feature, you're actually (indiscernible) it towards false negatives because you're digging 39 feet where there's nothing reported.

Q. Okay.

A. But I understand what you're saying. And maybe it's a bit different for, you know, environmental factors.

Q. You think with that kind of dig, that all is going to benefit too if it matches with your direct inspection; right?

A. (Indiscernible.)

Q. And does your contractor report that there are no indications, and you go back and say, "Okay, who else showed us no indications?" Is that matching, then, to the report?

A. Well, we match out the outlay features and all the field features.

Q. Like (indiscernible) features, those are indeed people reporting that it won't say, "Okay, the rest of the pipe, 36 feet, had no indications, --"

A. Yes. They tell us that.

Q. "-- and the tools say no indications," so that's (indiscernible).

A. Yeah.

Q. Okay.

A. They tell us that, yeah.

Q. So there is some --

MR. FOX: And is that process used on all three types of digs?

MR. BOTT: Yes.

MR. FOX: Corrosion, geometry, and cracking?

MR. BOTT: Yes, although sometimes for geometry we won't

expose the whole joint. We'll just bell hole (ph.) because ---

MR. CHHATRE: Right.

MR. BOTT: -- typically there's nothing else. You know, it's a direct measurement tool. So if there's a dent there, we expect to find the dent there. But for corrosion and cracking, we'll dig more, typically more than we need to. So we expect if there's false negatives to be found, we'll find them.

MR. PIERZINA: So did you say on a geometry dig you may not expose the whole joint?

MR. BOTT: Not always, no.

MR. PIERZINA: I'm sorry?

MR. BOTT: Not always, no.

MR. PIERZINA: Okay.

MR. BOTT: If there's other -- it depends on the coating partially, too.

MR. PIERZINA: Right. I was going to say maybe it depends on the pipeline too, because it --

MR. BOTT: Yeah.

MR. PIERZINA: You know, if you're on a geometry dig on a PE tape coated pipeline.

MR. BOTT: Yeah. We'll dig -- yeah, we dig longer sections usually on PE tape, because to get rid of the PE tape is actually -- and because you're more -- under PE tape, you're more likely probably to find features than under other --

MR. PIERZINA: Right.

MR. BOTT: -- kinds of coating.

MR. CHHATRE: All right.

MR. PIERZINA: What Ravi asked was if that other 36 feet shows no features on the NDE, you actually go back as the analyst and you compare that to your ILI run?

MR. BOTT: Yeah.

MR. PIERZINA: Okay.

MR. BOTT: So when I say we match all the field features and all the ILI, we look both ways, so --

MR. PIERZINA: Okay.

MR. JOHNSON: Does that answer your question? Which it was a humor -- you know, how do you know? How do you investigate what you don't know is there?

MR. BOTT: Um-hmm.

MR. JOHNSON: To me, that's a new question for me, so --

MR. CHHATRE: No, that one assumes facts because, see, what I'm saying is it's still based on probability and the vendor is telling you, "I'm only going to get -- my run is only 80 percent of the time." I'm just giving numbers. "Eighty percent of the time will be negative, and out of that 80 percent time I'm going to give you the right size." So there's always a chance of something slipping, and my really question was how many of those mismatches triggers questioning in your mind? I'm not saying you'll find a vendor that's going to give you a hundred percent of anything a hundred percent of the time. But when, at what stage

of your analysis do you question (indiscernible), and I guess there is no guideline per se on that.

MR. BOTT: There's no guideline. It depends a lot on what the outlier portrays.

MR. CHHATRE: That's what I was really getting into, because maybe there's so much weight that is put not just by you guys, but (indiscernible) on ILI inspections.

MR. JOHNSON: And that's one of the issues with the direct assessment. You're going to dig so many joints and then you make an assumption that the joints you dig are representative of the more joints you haven't dug, which is one of Enbridge's preference, that you do the inline inspection, because then you are looking at every joint.

MR. CHHATRE: Right. And there's nothing wrong with that thinking. The only question I have is there has to be some kind of (indiscernible) because I'm putting so much weightage on this inspection and that's really -- it looks like you're (indiscernible) for your integrity management --

MR. JOHNSON: Well --

MR. CHHATRE: -- on both crack, corrosion and --

MR. JOHNSON: -- I think there is a trigger, as Sean talked about yesterday with the Line 6-A tool. When the outliers came in and we had 80-percent through-wall, suddenly the outliers were so dramatic, you'd take a pressure reduction and you go back to the vendor and say, you know, "Here's what we're finding

immediately." So, you know, the trigger is based on, you know, engineering knowledge and what's going on. I don't think there's a magic number that ten outliers makes you do this. You're looking at it all the time. Every dig -- you know, all of the NDE information goes back to pipeline integrity. They put that in to do their comparison. It's like every dig is a validation dig, and that's where they get, I'll say, a comfort level.

MR. NICHOLSON: Well, what I thought I heard Steven say was he -- you look at every false negative and do an analysis on that.

MR. BOTT: Yeah.

MR. NICHOLSON: Okay. And so it could be that if those were -- you found that they were large defects with very deep features, then --

MR. BOTT: Yeah, and then --

MR. NICHOLSON: Then you would take steps.

MR. BOTT: Yeah. We would take a pressure restriction and maybe run another tool to -- whatever we needed to do, right, based on that --

MR. NICHOLSON: But it sounds like from your experience that maybe these typically are not significant features that are found.

MR. BOTT: Yeah. No, typically if you have -- typically a false negative that you would find is usually something that just barely is above the threshold, and if you deal with all the

(indiscernible) field measurement and valley measurements, it's questionable whether it's a true false negative. That typically is what my experience is, but --

MR. PIERZINA: But you now characterize a false negative as something that exceeds -- something that was identified that exceeds the tool threshold?

MR. BOTT: Yes. So, yeah, we make that distinction.

MR. CHHATRE: Are we (indiscernible)? 39?

MR. BOTT: We were actually -- oh, yeah, that was 39. Yeah, that's at the end of the --

MR. CHHATRE: Yeah, that's what I thought. Okay.

MR. BOTT: Yeah.

MR. NICHOLSON: I might have missed this. I came in late. If it mischaracterizes something, that's a false positive?

MR. BOTT: No, no.

MR. NICHOLSON: Is there a separate --

MR. BOTT: We actually call -- it's just mischaracterization if it calls it like a crack field and we find a crack-like or something like that, so -- I don't know if we have actually a definition. No, we don't have a definition in here, but essentially -- yeah, like if we -- if it under-calls it or over-calls it, that would be these.

MR. NICHOLSON: That's depth; right?

MR. BOTT: Yeah, that's depth.

MR. NICHOLSON: But like you say, crack field versus

crack-like, --

MR. BOTT: Yeah.

MR. NICHOLSON: -- is that quantified or is it --

MR. BOTT: We do look at it. We haven't specifically defined it, but we do say that -- I mean if you found -- I think the biggest one is if you find a SCC in the field or the tool reported like a linear defect like crack-like, that's the biggest one. Typically if it's a notch like our crack-like, we wouldn't generally worry too much about that, because we treat those two feature types exactly the same.

MR. CHHATRE: And so you treat all three similar. Crack-like --

MR. BOTT: We treat all three similar, yes.

MR. CHHATRE: Yeah.

MR. BOTT: But we do --

MR. NICHOLSON: Except you might have missed that longest indication --

MR. BOTT: Exactly.

MR. NICHOLSON: -- if it's a crack field.

MR. BOTT: Yeah, exactly.

MR. NICHOLSON: But there's no bucket for that mischaracterization in your probability of detection, probability of indication?

MR. BOTT: Well, probability of indication, that's what that measures, is the probability that it's classifying a feature

correctly.

MR. NICHOLSON: Oh, indication is your characterization?

MR. BOTT: Yeah.

MR. NICHOLSON: Okay.

MR. CHHATRE: Okay. I have no questions.

MR. NICHOLSON: Okay. Matt Fox?

BY MR. FOX:

Q. Yeah, I guess I did have, you know, a few questions about the 2010 crack run and -- because I understand that you're involved with the --

A. Yes.

Q. -- with that run. And have you done any, I guess, comparisons with the data from that crack run versus what was found from the 2005 crack?

A. So like we've kind of discussed before, we haven't done a lot of detail comparison yet. The feature population is a lot higher.

Q. Okay.

A. But the detection threshold is a lot lower --

Q. Okay.

A. -- than it was in 2005.

Q. Okay.

A. They've also changed sizing of all their leads.

Q. Leads.

A. One of the reasons we haven't done a lot of detail

comparison is because we're finding that it's reporting crack fields that we find in the field of corrosion --

Q. Okay.

A. -- and not an insignificant rate. Like it's quite often.

Q. Okay.

A. So we're just -- we don't want to make too much comparison between the tools until -- we're working through that with Gene (ph.) right now --

Q. Okay.

A. -- about the difference between crack fields and corrosion in the field, and I think once we get to the level where we kind of understand what's actually cracking, then definitely it makes it a lot easier to go compare the two tools with some confidence.

Q. I see. So I guess, you know, in the 2005 run we had some features at the rupture site that were characterized as a crack-like feature versus what we found was a -- after the rupture was crack field features, and we'll ask GE more about the analysis, but as I understand it, they changed their procedures to be able to better identify crack field features and distinguish them from crack-like features. Do you see features that were characterized as crack-like features in the 2005 report that are showing up as crack field features in the current analysis?

A. So I couldn't answer the number of them off the top of

my head, but I'm sure there are some. We have found some crack-like features reported by 2010 that turn out to be SCC, but so far all our analysis is showing that mostly it's due to -- there'll be SCC along the weld and there will be, like, corrosion at the weld, and so the tool actually caught both. It will call a crack field and then it will call the corrosion at the weld a crack-like, or, you know -- or the field will just draw a big circle around a bunch of stuff, and when we look closer at it, there's, you know, maybe something at the weld that the tool is calling crack-like in a shallow SCC, stuff like that. So I haven't -- yeah, I haven't seen anything in the 2010 data that would concern me that we're getting misclassification that way.

Q. Okay. So I guess the correlations haven't really -- or have any correlations been made to try to characterize the crack growth rates based on the two runs, or is that something that's planned for the future or what?

A. Yeah. So that would be something we kind of -- again, once we reach confidence with the tool. And one way to do it might be once we've completed our full dig program, we'll know which features were cracks in the field, and we can take those and compare them back to back. So there is some -- we would look to do that for sure. And we also use, you know, historical linear kind of growth rates to kind of compare to what we expect.

Q. And then I guess the other question I'd ask a little bit of a different topic is looking at -- in cases where corrosion

pits, you know, from -- have been detected and dug and then the pipe's recoated with the pits in place, is there a risk of subsequent cracking from those corrosion pits that are left in place?

A. I wouldn't say that I'm an expert on that sort of feature, but I think the risk is very low because -- they're a blunt defect. I mean usually when we recoat, we'll put a good coating on so that we don't have to worry about the environment getting back in there. So it would only be from cycling.

Q. But you still have the stress concentration from --

A. Yeah.

Q. -- just the geometry of the feature.

A. Yeah. So it's unlikely that anything would initiate, but if it did, then a crack tool would see that. And so if we -- when we do our dig history review, typically I would not remove a dig from my selection if it was recoated and then the tool was reporting significant cracking, unless we did it the year before. But if it was -- say we did it in 2004 and we have our 2010 run, --

Q. Right.

A. -- I would still go and check again.

MR. PIERZINA: Okay. So where -- how do you draw the line between -- you know, on something that's been looked at before when -- you know, when it -- when can you consider it good and when can you -- you know, because I mean there's a chance that

somebody did a poor job recoating, you know, something that was investigated previously.

MR. BOTT: Yes.

MR. PIERZINA: So how do you decide --

MR. BOTT: We don't have a written guideline on processes for that. Part of it has to do with the quality of the end-of-year report. Like you said, if it's a really good end-of-year report, there's lots of pictures, you can tell what they're doing, you have more confidence that, yeah, there's no cracking there and it's probably a good job. If it's -- yeah, if it's a poor quality, then you have less confidence, so you're more likely to go back. As far as time, I don't know if there's -- we don't have a guideline for time. I think it would depend on what the feature was, and it also, I think, depends a bit on what the new -- because we also run new metal loss tools, and so is the new metal loss tool showing growth on that joint? So does it look like there's, you know, corrosion happening again, stuff like that.

MR. PIERZINA: Uh-huh.

MR. BOTT: I can't -- you know, we don't have a written guideline for that other than I have to be confidence that we don't need to go back, so I'll make sure that I am.

MR. PIERZINA: Okay.

MR. CHHATRE: This is Ravi. Have you made a note of that, the fact that we had to go back and -- in case you get

transferred somewhere else or you get promoted or somebody else takes over, you've got a workload situation.

MR. BOTT: Yeah. So in our pie listing, which is the file where we document what we're digging, (indiscernible) -- excuse me -- NY, if I remove something, then I will put a note in there that I removed it. And if I didn't remove it but I looked at it, I will put a note.

MR. CHHATRE: So there is some --

MR. BOTT: Yes.

MR. CHHATRE: -- documentation trail --

MR. BOTT: Yes.

MR. CHHATRE: -- that people can look at. Okay.

MR. BOTT: Yeah.

MR. NICHOLSON: I want to go back to what you were saying about the 2005 run and GE's reassessment. Were you involved in that directly?

MR. BOTT: When they coated a crack field feature and said crack-like?

MR. NICHOLSON: Right.

MR. BOTT: I don't know if I directly asked them if their --

MR. NICHOLSON: Well, I guess I'm trying to find it. Did they say it was a change in an algorithm or a procedure or what exactly changed for them to tell you it's now a crack field?

MR. BOTT: It's probably a procedure. So, the way they

do their analysis is they have the raw signals from the tool, and then they have to base -- based on their experience and their knowledge of how the tool works, they have to classify that feature, and then they do all the sizing and everything after. So if they changed a classification, then it would be more of a procedural change than algorithm change as far as I understand their processes.

MR. NICHOLSON: But then you mentioned in 2010 it's a new algorithm and the tool -- something in the tool's changed or how --

MR. BOTT: So that's -- they've since -- well, fairly recently. I can't tell you the date, but they have actually updated their sizing algorithm for crack field features. I'm not sure when, but they -- you know, in the last year, so --

MR. NICHOLSON: So I guess to me that would be a headache for an integrity analyst now, because everything's changed. You've got a new tool with a new algorithm. As you said, you're getting more crack field features and it's hard to -- so they don't -- there's no way to apply the old algorithm to the new tool to kind of calibrate it or --

MR. BOTT: We could, although what we would probably do to do a tool-to-tool comparison is actually get them to re-analyze the old data using the new algorithm. That's probably what we'd do.

MR. NICHOLSON: And has that been done?

MR. BOTT: It hasn't yet, no.

MR. NICHOLSON: Is that something you're going to request?

MR. BOTT: Yeah. When -- at the time where we would ask any comparison between the runs, they would have to do that first so that we're comparing apples to apples, for sure.

MR. NICHOLSON: But that -- to date you haven't asked for the 2005 to be re-analyzed?

MR. BOTT: No.

MR. NICHOLSON: Okay. You think that will happen? Is that what you're saying?

MR. BOTT: Yeah, I think so. I would think that in order to do a good comparison, you have to. We may not get the whole data set analyzed, but definitely whatever we're comparing to the new data set.

MR. NICHOLSON: So when they go and change algorithms and methods of classifying and sizing, you're kind of in the dark. You don't know what they've changed; right? The only way you know is through your unity plots as to how accurate this new algorithm is and --

MR. BOTT: Yeah, yeah.

MR. NICHOLSON: Seems like you're always chasing the vendor's latest --

MR. BOTT: Well, I think at least recently they've been okay telling us when they change things. I can't speak between

2005 till now.

MR. NICHOLSON: Okay.

MR. BOTT: But I know that recently, definitely.

MR. NICHOLSON: And it's your option, then? You could say, "Hey, this -- I don't -- we liked what we got in 2005. We really liked that tool and that algorithm. Use that, not your latest beta"?

MR. BOTT: Yeah. I would -- yeah. I mean we're paying for the analysis.

MR. NICHOLSON: Okay.

MR. BOTT: So I would guess that if we said, "No, we'd rather use some other algorithm that you used before," then I'm sure that we could ask that.

MR. NICHOLSON: Okay. I'm done. Anything for you, Ravi?

(No audible response.)

MR. NICHOLSON: Matt? Brian?

MR. FOX: Have you asked them to -- I mean maybe not necessarily redo the whole data set, but look at the features from the ruptured joint using the new algorithm?

MR. BOTT: I can't honestly recall if we've done that or not. We may have, but I'm not sure.

MR. NICHOLSON: You say "we may have." Who else? Sean?

MR. BOTT: As in Enbridge.

MR. NICHOLSON: Oh, okay.

MR. BOTT: Yeah. Yeah, either Sean or myself.

MR. FOX: Sean might know --

MR. BOTT: He might.

MR. FOX: -- if that's been done?

MR. BOTT: But, yeah.

MR. PIERZINA: Or it might have even been somebody else; right?

MR. BOTT: Yeah, yeah. There was -- yeah. Especially -- you know, especially right after a failure, there's always lots of people we get in to help, so --

MR. NICHOLSON: Okay.

MR. CHHATRE: Thank you so much.

MR. NICHOLSON: Yeah.

MR. CHHATRE: (indiscernible)

MR. BOTT: Okay. Thank you.

UNIDENTIFIED SPEAKER: That was great.

MR. NICHOLSON: At this point we'll conclude the interview.

(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 Steven Bott
DOCKET NUMBER:	DCA-10MP-007
PLACE:	Edmonton, Alberta, Canada
DATE:	December 8, 2011

was held according to the record, and that this is the original, complete, true and accurate transcript which has been compared to the recording accomplished at the hearing.

_____
Karen L. Banks
Transcriber