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1	STATE OF FLORIDA		
2	DIVISIO	N OF ADMINISTRATIVE HEARINGS	
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4 5 6	RE IN: FUEL AND PURCHASED POWER COST RECOVERY CLAUSE WITH GENERATING PERFORMANCE INCENTIVE FACTOR,		
7	Petitioner,		
8	vs.	CASE NO. 19-6022	
9	**,		
10	Respondent.		
11		/	
12		VOLUME 2	
13		PAGES 157 - 290	
14	PROCEEDINGS:	Administrative Hearing	
15	BEFORE:	Honorable Lawrence P. Stevenson	
16	DATE:	February 4, 2020	
17	TIME:	Commenced: 8:55 A.M.	
18 19	LOCATION:	Division of Administrative Hearings 1230 Apalachee Parkway	
20		The DeSoto Building, Tallahassee, Florida	
21	REPORTED BY:	DEBRA R. KRICK	
22		Court Reporter	
23	APPEARANCES:	(As heretofore noted.) PREMIER REPORTING 114 W. 5TH AVENUE	
24		TALLAHASSEE, FLORIDA (850) 894-0828	
25		(050) 074 0020	

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9	*Huh-uh is a negative response *Uh-huh is a positive response	
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1	P R O C E E D I N G S
2	THE COURT: Mr. Rehwinkel, whenever you are
3	ready, I think we are all set.
4	MR. REHWINKEL: Okay. Thank you, Your Honor.
5	BY MR. REHWINKEL:
6	Q I want to take you back to the drafts that we
7	called that's Exhibit 115. If you can go to that. I
8	think we will spend most of the rest of the time on that
9	document.
10	A I am there.
11	Q And I want to take you to Document 2, which is
12	at Bates 19.
13	A Okay. I am there.
14	Q Now, the file name for this document says P
15	Crimi comments, do you agree with that?
16	A I do.
17	Q And also it says above the text on the upper
18	right-hand side, REV 10-15-16 HMC, do you see that in
19	the just above the well, do you see
20	A I do see that, yes.
21	Q Okay. Would it be a reasonable conclusion
22	that this is a document that was at least originally
23	generated by Harry Carbone
24	A Yes, I would agree with that.
25	Q on October 15th?

1	Okay. And would it be also reasonable to
2	assume, based on the Duke file name, that Paul Crimi
3	made some comments or edits to this document?
4	A It would. And one correction, I don't know
5	that Mr. Carbone would have created it, but he
6	certainly, by the revision date, it appears that he
7	edited it.
8	Q Okay. We wouldn't know necessarily when he
9	did it, but it would have been on or after the 15th of
10	October of 2016, is that right?
11	A I would say on or before.
12	Q Okay. Now, Mr. Crimi was a consultant to Duke
13	and also a member of the root cause team, is that
14	correct?
15	A Yes.
16	Q Okay. And he is a former employee of Duke and
17	Progress, right?
18	A Yes, that's correct.
19	Q And at some point, he was also an employee
20	probably of GE?
21	A He was, yes.
22	Q Okay. And would it be fair to say he is a
23	subject matter expert with steam turbines?
24	A He is.
25	Q Okay. So let's go down to the second

1	paragraph and just so we understand what these		
2	documents are, I mean, the night janitor wouldn't be		
3	able to go and make changes to these things? These		
4	are these changes are all by authorized engineers,		
5	right?		
6	A That's correct.		
7	Q Okay. So there is a statement here that		
8	starts "it is important" could you read that full		
9	paragraph there with those edits?		
10	A Yes, sir.		
11	"It is important to note that this turbine was		
12	originally designed for another project and built by the		
13	OEM but not shipped. It was subsequently reapplied to		
14	the Bartow project with the limitations and turbine		
15	outputs shown on the heat balances and other		
16	documentation provided. However, it was much less clear		
17	about the exhaust flow limit the output limit implied		
18	since this pressure and flow limit is not clearly stated		
19	on the documentation given."		
20	Q Okay. Now, is that isn't that true?		
21	MR. HERNANDEZ: Objection, Your Honor,		
22	compound.		
23	MR. REHWINKEL: I'll ask you this		
24	THE COURT: Overruled. Yeah, you can break it		
25	down, I guess.		

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1	BY MR. REHWINKEL:
2	Q The first sentence is true, is it not?
3	A Yes, it is true.
4	Q The second sentence is true, is it not?
5	A Yes.
6	Q And the third sentence is true?
7	A That one is difficult to say a true or false.
8	It was much less clear about the exhaust flow limit the
9	output limit implied again, it's a working document
10	of a root cause team. You are just asking me if that
11	statement is true or false, that sentence?
12	Q Well, I am asking you if you agreed with that,
13	let me ask it that way.
14	A I would say I generally agree with that.
15	The operating parameters to operate the steam
16	turbine are really on you know, we, like for
17	instance, we don't have, as I stated earlier, a low
18	pressure inlet instrument, so exhaust flow limit, there
19	is no way to measure that, so I think that's what this
20	sentence is getting at.
21	Q Okay. But there is no expression of a lack of
22	clarity about what the heat balances represent by
23	Mr. Crimi here, is there?
24	A No, that's correct.
25	Q And if we go to page 27

1	A Okay.
2	Q in the keynote section under Period 1.
3	A Yes.
4	Q It says MHPSA was hired to evaluate ST design
5	conditions, parentheses, original design was for Tenaska
6	3-x-1 heat balance and continue the warranty. Do you
7	see that?
8	A I do.
9	Q Okay. And even though it has an A in there,
10	there is no that's still Mitsubishi?
11	A It is. The A, I believe, stands for America.
12	Q All right. So somebody, when they developed
13	Appendix A, put 450 megawatts as the steam turbine
14	rating in 2016, do you see that, for Period 1?
15	A I do see that.
16	Q And that turned out to be an error?
17	A Are you asking me if that was an error?
18	Q Yes.
19	A It appears it was an error.
20	Q Okay. But if we go back let's go back to
21	page 175 now. Let's go go out a year in time.
22	A 175?
23	Q Yes, sir.
24	And this Appendix A here, we see in the
25	line or the row that's headed "Operating

1	Restrictions", do you see that caption?
2	A I do.
3	Q All right. And for Period 1, it says none,
4	dash, MHPS intent was to follow heat balance diagrams,
5	do you see that?
6	A I do.
7	Q Okay. So that's consistent, is it not, with
8	Mitsubishi's contention that the heat balances were
9	limitations that for operating the steam turbine,
10	correct?
11	A Again, calling heat balances limitations I do
12	not believe is accurate. They are predictions based on
13	a certain set of criteria, and so what this is saying is
14	the intent was to follow those predictions.
15	Q And that's what Mr. Crimi said a year earlier
16	in his statement, right, that the heat balances were
17	limitations in turbine output, back on page 19, right?
18	A There is a reference to the heat balances in
19	the sentence in the paragraph I read.
20	Q As a limitation, right?
21	A The limitations in turbine output shown on the
22	heat balances, yes.
23	Q Okay.
24	A Now, again, that's with other operating
25	variables, okay. So a limitation is according to

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1	whatever the other variables are for that specific heat
2	case, which there are dozens, as we've seen.
3	Q So let's go to page 195, and this is it's
4	got the draft water mark on it. So I am going to refer
5	to this as the final draft, is that fair?
6	A I am almost there.
7	Q Okay. Sorry, this is Document 18.
8	A Yes, that's fair.
9	Q All right. So Table A is here, and we see
10	if you go back to what did I have you look at? 175.
11	Why don't you keep your finger on 195.
12	A Okay.
13	Q So this document here, we saw that says
14	operating restrictions, right? For on 175 for the
15	one, two, three, fourth column for the fourth row
16	down.
17	A Oh, yes, I see where, yes.
18	Q Okay. And then if we flip back over to 195,
19	it now says MHPS IP exhaust pressure operating limits.
20	A Yes.
21	Q And then for Period 1, it now says machine
22	control to HP, IP and condenser design limits; do you
23	see that?
24	A I do.
25	Q Okay. Now, isn't what's happened between the

1 October 11th draft and February 6th draft is that the 2 question has been changed? 3 А What question? 4 Well, what the operating restrictions are. 0 5 Α I think it's pretty clear on page 175, it 6 refers to the heat balance diagrams. And on page 195, 7 it refers to the HP, IP and condenser design limits. Ι 8 am not sure I understand the question. 9 Q So if I'm looking at Table A on page 195 --10 and let's just go back to page five of the exhibit, which is the final --11 12 А Table A of JS-2? 13 It's identical, it appears, to Q Yes, JS-2. 14 page 195, right? 15 Α Yes. 16 So now just working off of this one, Q Okay. 17 this heading seems to ask what are the Mitsubishi IP 18 exhaust pressure operating limits. And then the answer 19 given is different than on the October 11th draft. It 20 says machine control to HP, IP and condenser design 21 limits. It doesn't refer to heat balances, right? 22 Α Correct. 23 Okay. And Mitsubishi never said that these 0 24 were the operating limits, these meaning what's in 25 column one on page five here. They never said these

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1 were the operating limits.	They said 420 was the
2 operating limit, right?	
3 A No, that's not co	prrect.
4 Q For Period 1?	
5 A That is not corre	ect.
6 Q In all of their of	documents that they provided
7 that you provided us, they	don't ever say that's the
8 operating limit for Period	1, do they?
9 A 420 is a predicte	ed megawatt output if a whole
10 bunch of variables, dozens	of variables are controlled
11 at certain points, 420 was	predicted as the generator
12 output at a power factor of	E .949, or a power factor of
13 .9.	
14You have to look	at each heat case
15 specifically. That is not	an operating limit. 420 was
16 the minimum contractual amo	ount that Mitsubishi had to
17 achieve in order to avoid 1	Liquidated damages on the
18 project.	
19QI mean, that's year	our opinion, right?
20 A That's not my	I believe it to be a fact.
21 <b>Q Okay.</b>	
22 A I think we've loc	oked at several pages that
23 show it's a fact.	
24 Q Well, in the RCA	process, Duke Engineering
25 didn't see it that way, did	d they, until you got to the

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1	final document?		
2	A I disagree with that. I don't see how you can		
3	draw that conclusion.		
4	Q Let's go back and look at Document 3, which is		
5	at Bates 23.		
6	A Document I am sorry, JS-3?		
7	Q No. No, sir. Document 3 in 115.		
8	A Oh, okay. I am sorry.		
9	Q That's okay.		
10	A Okay.		
11	Q And just so I understand, this is a document		
12	that you have agreed you edited, right or you had an		
13	3 opportunity to edit?		
14	A Yes, that's correct.		
15	Q Okay. And at the time you edited this		
16	document, you had both access to both the heat balances		
17	and the contract and the IP, HP and condenser limits,		
18	correct?		
19	A I could have had those available, yes.		
20	Q Okay. I mean, none of that was new		
21	information. That all existed back in 2006?		
22	A Right.		
23	Q Okay. So if I look at on page 24, if I could		
24	get you to turn to that.		
25	A Okay.		

1	Q In the first paragraph, about halfway down,
2	there is a sentence on the far right that starts MHPS,
3	do you see that?
4	A Yes.
5	Q So it says: MHPS Engineering indicated that
6	Bartow Unit 4S was an outlier relative to the Mitsubishi
7	40-inch L0 fleet with several operating hours above the
8	design limit of 15,000 I am stumbling over that
9	foot pounds per hour squared, parenthesis, the
10	Mitsubishi 40-inch L0 fleet average was closer to 12,000
11	foot pounds squared per hour, close parenthesis; do you
12	see that?
13	A I do.
14	Q Okay. You didn't propose to make a change to
15	that in your edit, did you?
16	A It does no, I did not.
17	Q Is that because it's factual?
18	A I don't believe it to be factual. Remember,
19	this is a draft document, and there is a lot of people
20	looking at it, and I wasn't privy to all the
21	conversations that took place over a long period of time
22	with this root cause team, but I have not seen any
23	Mitsubishi documentation that calls it a design limit.
24	I have seen documentation from Mitsubishi that refers to
25	their fleet maybe their fleet average or their

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1	normal their fleet operating experience, but that the
2	15,000 and 17,000 pounds per hour per square foot was
3	beyond their fleet experience and put them in a zone of
4	uncertainty.
5	Q You okay. The next sentence I mean, the
6	next paragraph, it starts, "While Duke Engineering", do
7	you see that?
8	A Yes.
9	Q So would you be considered part of Duke
10	Engineering for purposes of the RCA?
11	A Would I be?
12	Q Yes. I mean, you are an engineer. This is in
13	your area. You were overseeing the root cause team?
14	A We can assume that. Technically I am not and
15	never have been part Duke Engineering, but, yes, I can
16	see I was overseeing the process.
17	Q Right. And I accept that. Just to for the
18	judge to understand, Duke, big Duke that serves multiple
19	states has a centralized engineering area, which you
20	call Central Engineering, right?
21	A Correct.
22	Q And you also have engineers that are in your
23	direct chain of command that report to you, up the chain
24	to you, right?
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1	Q Okay. Those two groups of engineers and some
2	outside consultant engineers and yourself would have
3	been all part of bigger Duke Engineering, right?
4	A Yes.
5	Q Okay. So this sentence says: While Duke
6	Engineering agrees that back-end loading should be
7	considered a significant contributing factor toward root
8	cause, one cannot definitively conclude that it has been
9	the root cause of all five of the documented L0 events.
10	You didn't propose to change that sentence?
11	A Correct.
12	Q Do you believe it to be true?
13	A Well, I know that there is some issues with
14	that sentence. For example, there were really four LO
15	events. And then there was a fifth iteration where we
16	replaced blades proactively to try to get a new design
17	that would provide more megawatt output of the
18	generator, just to make that part clear.
19	Q Okay. Well, that's sort of a detail, isn't
20	it? It's not really that material to what's going on
21	here, is it? It would cover Period 1, and it would
22	cover Period 5, right?
23	A Right.
24	Q Okay. And, in fact, just so we can
25	understand, let's go to page one of this document, and I

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1	just want to ask you something that struck me curious
2	about this sentence.
3	It says: Duke Engineering concluded that
4	there was no correlation between any one of the above
5	listed factors and the five failure periods, is that
6	accurate?
7	A Could you show me where on page one that
8	Q Oh, I am sorry. I apologize. It's in the
9	next to the last paragraph.
10	A Oh, page one of JS-1?
11	Q Yes, sir.
12	A I am sorry. I was on the wrong document.
13	THE COURT: I was on yeah, final report.
14	THE WITNESS: Could you point to that sentence
15	again, please?
16	BY MR. REHWINKEL:
17	Q Okay. Go to the second to the last paragraph.
18	A Okay.
19	Q And it says: Duke Engineering concluded that
20	there was no correlation between any one of the above
21	listed factors and the five failure periods.
22	Is it events or periods that you are looking
23	at here? I mean, just to go to your point about there
24	were only four events, five periods, but
25	A Yeah. Well, I think it's both, right? There

1	was four events where we found damage, but there were
2	five operating periods. One of the periods came after
3	an iteration where we didn't have an event that caused
4	us to shut down, or we didn't find something on an
5	inspection that led us to change out blades, but we shut
6	down in order to install a new design of blade, so that
7	began Period 3. But you can't do the root cause on just
8	periods or just events. It's all-encompassing.
9	Q Okay. So in that context well so going
10	back to page 24 now that I understand how you are
11	looking at it.
12	MS. BROWNLESS: Excuse me, of which document?
13	Of JS-2?
14	MR. REHWINKEL: I'm just working in Exhibit
15	115.
16	MS. BROWNLESS: Okay. So you are on 18?
17	MR. REHWINKEL: So when I say a page, I mean
18	the Bates number.
19	THE COURT: Bates stamp, right?
20	MR. REHWINKEL: Yeah. I am not worried about
21	how the document is numbered.
22	BY MR. REHWINKEL:
23	Q So you said there was really four events
24	instead of five events. Apart from that, what other
25	problems are there with this sentence?

1	A Well, I think the key part of the paragraph
2	that you are pointing to is the sentence that starts, as
3	Appendix A illustrates, Periods 2, 4 and 5 saw operating
4	hours in the avoidance zone of one hour, 1.5 hours and
5	zero hours respectively. This indicates that back-end
6	loading was not the cause of any of the reported blade
7	indications failures during those periods of operation.
8	Q So you are saying that that undermines, or it
9	takes out any agreement that Duke Engineering had that
10	back-end loading should be considered a significant
11	contributing factor toward root cause?
12	A Again, this is not the root cause document.
13	This is notes, draft notes of a team. So there is no
14	conclusion here.
15	Q So why would people have put stuff in here it
16	if they didn't believe it to be true?
17	A I think it's a process, as we've talked about
18	before, working through probable, possible things that
19	could impact the blades that could cause the damage that
20	we saw.
21	The I think what this says is that Duke
22	agrees that back-end loading needs to be looked at, but
23	then when you look at the real-life operating experience
24	in these periods when we ran lower than even
25	Mitsubishi's fleet experience on steam flow loading on

1	blades, we still had damage with the blades. So that
2	clearly shows the lack of design margin.
3	Q Let me ask you about page seven of Exhibit
4	115.
5	Before I ask you the questions here, you agree
6	that no other Mitsubishi LO 40-inch blade steam turbine
7	experienced the kind of blade failures that you had in
8	Bartow; is that correct?
9	A I am not 100 percent sure that's accurate.
10	It's I just don't know.
11	THE COURT: Did Mitsubishi make that
12	representation during all this?
13	THE WITNESS: They did.
14	THE COURT: Okay.
15	THE WITNESS: Mitsubishi made that
16	representation, yes, Your Honor. In fact, it was
17	very more than that. They talked about how the
18	typical problems in their fleet of low pressure
19	turbines with LO blades was due to erosion, which
20	is not surprising. That's the same problem across
21	the industry with all equipment manufacturers of
22	turbines.
23	As the steam travels through a turbine and
24	uses its energy, it gets lower and lower pressure
25	and gets closer to the saturation point where it

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1	might turn into water. The blades aren't designed
2	to have water impinge upon them. They are designed
3	for steam. The water can cause erosion, which can
4	lead to cracking and failure. That's what
5	Mitsubishi told us was the issue that they had
6	_
	seen.
	We did not see this issue here, but there had
8	been some other indications through user groups,
9	not from Mitsubishi, that there, perhaps, were some
10	issues around the Mitsubishi fleet that Mitsubishi
11	did not report to us.
12	BY MR. REHWINKEL:
13	Q Now, I asked you in the deposition for any
14	information from users groups, and you said there was
15	none, correct?
16	A We have information from users groups.
17	Q I asked you in a late-filed Exhibit No. 11 to
18	provide it, did you?
19	A Oh, I don't know that we have documents. We
20	have people who have attended user groups, and we
21	have so they've had conversations with people at
22	users groups
23	Q Okay.
24	A so that's information.
25	Q So isn't it true that one of those

1 CO	onversations was you gave a presentation, and somebody
2 Ca	ame up to you afterwards and said I am interested in
3 w1	hat you are talking about?
4	A That is true.
5	Q Okay. But that person never said that that
6 <b>u</b>	tility had any problems with Mitsubishi that were the
7 sa	ame as yours?
8	A He indicated that they had similar issues.
9	Q Did he give you any information?
10	A No.
11	Q Okay. And did you present any of that
12 in	nformation in the root cause analysis?
13	A No.
14	Q And you had that information before 2018,
15 <b>r</b> :	ight?
16	A I don't know the relative dates of that user
17 g:	roup meeting compared to the root cause.
18	Q If I asked you that in your deposition and you
19 58	aid it was, do we need to go look at it?
20	A Okay, then
21	Q Okay.
22	A I agree.
23	Q And there was an inci there was a situation
24 ii	n Louisiana where someone came up to Mr. Salvarezza and
25 <b>s</b> a	aid he was interested, right, in what was going on at

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1	Bartow?
2	A Yes.
3	Q But he didn't say that they had L0 blade
4	problems, that they had failures like you had with
5	excessive vibration, right?
6	A That's correct.
7	Q Okay. And that was before 2018, correct?
8	A Yes.
9	Q And that didn't show up in the RCA or any of
10	the documentation that we were provided other than that
11	Q&A in the depo, right?
12	A We tried to verify through various means. The
13	fleet operating experience is obviously very important.
14	We rely on our OEMs for that information typically,
15	whether it's GE or Siemens or Mitsubishi. User groups
16	are also important, but we couldn't find any
17	documentation that there were similar failures to what
18	we've experienced at Bartow.
19	Q Now, would you agree with me that there are 32
20	Mitsubishi LO 40-inch blade steam turbines out there in
21	the world? I don't know if that includes you or not.
22	A I think at the time of this document, that was
23	the number that was used, right.
24	Q So you are one of 32 or you are one of 33?
25	A I don't know. There is probably more than

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1	that now. In fact, I know there are more than that now.
2	Q But at that time, there was 32 or 33?
3	A Yes. Yes.
4	Q And that was, like, 55 or 57 rows of blades
5	among all those units?
6	A Oh, yes, that's it was in the fifties.
7	Q Okay. And you have provided no evidence that
8	any unit other than Bartow among that fleet had blade
9	failures based on excessive vibration like you
10	experienced?
11	A That's accurate.
12	Q Okay. And you also agree, I think we just
13	talked about it in that draft, is that Duke Bartow was
14	an outlier compared to all of the other Mitsubishi LO
15	40-inch blade steam turbines?
16	A It was an outlier on steam flow pounds per
17	hour per square foot, right.
18	Q Wasn't it also an outlier in blade failure
19	experience?
20	A Yes.
21	Q Okay. Now, just to be clear in the R in
22	the if we go back to JS-2, the word outlier has been
23	taken out of the root cause analysis. In other words,
24	it doesn't show up in there with respect to how you
25	compare to Mitsubishi, right?

1	A How the Bartow plant compares to Mitsubishi?
2	Q Yes.
3	A I will take your word for it.
4	Q Okay. I mean, isn't it also true that in
5	these documents that were that preceded the final
6	draft, there was a reference to the Mitsubishi
7	experience and that got converted to industry
8	experience. So you took out the comparison of
9	Mitsubishi plants with respect to the blade failure
10	experience comparison, right?
11	MR. HERNANDEZ: Objection, Your Honor. We are
12	talking about a lot of documents. He is
13	referencing specific language in those documents.
14	If the witness could see the documents to answer
15	the question specifically.
16	THE COURT: Sure.
17	MR. REHWINKEL: Sure. I mean, we can go
18	through it.
19	BY MR. REHWINKEL:
20	Q Let's go to page 125. Just pick one. And
21	this is Document 13 under the tabs.
22	A Okay. I am there.
23	Q And if you go back to 123, it looks like it
24	was a October 12th document.
25	A Okay.

1	Q And back on page 125, and the one, two, third
2	full paragraph there, halfway down it starts on the
3	right-hand side, the number of blade failures and
4	problems with ST LO blade performance is not typical,
5	i.e., these issues are outliers among the Duke CC fleet
6	as well as the Mitsubishi 40-inch L0 fleet.
7	Did I read that right?
8	A Yes.
9	Q And that's true, isn't it?
10	A As far as I know, that is true.
11	Q Okay. Now, is it fair to say and if you go
12	back to JS-2, which is Document 1, that sentence does
13	not reappear, does it or let me withdraw that and say
14	that sentence does not appear?
15	A It doesn't, but I don't again, we talked
16	about this before. All these documents you are going
17	through are drafts of a working team. There is notes.
18	They are not a final root cause, and I wouldn't expect
19	the final root cause to be identical to any of these
20	documents.
21	Q Well, let's look at page two of Exhibit 15,
22	it's also JS-2.
23	MR. BERNIER: So two of JS-2?
24	MR. REHWINKEL: Yes.
25	MR. BERNIER: Thank you.

1	BY MR. REHWINKEL:
2	Q In the second full paragraph it starts "based
3	on", do you see that?
4	A I do.
5	Q This is your ultimate conclusion, right?
6	A It is. We discussed that before.
7	Q And this doesn't mention a comparison to
8	elsewhere in the industry, but elsewhere in the industry
9	referenced there is really Mitsubishi, right?
10	A No, that's not accurate. If you look at the
11	footnote at the end of that paragraph, that refers down
12	to the I will read it to you.
13	The most commonly reported issue with the
14	40-inch LO blade design elsewhere is water erosion,
15	which both Duke and MHP also agree is not a contributing
16	factor to the Bartow failures. So I really was
17	referencing the industry in general.
18	Q Okay. So but the outlier language and the
19	comparison to Mitsubishi and those other 32 plants,
20	experience is not contained in the final report that the
21	Public Service Commission gets to see, right?
22	A It's not in the root cause. And by agreeing
23	to what you just said, I am agreeing that these are
24	various drafts of root cause documents, which I don't
25	agree with that.

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1	Q Wait, now, you don't agree that Bartow and
2	Period 1 was an outlier compared to the rest of the
3	Mitsubishi LO 40-inch steam turbine fleet?
4	A An outlier from the standpoint of steam flow,
5	and an outlier from the blade, the snubber and Z-lock
6	damage we talked about, yes, I agree that it was an
7	outlier.
8	Q Okay. All right. So now I started this line
9	of questioning by asking you to go to page seven, and
10	look at footnote six.
11	MR. BERNIER: Seven of which? I am sorry.
12	MR. REHWINKEL: Of 115.
13	MR. BERNIER: Got you.
14	MR. REHWINKEL: It's the same as
15	THE WITNESS: Okay. I am there.
16	BY MR. REHWINKEL:
17	Q You are there. And you see footnote six down
18	there?
19	A I do.
20	Q Would you mind reading that aloud? And I am
21	going to ask you about the last sentence.
22	A Okay. Even though the LO blades are no longer
23	in the ST and the pressure plate has been installed,
24	MHPS Engineering does not have enough technical data to
25	support releasing Duke to operate the machine beyond the

1	current IP turbine exhaust pressure operating limits
2	because of potential impacts to upstream blading. That
3	is the L1 blade sets. This suggests that MHPS is unsure
4	what effect, if any, is created by its avoidance zone,
5	and more importantly, points to a design flaw that
6	affect more than the LO blades.
7	Q Now, this statement about a design flaw, is
8	there an analysis that was conducted to determine that
9	there was a design flaw in the L in the Mitsubishi
10	steam turbine that you bought?
11	A I think this statement is pointing to the fact
12	that Mitsubishi couldn't relieve the operating
13	constraints that were in place. Even after we took the
14	LO blades out and put a pressure plate in, Mitsubishi
15	still said you need to operate at a more conservative
16	or the more conservative operating parameter led Duke to
17	believe that there is more concern on Mitsubishi's
18	standpoint that perhaps it's not just an LO issue,
19	perhaps it's an issue elsewhere in the low pressure
20	turbine, and that perhaps they are questioning their own
21	design.
22	Q Well, what is elsewhere in your opinion? The
23	upstream blades? The nozzles? Anything?
24	A Well, technically, thousands of blades are the
25	same thing, but, yes, the so the well, let me show

25	Q How many 4-x-1 combined cycle units did Duke
24	blades, so we had to gather that information.
23	period, we did a very detailed inspection of those
22	At the end of Period 2 at the end of every single
21	At the end of Period 1, we did an inspection.
20	than is the norm.
19	inspections on the steam turbine, many more so times
18	we had multiple opportunities to do very detailed
17	very concerned every time we opened up this machine, and
16	A There is not. But I can tell you we obviously
15	the turbine, is there?
	where you determine that there was something wrong with
14	
13	Q But beyond this footnote, there is no analysis
12	damaged.
11	and that perhaps those rows of blades might become
10	Mitsubishi appeared to be questioning their own design,
9	maybe there would be damage to other blades that
8	continue operating at that lower pressure limit because
7	So there was concern that perhaps we need to
6	and this row of blades.
5	blades. Upstream of that would be this row of blades
4	and this way. So here's the LO blade, the largest
3	goes in the middle of the turbine and then goes this way
2	So upstream would be so remember the steam
1	this picture.

1	have experience with before you commissioned Bartow?
2	A This is Duke's only 4-x-1.
3	Q Okay. And how many 4-x-1 so would it be
4	fair to say that you did not have robust operating
5	experience with a 4-x-1 combined cycle unit?
6	A Yes.
7	Q Are you familiar with Exhibit 106 it's the
8	August 13, 2018 called the settlement.
9	MR. BERNIER: 106?
10	MR. REHWINKEL: Yeah, 106.
11	THE WITNESS: Yes, I am.
12	BY MR. REHWINKEL:
13	Q Okay. Now, is it
14	MR. BERNIER: Give us one second, Charles. I
15	am trying to find it.
16	MR. REHWINKEL: Oh, I am sorry.
17	MR. BERNIER: Okay.
18	BY MR. REHWINKEL:
19	Q So if we go to the back, page 11, we see Tony
20	Salvarezza signed this thing on October 13, 2018?
21	A Yes, I do.
22	Q And you would agree that Duke was having
23	discussions and trying to either work well, trying to
24	work out a resolution of these matters with Mitsubishi
25	at sometime not long after the RCA was completed?

1	MR. BERNIER: Judge, I am going to have to
2	object to this. I am not sure how any resolution
3	Duke was trying to work out with Mitsubishi has
4	anything to do with how the unit was operated
5	leading up to 2017, or after 2017 when the pressure
6	plates were put in. And I think those are the two
7	issues that we are here to talk about today. And I
8	am not sure how a settlement agreement is relevant.
9	THE COURT: Well, you are going to show us
10	it's relevant?
11	MR. REHWINKEL: Yes.
12	THE COURT: Okay.
13	BY MR. REHWINKEL:
14	Q And my question is: You signed you
15	provided you finalized an RCA and you filed it with
16	the Public Service Commission on March 1st, right?
17	A I don't know that that was the date of filing,
18	but yes.
19	Q Sometime in March?
20	A It was done in February it requires it's
21	finalized in February, so that makes sense.
22	Q And you filed testimony in March of 2018?
23	A Yes. Yes. Yes. March 1st, you are right.
24	Thank you.
25	Q Okay. And in this document, it says there was

1	a design flaw in the turbine, right?
2	A Could you point to where you are looking at?
3	Q I am sorry. When I say this document, I am
4	pointing to your root cause analysis at page seven.
5	A Page seven of the root cause analysis?
6	Q Yeah, footnote six that we were just talking
7	about.
8	A So, yes, it says it suggests that Mitsubishi
9	is unsure, and that there may be a design issue.
10	Q And it says, more importantly, points to a
11	design flaw that may affect more than the LO blades,
12	right?
13	A Yeah.
14	Q Okay. So my question to you is, you just said
15	there was a design flaw in February. In August you
16	signed an agreement where you gave up all your rights to
17	sue under the contract that you bought the unit for,
18	isn't that right?
19	MR. BERNIER: I'm going to go back to
20	objecting, Your Honor. I just don't see how that's
21	relevant to how we operated the unit, how Duke
22	operated the unit in 2017, the decision whether or
23	not to settle any potential contract claim. I just
24	don't see the relevance to the two issues we've got
25	identified here today.

1	MR. REHWINKEL: My response to that, Your
2	Honor, is that the root cause analysis we
3	established early on today that this is their
4	principle evidence to meet their burden of proof.
5	This root cause analysis purports to be what
6	happened, and they are asking the Public Service
7	Commission to rely on it to absolve them of any
8	liability to the customers for replacement power.
9	One the problems that we've raised is that the
10	way they ran the unit in the first period has
11	caused problems in later periods. They have and
12	part of our case is that their explanations about
13	the blade are inconsistent with the experience
14	other units have had.
15	Now, in the root cause analysis, they are
16	saying that there may be a design fault with the
17	turbine itself, not the blades, which is what their
18	whole case is about, but the turbine itself; and
19	they are asking the Commission to rely on that
20	while they are settling with Mitsubishi to give up
21	their right to sue for a design flaw.
22	It doesn't so we are offering this as
23	impeachment to the conclusions in the RCA because
24	the RCA is submitting that there is a design flaw
25	while, at the same time, they are giving up their

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1	right to sue. That's an inconsistency that we
2	would like you to consider in your fact-finding.
3	THE COURT: I am going to allow it, but I
4	mean, it's without prejudice. I mean, you can
5	continue to argue that it's not relevant. I am not
6	sure that you are totally tying it up, but I am
7	going to at least let them present it.
8	MR. BERNIER: Understood.
9	BY MR. REHWINKEL:
10	Q Okay. So my question to you was is that what
11	happened?
12	A Well, I think there is more to this agreement
13	that you are not talking about that's pretty important,
14	and you need to also think about the whole timeline of
15	events and what the warranty provisions were in the
16	contract, which I don't know specifically, but
17	typically, there is about a three-year warranty period.
18	It's typically one year for some pieces. It may be two
19	years, three years if you are lucky, all right. So
20	that's from '09 when we first started operating. This
21	agreement was in 2018, six years later. So I don't know
22	is that we had any warranty claim left on the original
23	blades, and I think that's what you are inferring.
24	Q Well, if you are saying there is a design
25	defect?

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1	A Even for a design defect.
2	Q Okay. And we don't know and I am not
3	asking you to resolve that question because I know you
4	are not an attorney, right. But the my original
5	question that started this line is what analysis did you
6	do to demonstrate that there was a design flaw in the
7	turbine? And I don't think there was one, was there?
8	A I think we are well, what we are saying is
9	that there was inadequate design margin at the very
10	least.
11	Q That was for the blades, right?
12	A Well, you are I think you are
13	misinterpreting something. So look back at the point
14	that the wording that you are pointing to is on page
15	seven of JS-1 and JS-2, correct?
16	Q Page seven, footnote six.
17	A Right. So the last sentence, this suggests
18	that MHPS is unsure what effect, if any, is created by
19	its avoidance zone, and more importantly points to a
20	design flaw that may affect more than the LO blades. So
21	what do you mean when you say the turbine?
22	Q Well, the part of the turbine that's not the
23	LO blades, everything else that you showed the judge on
24	the picture.
25	A So which would be the L1 blades, the other

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1	sets of blades, which we know from very detailed
2	
	examination didn't have any damage. We looked way more
3	times than we should have, but we gained a lot of
4	information doing those inspections.
5	Q And is there did you present any evidence
6	in this RCA concurrent with this assertion here in this
7	footnote that any other Mitsubishi L0 40-inch steam
8	turbine units were having the same kind of problems, or
9	had a design defect or flaw in them?
10	A That wasn't the question of the root cause.
11	The question of the root cause is why did these snubbers
12	and these Z-locks fail?
13	And so, yes, you take into consideration what
14	is that fleet experience? And the root cause shows, or
15	says we reviewed, the team knew that the fleet
16	experience at the Bartow plant was an outlier compared
17	to the Mitsubishi fleet from a damage standpoint. But
18	when you go back and look at what caused the Bartow
19	failure, that's what the root cause is about. It's not
20	about we didn't do a root cause on Mitsubishi's
21	issues. We did a root cause on Duke Energy's issues.
22	Q But if there was a design flaw, it wouldn't
23	have been just not a manufacturing flaw, you are
24	saying it's a design flaw. That would have applied to
25	the other 32 units, right?

1	MR. HERNANDEZ: Objection, Your Honor,
2	foundation.
3	THE COURT: Overruled. I mean, I think it's
4	understandable.
5	THE WITNESS: Potentially it could be
6	applicable to the other units. And you have to
7	look at the design conditions, the operating
8	parameters of each of those 30-some units, or
9	50-some rows of blades that we talked about. And
10	if any of those other 50 blades were operated the
11	same way as Bartow within the guidelines
12	established by the OEM, I would be pretty worried
13	if I owned one of those other sets of blades.
14	BY MR. REHWINKEL:
15	Q Well, you agreed you are an outlier, and they
16	didn't have any of the same kind of problems, right?
17	A Correct.
18	Q So why wouldn't isn't that just as
19	correlative that there is not a design flaw in there
20	because they are not having any problems and only you
21	are?
22	A Not necessarily. That's a factor that you
23	have to take into account, but the operating parameters
24	
	at Bartow we just talked about how Bartow is a 4-on-1

1	compared to the Mitsubishi fleet. It's about 15 the
2	calculation is about 15,000 pounds per hour per square
3	foot of impact on the last stage blades, which is an
4	outlier to the Mitsubishi fleet, but we operated within
5	the design parameters given by Mitsubishi.
6	They didn't say, don't operate beyond 15,000
7	or 17,000. There is no way to measure that. They said,
8	don't operate beyond this operating pressure. Don't
9	operate besides this beyond this operating
10	temperature, which we did.
11	Q Would you agree with me that Exhibit 106
12	covers claims that dated back to Period 1?
13	A Yes.
14	Q Okay. And what basically what you did
15	here, I and tell me if I am oversimplifying it, is
16	you had they had a claim against you for, like, \$10.2
17	million and you had a claim against them for \$6 million,
18	and you settled it where you gave them \$3 million and
19	they gave you a \$2 million credit on the next set of
20	blades, is that
21	A That's a fair summary.
22	Q Okay. So I just want to ask you about
23	A I am sorry, with one exception. I am sorry.
24	Q Sure.
25	A The credit could have been used in many

1	different ways. Not necessarily at Bartow.
2	Q Right. It specifically mentioned you could
3	use it on the blades, but you could use it elsewhere
4	under other conditions, right?
5	A Correct.
6	Q Okay. And it can be read in here, right?
7	A Yes.
8	Q So let's just go to page one, and I just want
9	you to read for the record the last two whereas clauses
10	aloud, please.
11	A Okay. Whereas, after the steam turbine was
12	commissioned in June 2009, MHPS designed enhanced L0
13	blades that would endeavor to allow Bartow station to
14	increase its output from 420 megawatts to 450 megawatts
15	and whereas, the parties entered into purchase order
16	718383 on February 10th, 2014, whereby MHPS was to
17	design and install such enhanced design L0 blades at a
18	\$6 million cost to DEF, which amount DEF has paid.
19	Q Okay. So this is a document that Mr.
20	Salvarezza signed on behalf of the company, right?
21	A Yes.
22	Q So he agreed to what is stated in these two
23	whereas clauses, correct?
24	A Yes.

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And doesn't that say that, reading these two

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1	together, that the output of the steam turbine was
2	420 megawatts and you wanted to increase it to 450,
3	right?
4	A Generally that's correct.
5	Q And that specifically is in Period 1 that it's
6	420, right?
7	A Yes.
8	MR. REHWINKEL: Your Honor, I believe if we
9	take a short break here, I can substantially
10	shorten the day at least from what I am
11	contributing to it.
12	THE COURT: How long do you need?
13	MR. REHWINKEL: Just five minutes.
14	THE COURT: Five minutes. Sure, we will take
15	five.
16	(Brief recess.)
17	THE COURT: Back on.
18	Whenever you are ready, Mr. Rehwinkel.
19	MR. REHWINKEL: Thank you for that, Your
20	Honor. And I think it did help a great deal.
21	Thank you.
22	THE COURT: Yep.
23	BY MR. REHWINKEL:
24	Q Let's go to we are still on Exhibit 115,
25	and go to page two.

1	A Okay.
2	Q And if you wouldn't mind reading the second
3	paragraph above where it says historical overview, where
4	it says for Bartow, just that sentence.
5	A Starting with the words "for Bartow"?
6	Q Yes, sir.
7	A For Bartow, the long-term solution is to
8	replace the LO blades with blades of a different design
9	and/or to retrofit the LP steam path and/or continue
10	operation with pressure plate.
11	Q All right. Would you mind explaining, so
12	that to the judge what is referred to there as the LP
13	steam path?
14	A Yes, sir.
15	May I stand up, Your Honor?
16	THE COURT: Sure.
17	THE WITNESS: So the three options are
18	essentially replace the LO row again, the two rows
19	with another design of blades, or when we say the
20	whole low pressure steam path, it would basically
21	be lifting this section of the overall turbine
22	generator out and putting a different low pressure
23	turbine in.
24	So that would entail all rows of blades, all
25	rows of fixed diaphragms in between the blades, the

1	casing, everything associated with the low pressure
2	turbine.
3	BY MR. REHWINKEL:
4	Q Thank you.
5	And it says and/or there, is that correct?
6	A It does.
7	Q Now, I am not trying to just for factual
8	purposes, in October, November of this year, you
9	actually put in the solution that you chose, which was
10	we call the Period 7 blades?
11	A We are on Period 7. Yeah, we put in another
12	iteration of blades redesigned that had very significant
13	testing done at a facility in Japan that we witnessed.
14	Those blades were installed November, December
15	timeframe. I can't remember the date we started up, but
16	it was in, I think, early December. So we are operating
17	with those that generation of blades right now.
18	Q Okay. So is it fair to say that well, so
19	now Mitsubishi has installed the fourth set of blades on
20	this on that low pressure turbine, is that fair, or a
21	different set?
22	A Well, we installed one end at the start of
23	Period 2, then both ends at the start of Period 3, both
24	ends at the start of Period 4, both ends at the start of
25	Period 5. The start of period six had pressure plates.

1	So to your point, this is really the start of Period 7
2	with new blades, but I think it's more than four.
3	Q So it's five sets?
4	A Yes.
5	Q Now, this is just a hypothetical, because I am
6	not suggesting that it's not going to work. But if
7	there is a problem with this set of blades, will you
8	replace the steam path for certain?
9	MR. BERNIER: I'm going to object. Again, we
10	are going back to the two issues of operation, and
11	now we are dealing with a hypothetical about what
12	could happen in the future.
13	THE COURT: That's well, I will overrule it
14	again. I mean, Mr. Swartz, if you have any notion,
15	you can answer.
16	THE WITNESS: Well, let me start by saying one
17	big difference in this iteration is we've installed
18	a permanently-mounted blade vibration monitoring
19	system along with the new sets of LO blades. So as
20	we increase load, we can take data.
21	It's very much like the temporary system that
22	was used at the beginning of Period 3, where we
23	came up with the avoidance zones. This is a
24	permanently mounted system, much more robust, so
25	it's made so it's not going to come apart and

1	potentially cause what we would call domestic
2	object damage inside the turbine.
3	That gives us much greater confidence that we
4	will find an issue prior to any type of vibration
5	that would lead to component failure. So I think
6	that's a really significant difference with what we
7	did with this iteration of blades.
8	You know, the hypothetical, what would we do
9	if this set of blades failed? Really, we would
10	have to like, how would they fail? I mean
11	and I am not trying to be funny, but was it an
12	erosion issue? Was it high cycle fatigue? Was it
13	a snubber? Was it a shroud?
14	I think it depends on the type of failure. If
15	it's an erosion issue, for instance, there are ways
16	to deal with that. So it really depends.
17	I think where you are going, though, is, you
18	know, our appetite my personal appetite for
19	putting in more sets of blades is very low, you
20	know, that's why we put a pressure plate in at the
21	start of Period 6. No more trying. We've got to
22	figure something else out, and our customers can't
23	stand that.
24	And I think that was a really good decision, a
25	very sound decision, because once we put that

1	pressure plate in in the spring of 2017, we finally
2	had two-and-a-half years of nothing happening.
3	Yes, we ran about 40 megawatts lower from the total
4	output. Instead of a 1,200-ish megawatt site, it
5	was 40 megawatts lower than that. But we didn't
6	have any issues where we had to shut down for the
7	low pressure turbine, and I think that was really
8	good for customers.
9	It was the right decision while we were
10	figuring out what we could do for the next
11	iteration, which I do believe will be the long-term
12	solution, but Period 7 is going to go on for a long
13	time.
14	BY MR. REHWINKEL:
15	Q Just on your blade vibration monitor point, it
16	is true, as is stated in the next sentence, that even
17	had you replaced the steam path, you still would have
18	insisted on a blade vibration monitor as a part of

19 anything that was done, right?

A That was Duke Energy's position. We wanted to make sure that that was part of the solution. Not all the -- not all vendors agreed to that.

23 Q All right.

A So it actually disqualified some from the --25 from that project.

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1	Q And GE was a close second to the solution that
2	you put in in the fall of '19, right?
3	A They were.
4	Q Okay. And the fact that it says and/or means
5	that you still haven't completely given up on maybe
6	replacing the steam path, right?
7	A I think the and/or is really just trying to
8	show that there were three options, that they're not
9	mutually exclusive, right? Let me get back to the
10	sentence and read it again.
11	Right. So it might require new designed L0
12	blades and a new steam path. That's what the root cause
13	is showing. But at the point of this root cause, we
14	didn't know what the long-term solution was. So we're
15	just leaving all options open while the team studied
16	what the ultimate long-term solution would be, which we
17	then decided, you know, long after, months after this.
18	Q Okay. When you did your industry experience
19	research, you didn't find any instance of an L 40 an
20	LO 40-inch steam turbine in the Mitsubishi fleet having
21	to replace even one set of blades in 11 after only 11
22	years of operation, did you?
23	A I am not sure. I actually suspect that there
24	were issues, but likely caused by erosion.
25	Q Okay. I should have added based on a

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1	vibration-induced damage?
2	A Right. No snubber or shroud issues like we've
3	experienced at Bartow.
4	Q Okay. So with that clarification, your
5	research didn't reveal
6	A Correct.
7	Q And you did not, likewise, turn up any
8	industry experience that showed that a L0 40-inch
9	Mitsubishi steam turbine operator had to replace a steam
10	path?
11	A Correct, we did not find anything of that.
12	Q Okay. All right. I have just have a couple
13	of sort of clarification questions to ask you on I am
14	still on 115, and I want to take you back to page 17 of
15	18, which is Exhibit 17
16	A Okay.
17	Q exhibit page 17.
18	Can you tell me why Citrus L0 on the far
19	right-hand side is the header for that column?
20	A I may be on the wrong page.
21	Q I apologize. It's the one it's the
22	Appendix A in your JS-2. It's page 17, and it says
23	Appendix A.
24	A I am sorry, I was on page seven.
25	Q Sorry.

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1	A All right. I am there.
2	Q So my question to you is: Can you tell me why
3	Citrus L0 is the header for the far-right column?
4	A I don't know specifically, but what I do know
5	is that Duke had Duke Energy had some concerns over
6	the Citrus LO blades.
7	Citrus combined cycle is our newest plant.
8	It's two 2-on-1 combined cycles on one site, and it does
9	have Mitsubishi equipment, Mitsubishi combustion
10	turbines and Mitsubishi steam turbines. So there is two
11	steam turbines, and it does have 40-inch steel blades,
12	so there is a similarity there.
13	The design at Citrus is such that the
14	calculated steam flow we've been talking about this
15	pounds per hour per square foot number. It's less than
16	11,000, or around 11,000 at Citrus. So because of that,
17	Mitsubishi doesn't not think that there is any issues,
18	but I believe they are similar to Type 5 blades, or they
19	are Type 5 Mitsubishi Type 5 blades, which don't
20	mistake that with period, right. So they are different
21	style of blades than any of the iterations at Bartow,
22	but they are similar in that they are 40-inch steal L0
23	blades, if that makes sense.
24	Q Okay. I just wanted to understand whether
25	this was supposed to be an identical comparison of what

1	you are putting on as a type as a Period 5 blade, and
2	that's
3	A I know we obviously had concern with this
4	Citrus project because of what were finding out, or what
5	we found out here. So we are just showing for
6	comparison purposes what is installed at Citrus.
7	Q Okay. I understand that.
8	And can you tell me, do you know at what point
9	in any of the periods any of the damage to your LO
10	blades occur at Bartow?
11	A We do know. If we could look if we look at
12	that same exhibit and go to just because it's going
13	to help me remember some things. If we go to page five.
14	It's Table A.
15	During Period 4, we were able to pinpoint when
16	some of the damage occurred. We had if you look at
17	the keynotes from period row and go over to that Period
18	4 column, it said it shows the two separate step
19	changes that were actually reductions, decreases in
20	vibration, led Duke Engineering recommendation to remove
21	the steam turbine from service for inspection.
22	So there was discussion with Mitsubishi after
23	we noticed these reductions in vibration. It's
24	interesting, Mitsubishi believed it to be bearing
25	settling in, just some normal course of action after an

1	outage on a steam turbine, which we had just had an
2	outage at the start of Period 4. Our Duke Engineering
3	wasn't convinced.
4	It's an unexplained change in vibration,
5	you know, typically well, you monitor vibration for
6	increases. If there is an increase in vibration, you
7	need to understand why, and if you can't figure it out,
8	if it gets beyond a certain point, you typically stop
9	operation and go conduct inspections, because that can
10	lead to damage very significant issues in multiple
11	components.
12	In this case, there were slight changes and
13	there were reductions, but after inspection, we when
14	what we found, we found, looking at row broken snubbers
15	in the row that's titled "Broken Z-locks", we found one
16	broken snubber on the generator end of the machine, one
17	broken Z-lock on the turbine end of the machine, and two
18	broken Z-locks on the generator end of the machine, and
19	so that's one, two that's four pieces of metal.
20	Small pieces of metal. Remember, we are talking about
21	the snubbers and the Z-lock. But two of those instances
22	were almost certainly the times we saw the slight

23 reductions in vibration.

24 So the fact that we shut down to do an 25 inspection and take a look was the right thing to do,

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1	the prudent thing to do. Before we could operate any
2	more, we had to replace blades yet again.
3	Q So is that the only
4	A That's not the only time. I am sorry. Back
5	to your question.
6	In Period 5, if you look at the same row,
7	keynotes from period, it doesn't show the date, but we
8	do know same similar type of thing. It wasn't
9	vibration in this case, but we had two things happen
10	simultaneously.
11	We had a decrease in pressure of vacuum. We
12	are losing vacuum in the condenser. And we also, all of
13	a sudden, have indications of sodium in the condenser.
14	The cooling water that flows through the
15	condenser is saltwater. It's from Tampa Bay. So sodium
16	is much easier to monitor than chloride level, so we
17	monitor for sodium. Any indication of sodium above
18	very, very minute traces is a large alarming. If you
19	get sodium, or especially chlorides into your pure water
20	that you are going to just turn back into steam and
21	reuse it in the process again, that causes all kinds of
22	issues in the system, and potentially turbine issues in
23	the long-term.
24	So we got an alarm that we had high sodium.
25	We have an alarm that there is reduction in vacuum, so

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1 we shut down the turbine immediately. So we know when
2 that failure occurred as well. So Period 4 and 5, we do
3 know when those happened.
4 Period 1, we don't know when that happened.
5 Period 3, we don't know when that happened.
6 Q Okay. And for Period 1, 2, 3, 4 and 5, can
7 you tell me what pressures were on the blades at the
8 time damage occurred?
9 A By pressures on the blades, you mean this mass
10 flow rate that we've been discussing?
11 <b>Q Yes.</b>
12 A I don't know that number. Again, it's a
13 calculated number. What I can tell you is that we were
14 operating below whatever the LP turbine or IP exhaust
15 pressure limitation was at the time.
16 Q Okay. Mr. Swartz, those are all the questions
17 I have for you today?
18 MR. REHWINKEL: Thank you, Your Honor.
19 THE COURT: Who's next?
20 EXAMINATION
21 BY MR. MOYLE:
22 Q Good afternoon. I am Jon Moyle, I am
23 representing the Florida Industrial Power Users Group.
24 You have been in the electric world a long
25 time, have you not?

1	A	Yes, sir, I have.
2	Q	Okay. Are you familiar with the U.S. Energy
3	Informatio	n Administration?
4	A	Not really. No, sir.
5	Q	EIA, you have never
6	A	It's somewhat familiar, but I wouldn't say I
7	am the	acronym is, rather, but I am not familiar with
8	what it do	es.
9		MR. MOYLE: I have a document if I can just
10	show	him?
11		THE COURT: Sure.
12		THE WITNESS: Thank you.
13	BY MR. MOY	LE:
14	Q	Sir, I have handed you a document from U.S.
15	Energy Inf	ormation Administration. It's a glossary of
16	terms unde	r the letter G, right?
17	A	Yes.
18	Q	Okay. I might have handed you my copy that
19	had a litt	le star on it.
20	A	Oh, it has the answer on it.
21	Q	The generator nameplate capacity, which is on
22	page three	of six, do you see that?
23	A	Generator nameplate capacity?
24		Right.
25	A	Yes, sir.

1 0 Would you mind just reading that into the 2 record? 3 А Generator nameplate capacity installed. The 4 maximum rated output of a generator, prime mover, or 5 other electric power production equipment under specific 6 conditions designated by the manufacturer -- designated 7 by the manufacturer. Installed generator nameplate 8 capacity is commonly expressed in megawatts and is 9 usually indicated on a nameplate physically attached to 10 the generator. 11 Q Okay. Are you comfortable with that 12 definition for generator nameplate capacity? 13 Α I am. 14 Q Okay. And a couple of follow-ups on that. 15 Does the unit that we are talking about here 16 have a, you know, have a nameplate on it? 17 Α I don't know. 18 If you were to show me around, you could you 0 19 say, Mr. Moyle, let me show you our nameplate, and it 20 would be right there, and I would see 420? 21 I wish I could tell you. I don't know if it Α 22 has a physical nameplate or not. 23 So you just don't know one way or the other on 0 24 that? 25 А I don't. But what I can tell you is in the

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1	contract we looked a little bit earlier today at the
2	generator capability curves, and that does include the
3	nameplate ratings of the generator.
4	Q Right. And there is nameplate I mean, we
5	have it throughout these documents, right? You looked a
6	it, and that chart you were looking at it says 420,
7	right, in your root cause analysis?
8	A Right.
9	Q And I just want to get your understanding on
10	the record with respect to nameplate and what it means.
11	Also, with respect to when Duke or others
12	announce a project, don't they typically announce it by
13	using the megawatts that are expected from the
14	nameplate?
15	A Yes, I would agree with that.
16	Again, we typically that's our product.
17	That's what people are familiar with, and that would
18	make sense to make announcements in that manner.
19	Q Okay. I am wanting to ask you some questions
20	about the root cause analysis.
21	If I understand I mean, the history of this
22	generator is, is that it's referred to in some of your
23	documents as it got picked up on the gray market, right?
24	You have to say yes or no.
25	A Yes, I am sorry, yes.

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1	Q The court reporter needs to put nodding head
2	yes.
3	A Sorry.
4	Q Anyway, that's all right.
5	And so the gray market is, you know, kind of
6	an interesting term. What does that mean, the gray
7	market for generators?
8	A So the gray market would mean it wasn't
9	bought or a piece of equipment isn't bought from the
10	original equipment manufacturer. In this case, the
11	steam turbine that was installed at the Bartow project
12	was purchased it was originally manufactured for a
13	different company for a different project, and so and
14	that project fell through. I don't know why it didn't
15	come to fruition. And so instead of going to the
16	original equipment manufacturer and buying something
17	directly from them, it was this one that was already
18	there that was really owned by a company called Tenaska,
19	and we purchased that one. So that would be the gray
20	market.
21	Q Yeah. Would it be somewhat analogous to if I
22	was going to buy a Ford F150 truck, I can buy it from
23	the dealership and nobody had owned it before, or I
24	could buy it from somebody who bought it from a
25	dealership and then drove it home and then said, you

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1	know, I don't really like it and left it in his garage
2	for a few years and I bought it from him in his garage
3	after a few years; is that fair?
4	A I don't think it's exactly fair.
5	In this case, the turbine was never delivered
6	to Tenaska. It was kept in storage at Mitsubishi, so it
7	was subject to the same whenever Mitsubishi or any
8	turbine manufacturer makes a product, they are
9	manufacturing it and they are storing it under a certain
10	set of conditions. So this one was stored in those same
11	sets of conditions as a regular new turbine, never left
12	Mitsubishi, but stayed or never yeah, never left
13	Mitsubishi, so it yeah, it didn't go to that other
14	person's garage in your
15	Q Yeah. And so you as we sit here today, you
16	know for sure it didn't get in a warehouse somewhere
17	else. It stayed on Mitsubishi grounds and stayed in
18	their warehouse, or you are not sure of that?
19	A No. It's my understanding Mitsubishi had
20	possession, and we've actually looked at well, the
21	project team involved in the project looked at all kinds
22	of documentation of the storage conditions from
23	manufacture to the date of purchase and to inspections
24	as well.
25	Q How long from date of manufacture to date of

1	purchase for you all, how long did it stay in the
2	warehouse?
3	A I am sorry, I don't know that number.
4	Q It was more than a year, was it not?
5	A It was more than a year, yes.
6	Q Do you know if it was more than five years?
7	A I don't think it was more than five. It may
8	have been around four, if I remember correctly.
9	Q Yeah. Are I have a boat. And people tell
10	me on my boat that the best thing you can do for it is
11	use it, run the engine, that you need to run the engine
12	to make it operate okay. Have you ever heard anything
13	like that being an engineer, it helps to run things?
14	A I have heard similar things like that, but I
15	would also tell you that that engine then is going to
16	need more frequent maintenance intervals because you put
17	on run hours.
18	Q Yeah. Yeah. The engine the turbine you
19	bought, it was not run while it was in the warehouse,
20	correct?
21	A Correct.
22	Q Okay. And if things are not run, there are
23	issues that can arise from an engineering standpoint,
24	correct?
25	A Not necessarily. Again, you have to think

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1	about how this turbine is stored, and it was actually
2	stored under inert gas pressure in casings with the
3	pressure monitored so the regular atmosphere that we are
4	breathing now never even got to the turbine, so that
5	prevented corrosion, for example.
6	Q Was the plant near the sea? I mean, Japan is
7	surrounded by a lot of water, is it not?
8	A I don't know.
9	Q You don't know where it was?
10	A I don't know where the plant was.
11	Q There have been a lot of questions about root
12	cause analysis, or RCA, and let me just make sure I got
13	this right. You all, Duke, did a root cause analysis,
14	correct?
15	A Correct.
16	Q And that was comprised of seven people who are
17	all Duke employees, correct?
18	A I think that's what this says. One of them
19	was actually a consultant, as Mr. Rehwinkel pointed out,
20	a former Duke employee, that at the time of the root
21	cause was actually a consultant back for the company.
22	Q Okay. So you had six Duke employees and some
23	person who was a Duke employee for a number of years
24	that recently left and came back in?
25	A Yes, sir.

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1	Q Okay. And you were not on that seven-member
2	team?
3	A That's correct.
4	Q Okay. So some of the questions that Mr.
5	Rehwinkel asked you, you were struggling a little bit
6	and surmising, and there were a couple of objections
7	from your lawyer about I don't want you to have to
8	guess. I assume that's because you weren't involved in
9	drafting the report, correct?
10	A That's correct.
11	Q All right. Mitsubishi, they also did a root
12	cause analysis, did they not?
13	A They did. In fact, I think they've done
14	multiple root causes.
15	Q Right. And their first take at it, their
16	first take at it was essentially too much steam is being
17	put through the process, correct?
18	A Too much steam to the low pressure turbine,
19	yes.
20	Q Right. And your your being Duke root
21	cause analysis, you spent a lot of time with Mr.
22	Rehwinkel on it. I am going to try to characterize it
23	at a high level and see if I can get you to agree that
24	you are comfortable with this, but that there were
25	identified a number of possible causes for the problems

<ul> <li>A Correct.</li> <li>Q And you all couldn't really come to</li> <li>100 percent conclusion, decisive conclusion as to what</li> <li>caused the problem, but you said, here are what we thi</li> <li>are our best ideas as to what caused the problem,</li> <li>correct?</li> <li>A That's correct. And we are able to conclude</li> </ul>	nk
4 100 percent conclusion, decisive conclusion as to what 5 caused the problem, but you said, here are what we thi 6 are our best ideas as to what caused the problem, 7 correct?	nk
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6 are our best ideas as to what caused the problem, 7 correct?	
7 correct?	
$8$ $\Lambda$ That is correct. And we are able to conclude	
A THAT'S COTTECT. AND WE ALL ADIE TO CONCLUDE	
9 based on in-depth analysis that that lack of blade	
10 design margin was the root cause.	
11 Q Right. And it struck me a little bit as,	
12 like, well, you couldn't figure out exactly what it wa	s,
13 so it was, like, well, it wasn't designed right. But	I
14 am I was a little curious about how you all followe	d
15 up on that, and you I think Mr. Rehwinkel asked you	
16 what was the design flaw. I think you said, well, it	
17 wasn't designed within the right margins, is that right	t?
18 A I don't know if that's what I said, but as f	ar
19 as follow-up, it's difficult at that point because	
20 essentially Duke Energy is saying, Mitsubishi, we	
21 believe you have an inadequate lack of design margin i	n
22 your blades. The OEM does not want to admit to that.	
23 They did admit in their later presentation in the fall	
24 of 2017 that the blade flutter was caused by or tha	t
25 the failures were caused by blade flutter in all of th	е

1	periods.
2	Q Yeah. And blade flutter, that's like
3	vibration, right?
4	A It is. Same thing.
5	Q And you can get vibrations caused by a whole
6	bunch of things, correct?
7	A Yes.
8	Q Yeah. Including putting too much steam
9	through. If you are putting too much steam and it's not
10	designed for that, that can cause vibration or flutter,
11	correct?
12	A That's correct.
13	Q All right. And it could be some other things?
14	A Yes.
15	Q Okay. But in terms of Duke looking at it, you
16	all never came to a conclusion with respect to I
17	wrote it down the margin. You said they didn't
18	design it and they didn't have enough design margin, I
19	think; is that right?
20	A Right.
21	Q And design margin, what is design margin? I
22	assume it's like a level of tolerance. They say, oh,
23	well we can, you know, do this or do that. Is that
24	right?
25	A It is. For many pieces of equipment, they may

1	be designed for a certain level, but there is an
2	engineering design margin or extra capacity that's built
3	in, or design factor that if someone were to go above or
4	if the limit is low or below, then there won't be a
5	failure or an issue with that particular component.
6	Q Yeah. And that wouldn't make a lot of sense,
7	would it, if somebody was operating an expensive piece
8	of equipment that you had, you know, zero tolerance,
9	right?
10	A It would not make sense, right.
11	Q And wouldn't it make sense for a manufacturer
12	also to make sure that the equipment is not torn up to
13	say, here, y'all should operate it, you know, at this
14	level, you know, give you some good parameters in which
15	to operate the piece of equipment?
16	A Yes.
17	Q All right. And given the definition we just
18	read, you know, the federal government with respect to
19	their definition of generator nameplate capacity, they
20	call it the maximum out maximum rated output of a
21	generator is what that 420 would be, right?
22	A That's what that said, yes.
23	Q Okay. And when you were doing your
24	investigation, or your critical your root cause
25	analysis and you said, well, we don't think it was

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1	designed within the right amount of tolerances, can you
2	tell me anything about that? Like, did you say, oh, you
3	only gave it a five-percent tolerance, or a 20-percent
4	tolerance? I mean, do you have anything substantively
5	more than a conclusionary statement that it wasn't
6	designed within a range of tolerance?
7	A Well, I think
8	Q If you give the answer yes, no, and then
9	explain it, that would be great.
10	A Well, it's difficult to say yes or no because
11	it's a complicated issue, and I think it's most
12	important to go back and look at what happened across
13	all the periods. So you keep talking about steam flow
14	and operating above a certain amount of steam flow.
15	Starting with Period 2, the operating
16	pressures that we ran the steam turbine at were reduced,
17	and then throughout Period 2, 3, 4 and 5. In fact, in
18	Period 5, they were very low, but yet the blades still
19	had damage to the snubbers or the airfoil tips even with
20	lower steam flows, even with lower steam flows than what
21	the Mitsubishi fleet had experienced. I think that that
22	shows that there wasn't enough design margin in the
23	blades.
24	Q And can you describe the failure of design
25	margin in any order of magnitude?

1	A I don't have a percentage for that. No.
2	Q Or any narrative description for it?
3	A I think it would be difficult to do that
4	without testing with instrumentation and breaking them
5	on purpose with instrumentation hooked up so that you
6	could see when they break, and you know what all the
7	different parameters were at the point of the failure
8	occurring.
9	Q I want to shift a little bit and talk about
10	the blade a little bit. You guys were running a blade
11	which I have gone over and looked at. It is pretty
12	heavy.
13	A It is.
14	Q Do you know if Mitsubishi made that blade or
15	whether they had it made by a subcontractor and had it
16	casted by a third party?
17	A It's my understanding that Mitsubishi does
18	that themselves.
19	Q Okay. Are you aware that in the turbine
20	business, that some turbine blades are made by third
21	parties?
22	A I am.
23	Q But you got affirmation that Mitsubishi said,
24	no, it's on us, this is our blade?
25	A That's my understanding.

22	2
22	2

1	Q Okay. And do you know if that blade was cast
2	in a single casting? Do you know what I mean by single
3	casting?
4	A I do. I don't know the specifics of the
5	manufacturing process.
6	Q Right. So just to make sure we are on the
7	same page. Like a single casting is you got a form and
8	you put in the metal, and then it hardens and that's it,
9	and you don't have to weld anything else on to it,
10	correct?
11	A Oh, so I do know the answer then. It's not a
12	single casting.
13	Q And the things that were breaking off, I
14	looked at that, they looked to me like they were welded
15	on; is that right?
16	A I believe they are, yes. And there is other
17	pieces like the tip of the airfoil, I believe, is not
18	part of the forge, the original forging.
19	Q Right. So from the engineering standpoint,
20	when you weld something on and you have a single form
21	that's cast, the weakest part is where something has
22	been welded on, all other things being equal; correct?
23	A There are certainly stress risers that at the
24	heat affected zone of a weld. That doesn't mean
25	necessarily that it's the weakest point, though. And in

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1	the case of these blades, it didn't fail at the heat
2	affected zone in the weld. The snubbers and the Z-locks
3	failed near the tips, not near the welds.
4	Q So when you say the snubbers and just can
5	you go point just so we know exactly what
6	MR. MOYLE: If I could approach, Your Honor?
7	THE COURT: Sure.
8	THE WITNESS: So the mid-span snubbers, this
9	being the span of the blade, the mid-span snubbers
10	are these pieces, and then the airfoil tips, or the
11	Z-locks, are these pieces up here, the tips.
12	BY MR. MOYLE:
13	Q Okay. And the mid what do you call them?
14	A Mid-span snubbers.
15	Q Yeah. They look like they are welded on,
16	right?
17	A I believe they are, yes.
18	Q The same with the ones on the top?
19	A Yes.
20	Q All right. So is that in your business, is
21	that maybe not such a big surprise, that the piece is
22	welded on?
23	A That is not a surprise. That's correct.
24	Q That happens?
25	A That's right.
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1	Q And all other things being equal, wouldn't you
2	think it's more likely that for that to happen if you
3	are running at a higher frequency rate than at a lower
4	frequency rate?
5	A That what would happen?
6	Q That you would have a failure just with
7	respect to vibration?
8	A If something were welded on?
9	Q Or not, just in terms of, you know, if you are
10	running something, you know, at 150 percent of its
11	capacity compared to 80 percent of its capacity, all
12	other things being equal, isn't it more likely that
13	something being run at 150 percent of its capacity is
14	more likely to have a problem?
15	A That could lead to problems, I agree, but I
16	don't agree with the idea that the heat affected zone of
17	a weld makes it necessarily the weak point. I think you
18	went back to that.
19	Q Okay. And just so we have a clear record, I
20	mean, the operations of the unit in question during
21	Period 1, those were run for a pretty extended period of
22	time. They were run more often over the 420-megawatt
23	nameplate rating as compared to other periods in time,
24	correct?
25	A That's correct.

1	Q I saw something in one of the documents that
2	said about 15 percent of the time. Does that sound
3	about right to you?
4	A It does, yes.
5	Q Yeah, okay. What's blending?
6	A Blending operation in a combined cycle
7	remember that there is inherent flexibility in a
8	combined cycle operation, and Bartow is a 4-on-1. So
9	the transition between operating in 4-on-1 or 3-on-1 to
10	2-on-1 to 1-on-1, any time you do that, you have to
11	let's use an example.
12	If you are going from 2-on-1 configuration to
13	3-on-1 configuration, so that means two combustion
14	turbines operating with a steam turbine in service. You
15	start up the third combustion turbine. You are
16	generating electricity with the combustion turbine
17	generator. The exhaust, remember, is going out the
18	stack. It's not going to the HRSG yet. When you
19	start then you start warming up the heat recovery
20	steam generator. You start generating steam. You don't
21	immediately put the steam into the turbine. You have to
22	wait for certain conditions to be met on the steam. You
23	don't want to put water in the steam turbine.
24	So what you do is you bypass steam to the
25	condenser, and then once steam conditions are met, you

1	start slowly blending. You start increasing the
2	percentage of steam that's input to the steam turbine,
3	so more to the steam turbine, less to the condenser
4	until all of it is going into the steam turbine.
5	If you are going from 3-on-1 to 2-on-1
6	configuration, it's just the opposite. You start taking
7	it out of the steam turbine and bypassing steam to the
8	condenser, and then you shut down the HRSG and start
9	exhausting out to the atmosphere.
10	Q And this is a 4-on-1, right?
11	A This is a 4-on-1.
12	Q But you can run it 3-on-1, 2-on-1?
13	A We can run it in any of those other
14	combinations.
15	Q So if you are not blending, you know, the way
16	you are supposed to do it, the way you described it,
17	what are the consequences of that?
18	A Well, that's something we looked at in the
19	root cause. In fact, Duke Energy made up our own
20	definition of what a high-energy blend was because
21	that's a possibility that that could exert more energy
22	on the LO blades because, as I described, there is steam
23	flow that's being put into the condenser. It goes into
24	the condoner nearby the LO blades, so that's something
25	we needed to look at.

1	Because there is no industry standard for the
2	amount of energy that's put in the condenser during a
3	blend, we looked at a lot of data. We came up with a
4	method for classifying and a definition for high energy,
5	and it was just based on the change in temperature over
6	a certain period of time. More than a certain change in
7	temperature in a minute's time, we said, let's just call
8	that high energy, and it happens so many times over
9	if you have this many blends, we see that this many
10	of the blends, a percentage of the blend.
11	And then we were, because we made that
12	definition, we were able to look around industry at both
13	our at our combined other combined cycles,
14	Mitsubishi or non-Mitsubishi units, and compare, is the
15	energy of the blends at Bartow out of line with the rest
16	of the unit what we see in the rest of our fleet? Is
17	that change in temperature over a period of time
18	greater, which could put in more energy into the
19	condenser which could be negatively impacting the
20	blades? And what we found is about consistent at Bartow
21	with other units.
22	Q Yeah. And when you did that analysis, a lot
23	of people are running combined cycle units, right?
24	A Oh, yes.
25	Q I mean, if we were to hazard a guess in this

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1	country how much of the energy is supplied by combined
2	cycle units, what would you say, 40, 50 percent?
3	A It's growing. It's probably 40-ish percent,
4	plus or minus.
5	Q Yeah. There was something that caught my eye
6	in one of the documents Mr. Rehwinkel was discussing
7	with you, and I will refer it to you. It's on his
8	Exhibit 115, and it's on Tab No. 6, and it's on Bates
9	number 49.
10	A Okay. I am there.
11	Q And there is about middle of the page there
12	it says, blending operation, do you see that?
13	A Yes.
14	Q Just read the quote, if you would, underneath
15	there.
16	A It says: We've had bad blends during all five
17	periods of operation.
18	Q Yeah. And you said you came up with a
19	definition for the energy. I mean, what's a bad blend?
20	I assume that's something that's not good just by the
21	term, right?
22	A Yeah. I would say this is a good example of
23	why this is a draft document, and why we go through a
24	lot of iterations before putting out a final document.
25	But I believe that the term bad is being used here in

1	place of high-energy.						
2	During the course of this root cause, we were						
3	developing this high energy blend definition. Maybe we						
4	didn't have it at this time. I don't know. I don't						
5	want to speculate, but I believe it means the same thing						
6	as a high-energy blend.						
7	Q Do you know who came up with that word, which						
8	member of the seven-member team?						
9	A I do not.						
10	Q Did you ever talk to anybody about what that						
11	meant, or are you just kind of saying, oh, I think it						
12	means high-energy and surmising that?						
13	A I don't know.						
14	Q Yeah.						
15	A I didn't have that discussion.						
16	Q And that's fair, because you didn't, you know,						
17	you didn't work on the report. You weren't in all those						
18	meetings.						
19	A Correct.						
20	Q Okay. I just want to make sure the record is						
21	clear. When these problems occurred, you opted to just						
22	run the Bartow facility on the simple cycle, not						
23	combined cycle, right?						
24	A During the periods when we were replacing						
25	blades, we were running in simple cycle mode. I don't						

1 know how many of the simple cycles were in operation. 2 It changes the economics of those units. They are much 3 less efficient obviously in simple cycle mode. So they are placed in our dispatch order changes. 4 And then 5 based on what the system load is on any given day, they 6 may or may not be asked to run, but there is always at 7 least one in service, I know, during all these time 8 periods.

9 Q Yeah. So just in terms of the impact on 10 efficiency, just give the judge an idea about the 11 negative effect on efficiency if you are only running it 12 in simple cycle and not using the heat recovery system, 13 the HRSG system, which you have done as a result of some 14 of these issues, correct?

- 15
- A Correct.

Q So just is it about a third -- is the heat recovery system about a third? Use the 420 nameplate, what would you not realize not being able to run it in the combined cycle mode?

20 Well, from a production standpoint, it was Α 21 about -- oh, when the steam turbine was not in service? 22 0 Right. 23 Α When the steam turbine was not in service, we 24 are missing that 380 to 420 megawatts, depending on 25 where we were running at the time. The combustion

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1	turbines, the four combustion turbines are nominally
2	around 200 megawatts. Again, as I have described, they
3	can do more than that depending on the ambient
4	conditions in the heat of the summer they may not make
5	that much. But let's say they are 200-megawatt units,
6	we had about 200 megawatts capacity instead of about
7	1,200 megawatts of capacity.
8	Q Okay. So about a third is knocked out?
9	A During the outages.
10	Q Right.
11	A During the outages, right.
12	Q Okay. And then for that third, you had to go
13	find that power somewhere else, either run it on your
14	system or buy it in the market; is that right?
15	A That's correct. If it was needed.
16	Q So with respect to you got on you
17	testified on this a little bit with Mr. Rehwinkel about
18	the status of Mitsubishi blades in the market. Duke has
19	a lot of other Mitsubishi blades, do they not?
20	A I don't believe Duke has a lot of other
21	Mitsubishi blades. In steam well, I mean, correct
22	that. So in steam turbines, we do have other combustion
23	turbines that are Mitsubishi. Combustion turbines have
24	blading. I am not aware of any other Mitsubishi steam
25	turbines other than what's installed at Bartow and the

1	two that we have at Citrus.
2	Q Okay. And you haven't had any similar
3	problems with the turbines at those other Duke units
4	that you have experienced at Bartow, correct?
5	A Well, the two Citrus steam turbines didn't
6	start up until late in 2018.
7	Q Yeah. And we are not looking for problems,
8	it's okay to say there are no problems?
9	A Yeah, no problems.
10	Q I am not disappointed, you know.
11	A The operating experience is limited to about a
12	year-and-a-half.
13	Q Right. Right.
14	And you have no personal knowledge with
15	respect to anybody else having any problems with
16	Mitsubishi blades of the ilk that are at your Bartow
17	unit, correct?
18	A Other than what we had discussed earlier.
19	There is some discussion at user group meetings and some
20	interest in our issues, but nothing that I can show you
21	in documents.
22	Q Yeah. In these administrative proceedings, we
23	treat hearsay a certain way, so if I ask you have
24	personal knowledge if somebody told you I am having
25	something going on, correct? That's the only
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1	information you have that somebody else may have an
2	issue?
3	A That's correct. That's correct.
4	Q Yeah. And the what company was that? Do
5	you remember the company that
6	A I don't remember. Mr. Rehwinkel thought it
7	was in Louisiana, I think he said. I have no reason to
8	doubt that.
9	Q I'm asking you the name of the company, like
10	energy or somebody from energy?
11	A I don't remember.
12	Q You don't remember who it was?
13	A I don't.
14	MR. MOYLE: Okay. I think that's Judge, if
15	I could just get one quick second?
16	THE COURT: Sure.
17	MR. MOYLE: Thank you. That's all I have.
18	THE COURT: Mr. Brew.
19	MR. BREW: May I approach the witness, Your
20	Honor?
21	THE COURT: Sure.
22	EXAMINATION
23	BY MR. BREW:
24	Q Good afternoon. These are the two exhibits I
25	want to show you. Your Honor, you have them there. I

1	am going to talk about this one.
2	A Okay.
3	Q Thanks.
4	Good afternoon, Mr. Swartz, one of the
5	advantages of going at the tail end is that many of my
6	questions have been answered. The downside is that I
7	will be jumping all over the place.
8	First, I want to just really quickly run
9	through some stuff that's been covered in different
10	pieces about the function and operation of Bartow.
11	A Yes, sir.
12	Q It was originally designed and built for a
13	3-x-1 configuration, right?
14	A That's correct.
15	Q Okay. And Duke decided when it did its
16	repowering program that it might be better do a $4-x-1$
17	operation, right?
18	A That's correct.
19	Q And that's eventually what was built?
20	A Yes.
21	Q Okay. And so we have 4 CTs, combustion
22	turbines, that produce electricity and exhaust gas that
23	run through the heat recovery steam generators, right?
24	A Yes.
25	Q And then the steam from those steam generators
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1 run down to the steam turbine?
2 A Yes, sir.
3 Q We've gone through where the steam goes in
4 through the middle, goes out both sides and into the
5 condensers?
6 A From the low pressure turbine.
7 Q From the low pressure turbine eventually, yes.
8 And you can run any one of those sets 1-x-1,
9 <b>2-x-1</b> , <b>3-x-1</b> , <b>4-x-1</b> ?
10 A Yes.
11 Q Okay. You can for any of the CTs, you can
12 do duct firing, which is to add gas to the combustion
13 gas, much like an afterburner on a jet?
14 A Yes, sir. That's right.
15 Q Okay. And so you can do that for short
16 periods for peaking because it gives you real punch on
17 your output, but it's not particularly efficient?
18 A That's accurate.
19 Q Okay. And you also can divert steam, I think,
20 from the intermediate pressure to the CT itself for what
21 you call power augmentation?
22 A Correct.
23 Q Okay. And that's sort of like supercharging a
24 car. You smoosh more stuff into the combustion zone and
25 you get more power out of it?

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1	A Yes, sir. That's right.						
2	Q Again, that's not the most efficient way to do						
3	it either in terms of heat rate in the operational						
4	plant, right?						
5	A Yes, sir.						
6	Q Okay. So when the Bartow unit went into						
7	service in June of '09, right?						
8	A Yes.						
9	Q And in your 2010 10-year site plan filed with						
10	the Public Service Commission, you listed the max						
11	generation capability in megawatts of the unit is 1,253						
12	<pre>megawatts; is that right?</pre>						
13	A I would have to look at that. I am not						
14	familiar with that document.						
15	Q Okay. But that would be about right, 1,200						
16	megawatts?						
17	A That's about right, yes.						
18	Q And of that 1,200 megawatts, about						
19	420 megawatts would have been ascribed to the steam						
20	turbine, right?						
21	A That's about right.						
22	Q Okay. Now, the different modes of operation,						
23	the plant does not simply run $4-x-4$ all the time, right?						
24	A Correct 4-x-1, right.						
25	Q It could be $4-x-4-x-1$ , it could be in any						

1	possible combinations
2	A Yes, sir. That's right.
3	Q as you ramp it up and ramp it down?
4	A Yes.
5	Q And as you're ramping up it up, if you are
6	adding another heat recovery system to the steam, as you
7	said, you would bypass that steam to the condenser to
8	blend it before introducing it into the steam turbine,
9	right?
10	A Yes.
11	Q Okay. So you have a number of ongoing
12	systems normal operation is, in fact, a constant set
13	of dynamic changes, where you are going up, you are
14	going down, you are ramping up, you are ramping down,
15	you are taking parts off, you are adding parts on; is
16	that right?
17	A Yes, part of the value of the Bartow combined
18	cycle is the operational flexibility that it provides so
19	that we can change the operation as you described to
20	meet the customer needs.
21	Q And so when the units first well, let me
22	back up a little bit, I guess. You have been asked this
23	question around-about, but I want to ask it directly.
24	The company's position on what is wrong with
25	the zero blades is captured in your root cause analysis,

1	right?
2	A Yes.
3	Q JS-1, JS-2, whatever one we want to refer to?
4	A Yes.
5	Q Is it the company's position that the zero
6	level blades were insufficiently designed for
7	450 megawatts or the originally promised 420?
8	A It's actually neither. The inadequate design
9	for the operating pressures and temperatures that we
10	were given as operating parameters.
11	Q Okay. So are you saying is the company
12	saying that the blades as designed were not sufficient
13	to meet the specifications per your agreement with what
14	Mitsubishi had to do?
15	A Yes.
16	Q Okay. And the company's proposal is that
17	ratepayers be insurers for that design defect by paying
18	for all the replacement power costs?
19	A I am not sure what you mean by insurers.
20	Q You want us to pay the bill?
21	A Well, our company's position is that we
22	prudently operated the equipment within the parameters
23	provided to us from the equipment manufacturers, and we
24	did that each period of operation and we took action
25	each period of operation.

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1	Q That wasn't my question. Are you asking
2	consumers to pay the bill or are you asking Mitsubishi
3	to pay the bill?
4	A Well, as far as asking Mitsubishi to pay the
5	bill, I think that goes back to contract language that
6	we have found it's very unlikely, if not impossible to
7	get manufacturers or vendors to agree to clauses that
8	would include lost business. It simply will back out of
9	that contract before agreeing to that.
10	Q You said that in your direct testimony. Would
11	you refer to it for a minute on page seven? I am
12	pointing to the answer that begins on line nine. This
13	is of your original direct testimony, because that's
14	what we are talking about right now.
15	A Page seven?
16	Q Page seven. The answer on lines nine to 13.
17	A Okay. I am there.
18	Q Okay. Actually above that, the answer on
19	lines one through three, where you talk about the
20	unwillingness of original equipment manufacturers to
21	accept the risk of paying consequential damages; do you
22	see that?
23	A I must be on the wrong document. I do not see
24	that.
25	Q I am looking at your March 19th March 1

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1	March 1, 2019, direct testimony.
2	A Okay. I was looking at the March 18
3	testimony.
4	Q Okay. You have a question: In your
5	experience, do DEF's agreements with OEMs usually
6	include a similar disclaimer of liability? You are
7	talking about consequential damages, do you see that?
8	A Yes, I do. That's row 22, or line 22?
9	Q Yeah, that's
10	A I don't have page numbers on mine.
11	Q Okay. I am looking at the answer that you
12	gave there
13	A Okay.
14	Q that starts with the word yes.
15	A Right.
16	Q Okay. You say: To my knowledge, this is the
17	case throughout the industry. What industry do you
18	mean?
19	A The utility industry.
20	Q The utility
21	A Well, to clarify, so I have experience in the
22	utility industry, obviously, but also in the pulp and
23	paper manufacturing industry, and then before that in
24	the Navy. But in my 35 years of experience in those
25	entities, I have not experienced a company willing to

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1	take on business interruption risk.
2	Q So for a combined cycle unit that's sold to a
3	merchant generator, to the extent that they can't
4	recover consequential damages for a design defect from
5	the OEM, that becomes the responsibilities of their
6	investors?
7	A I am not familiar with exactly the financing
8	of a merchant generator. I have not worked in that
9	business, but that sounds plausible.
10	Q Okay. Somebody that can't recover their cost
11	of operations through regulated rates?
12	A Right.
13	(Discussion off the record.)
14	BY MR. BREW:
15	Q You had talked about on a number of occasions
16	that, I don't know if it's common, but a typical failure
17	mode of L0 blades elsewhere in the industry was erosion?
18	A Yes, sir.
19	Q Which basically in the turbine and gas,
20	excessive moisture in the blade areas and the water
21	starts pounding in at 3,600, but you and Mitsubishi
22	agreed that in this case that the root cause was too
23	much vibration, or flutter, that was affecting the zero
24	level blades; is that right?
25	A Yes, that's correct.

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1	Q Okay. And when you went to Mitsubishi in 2012
2	and asked them to look into going to 450 megawatts, or
3	higher steam loading levels, you had described it as
4	their initial response is that they didn't have any
5	experience with the loadings at that level in their
6	steam turbines; is that right?
7	A I don't know that that was their original
8	response. I think what I said is when they first
9	when we first experienced the damage, or discovered the
10	damage in 2012, that was one of Mitsubishi's responses,
11	is that the calculated steam flow on your LO blades at
12	Bartow is beyond our industry experience.
13	Q Okay. So it was beyond their experience.
14	Isn't it true that it was also beyond yours, because as
15	you noted, Bartow is only $4-x-4-x-1$ combined cycle,
16	right?
17	A It is our only 4-on-1 combined cycle, but I
18	don't know what the pounds per hour per square foot is
19	on LO blades on any other units.
20	Q Okay. All right. And you did the comparison
21	and your root cause analysis for blending counts,
22	particularly with your Lee and Hines combined cycles?
23	A Yes.
24	Q Now, the Lee combined cycle is a $3-x-1$ , right?
25	A Correct.

1	Q And the Hines a series of 2-x-1s?
2	A Correct.
3	Q Okay. So neither one of them would operate at
4	a same energy levels as, say, going from a $3-x-4$
5	operation blending operation at Bartow?
6	A Well, when you talk about energy we probably
7	need to define that. But I also would say that the
8	reason H.F. Lee and Hines we are using for comparison is
9	because those are the installations that have 40-inch L0
10	blades. Other installations have different sized
11	blades, so we wanted to make sure we used installations
12	that had similar blades. But the pressure the energy
13	that you are stating really goes back to the pressure
14	and temperature of the steam, and that's the pressure
15	that equates to the mass flow rate.
16	So whether you are in 2-on-1 or 3-on-1, it
17	depends on the design of the heat recovery steam
18	generators. It might be a heat recovery steam generator
19	that's capable of producing twice as much steam as the
20	ones at Bartow at much higher pressures. And then even
21	though it's a 2-on-1, it could be more energy into the
22	low pressure turbine than a 4-on-1 at lower pressures.
23	Q Is that the case in Hines $2-x-1$ steam
24	pressures?
25	A I don't know that the exact steam pressures.

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1	I would say they are likely very similar to Bartow, but
2	I wanted to characterize your it's an
3	oversimplification to say a 4-on-1 has more energy than
4	a 3-on-1.
5	Q Okay. But you don't know what the steam
6	pressures were for Lee are?
7	A Correct.
8	Q Okay. After the I get hung up on the
9	period statements, but after the, I guess the third
10	period failure in 2014 is when Duke and Mitsubishi
11	agreed to actually test for vibration levels by doing
12	the telemetry test and installing the vibration monitor?
13	A Well, not exactly. It was during Period 2
14	when we were running with the second set of blades in
15	one end of the machine and still had original blades in
16	the generator end of the machine when we contracted with
17	Mitsubishi to make a new design of blade called a Type 3
18	blade that was installed during that outage between
19	Period 2 and Period 3.
20	So when we started up in Period 3, we had this
21	new design blade. Part of that project was also to
22	install the temporary blade vibration monitoring system
23	and take data at the very beginning of Period 3 so that
24	we could come up with any additional operating
25	parameters that we may need to protect the system.

1	Q Okay. With that clarification, Duke and
2	Mitsubishi jointly agreed to install the temporary
3	vibration monitoring telemetry to get actual information
4	using string gauges on the stresses at the zero level
5	blades, right?
6	A Yes, that's correct.
7	Q Okay. And is there any part of the design of
8	the testing and installation that Duke was not onboard
9	with for the vibration limit?
10	A Not that I am aware of.
11	Q Okay. And you got the result of that
12	vibration monitoring testing, and it was at that point
13	that Mitsubishi recommended establishing the avoidance
14	zone?
15	A That's correct.
16	Q Okay. And so and specifically what we're
17	talking about is you had two other data points. You had
18	the outlet pressure from the intermediate turbine
19	turbine pressure area, and you had condenser vacuum or
20	back pressure?
21	A Correct.
22	Q Okay. And the problem with the condenser is
23	that if you put too much steam energy in there, it can
24	lose vacuum and that's when you get back pressure and
25	this can cause other problems?

1	A That's an issue with the condenser, right.
2	Q Okay. So you had that information, and if I
3	can ask you to take a look at the document that I showed
4	you, the one-pager, that is a diagram that's listed
5	bypass connection locations, do you see that?
6	A Yes, I do.
7	Q Are you familiar with this diagram?
8	A I have seen it before, yes.
9	Q Okay. It's in one of Mr. Polich's exhibits.
10	It's in JS-4. It appears in a number of places on the
11	exhibits. And I will represent to you that it's a
12	diagram for where the, I guess you call them spargers or
13	dump tubes go when you are sending steam to the
14	condensers in bypass mode?
15	A Yes, that's correct.
16	Q And that the C and D hot reheat tubes are
17	located closer to the exhaust, right?
18	A I don't know if that's correct or not. I
19	can't tell from this diagram.
20	Q Isn't it true that Mitsubishi found that when
21	you were engaging the D and C tubes is when they
22	experienced more vibration in the zero level blades?
23	A I do believe that there as document that shows
24	that. I know our concern and what we saw in operation
25	was that alpha and delta concerned us more actually, A

1	and D.
2	Q A and D.
3	A I'm sorry, I default to the phonetic. And the
4	reason why is A and D are physically farther from the
5	condenser than B and C, and so there is more likelihood
6	of water entrainment in the A and D lines.
7	Q Okay. And so my question, then, is there is
8	nothing about the final fix that's been implemented that
9	has changed the design or the configuration within the
10	condenser, right?
11	A Not for the sparger tubes that you are talking
12	about.
13	Q Right. That's what I am talking about.
14	A Yeah. I believe there were some other minor
15	changes, but not to what we are looking at here to my
16	knowledge.
17	MR. BREW: Okay. We are sticking to direct
18	right, not rebuttal?
19	MR. BERNIER: That's correct. Mr. Swartz is
20	excited to come back for rebuttal.
21	MR. BREW: All right. Then I will wait.
22	THE COURT: So there is no redirect, is
23	that or is there?
24	MR. BERNIER: Typically we do redirect after
25	staff would go through, or actually after the

1	Commissioners would, but then he will come back and
2	do his rebuttal testimony.
3	THE COURT: Okay. I just want to be sure. I
4	don't want to
5	MS. BROWNLESS: Can I just ask a question?
6	Most of the testimony filed by Mr. Swartz is
7	rebuttal testimony, and many of the questions that
8	have been asked today concern those areas. So just
9	so I am clear, would it not be appropriate to allow
10	us to ask our questions about all of Mr. Swartz's
11	testimony, subject to, of course, you being able to
12	go at the very end and do redirect?
13	MR. BERNIER: After Mr. Polich testifies?
14	Because I thought that was the agreement that we
15	had set up in the agenda.
16	MS. BROWNLESS: That's fine. I'm sorry.
17	Perhaps I was confused.
18	MR. BERNIER: That's okay. I understand that
19	we have strayed around a little bit, but we have
20	stayed really close to the root cause analysis.
21	MS. BROWNLESS: Thank you.
22	MR. MOYLE: Just to be clear, then, the plan
23	will be he will retake the stand and talk about
24	rebuttal and we will have a chance to ask questions
25	about his rebuttal?

1	MR. BERNIER: That's correct.
2	MR. MOYLE: Okay.
3	MR. BERNIER: Unless when he gets done y'all
4	want to let him go.
5	MS. BROWNLESS: Thank you.
6	THE COURT: Was there anything from the
7	Commission?
8	MS. BROWNLESS: No, sir. I am good. Thank
9	you, sir.
10	MR. BERNIER: Can we have one minute?
11	THE COURT: Sure. Take 10.
12	MS. BROWNLESS: Oh, I am sorry.
13	MR. BREW: I'm not finished.
14	THE COURT: Oh, I am sorry. I thought you
15	were done.
16	MS. BROWNLESS: Yeah.
17	MR. BREW: No. No. I had an exhibit
18	THE COURT: I knew you never got to this one.
19	MR. BREW: Right.
20	THE COURT: I thought you were waiting for
21	rebuttal.
22	MR. BREW: Well, I am waiting for rebuttal on
23	that one, but that's why I asked a clarifying
24	question.
25	THE COURT: The floor is yours.

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1	BY MR. BREW:
2	Q You talked a little bit with Mr. Rehwinkel
3	about what happened after Period 5, but I just wanted to
4	clarify that, too.
5	What we will call Period 6 is when you
6	installed the pressure plate beginning around April of
7	2017?
8	A Yes, sir. That's right.
9	Q And you finally removed that with the outage
10	that occurred fourth quarter of last year?
11	A Correct.
12	Q And so during that entire time, your max
13	generation was confined to about 380 megawatts from the
14	steam turbine?
15	A That's accurate.
16	Q Okay. And did you experience any ancillary
17	damage from the use of the pressure plate?
18	A We did experience some damage. Nothing to the
19	steam turbine itself, or the steam the centerline
20	turbine components. What we found during a routine
21	inspection, we didn't shut down in a forced manner for
22	this, but during a routine inspection, we found that
23	some, like, ladders, some supports for different things
24	inside the casing of the low pressure turbine had been
25	damaged.

1	We suspect that the pressure plate caused some
2	pressure waves or vibration inside the casing that was
3	different than operation with blades. So we had to do
4	extra stiffeners in some locations, and we actually
5	removed some unnecessary things like ladders that were
6	attached to the inside of the casing.
7	So nothing that impacted the operation, and
8	the stiffeners worked well because in subsequent
9	inspections, we didn't see any issues.
10	Q So running with the pressure plate for
11	two-and-a-half years, it was noisy and vibrated a lot
12	because of the impingement of steam and stuff through
13	the pressure plate hold?
14	A Well, it's all relative. When you say
15	vibrating a lot, there was no turbine centerline
16	vibration. The unit ran very well at low vibration
17	levels. There was obviously vibration in the casing.
18	And, yes, it was louder operating with a pressure plate
19	than with a set of blades in the LO position. To be
20	honest, it was not as loud as what we had thought it
21	might be.
22	Q And the new redesigned Level 0 blades were
23	installed in December, and the unit is now back in
24	operation for what we now call Period 7?
25	A Yes, sir.

Q And it's too early to tell whether that is -has any results to speak of, or are you operating at 450 or 420?

There are some results so far, and this is 4 Α 5 somewhat of a -- understand why we haven't run it there 6 yet, during that same fall outage where we installed the 7 blades, we also did maintenance on the combustion 8 turbines. Two of the combustion turbines were at their 9 major maintenance interval and two of the combustion turbines generators were at their major maintenance 10 11 interval. During testing of one of those generators, we 12 experienced a generator failure that we had to rewind 13 the stator, which is the bars that go around the 14 rotating part of the generator. We just finished that 15 project about two weeks ago, so we didn't have the 16 capability to run it 4-on-1 configuration until about 17 two weeks ago.

18 We didn't immediately go to 4-on-1. In fact, 19 we still haven't gone to 4-on-1. We wanted to 20 coordinate with Mitsubishi. We have this permanently 21 installed blade vibration monitoring system. When we 22 first operated with the steam turbine in December, we 23 did a lot of testing with Mitsubishi, and we operated in 24 a lot of different combinations, 1-on-1, 2-on-1, 3-on-1, 25 duct burners, no duct burners, made sure we were looking

1	at the response, or lack thereof, on the blade vibration
2	monitor, and everything looked really good for up to
3	3-on-1 operation with full duct burners.
4	We will continue that testing protocol
5	starting this coming Monday as a matter of fact.
6	Mitsubishi will be on site and will be stepping through
7	in 4-on-1 configuration.
8	Q Okay. So you mentioned it earlier, but the
9	blade vibration monitoring system has now been made
10	permanent?
11	A Correct.
12	Q And to this date, you haven't gone back up to
13	full power operation?
14	A Correct.
15	MR. BREW: Thank you. That's all I have.
16	THE COURT: Still nothing?
17	MS. BROWNLESS: I will pass these out.
18	THE COURT: Oh, okay.
19	MR. BERNIER: I am sorry, James, did you want
20	to mark this?
21	MR. BREW: That was marked for identification
22	as I believe 113.
23	THE COURT: It's already been marked?
24	MR. BERNIER: Yes.
25	THE COURT: Are we talking about the

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1	one-pager?
2	MR. BREW: The one-pager was marked as 113.
3	The other one was actually marked as 112.
4	THE COURT: Okay.
5	EXAMINATION
6	BY MS. BROWNLESS:
7	Q Good afternoon.
8	A Good afternoon.
9	Q It's been a long day.
10	I want to start by asking some pretty basic
11	questions. The original
12	MR. REHWINKEL: Is your mic on? I think there
13	is look underneath, there as button.
14	MS. BROWNLESS: It's green.
15	THE COURT: You need to really lean into it
16	maybe.
17	MS. BROWNLESS: Oh, thank you, Judge.
18	MR. REHWINKEL: Okay. I just couldn't hear
19	you down there.
20	BY MS. BROWNLESS:
21	Q The original Tenaska contract, an excerpt of
22	which I provided as Exhibit 111.
23	A Okay.
24	Q The original Tenaska plan was to connect three
25	M501F CTs to the steam turbine, is that correct?

1	A Could I ask which page you are referring to
2	just so I make sure I verify? That does sound correct,
3	I just want to verify the type of combustion.
4	Q If you look at the very last page, it says
5	M501F cast turbine.
6	A Yes, that's correct. I see it.
7	Q And the original Tenaska configuration was to
8	produce gross steam turbine output of 420 megawatts, is
9	that correct?
10	A That's correct.
11	Q The type of steam turbine that you have
12	connected that's 401 is also a 501F type CT, right?
13	A The four combustion turbines, yes, they are
14	also 501 technology.
15	Q Okay. And I am curious as to why you were
16	willing to accept well, let me refer you to Exhibit
17	110. If I look on page let me it's Bates page
18	12432, and the page 3-2-1; do you see it, sir?
19	A I do.
20	Q It's under 3.2, guaranteed performance and
21	other guarantees of acceptance tests?
22	A I see that.
23	Q Okay. It indicates here under the liquidated
24	damage performance guarantees that the MPS net steam
25	turbine maximum electrical output would be 420.07
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1	megawatts, is that correct?
2	A Yes, it is.
3	Q And so I guess I am curious why the 3-on-1
4	configuration with F type combustion turbines would
5	produce 420 and Mitsubishi is saying that your 4-on-1
6	configuration would also produce 420.07?
7	A Well, I don't know the specifics about the
8	Tenaska 3-on-1 that was originally considered or
9	contemplated for that contract. It could have had it
10	may not have had duct burners installed, which makes a
11	very significant difference whether they have duct
12	burners installed or not. That's one variable that
13	could be different. But I just not knowing the
14	specifics of that Tenaska contract, I don't know that I
15	can explain that contract.
16	Q Okay. Well, I guess if there were duct
17	burners on the Tenaska contract, then that would make it
18	comparable to your contract where there were duct
19	burners, correct?
20	A It would, yes.
21	Q Okay. And if there were no duct burners,
22	wouldn't that result in potentially a lower megawatt
23	maximum electrical output?
24	A Well, the maximum electrical output really
25	goes back to the generator, the electrical generator.

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1	And so the generator is the same for the Tenaska
2	project, we bought that generator for the Progress
3	Energy project. And at a power factor of .90, as we
4	looked at in the generator capability curve, the maximum
5	electrical output is 420 megawatts, approximately.
6	Actually the generator performance curve shows 421.2
7	megawatts.
8	Q And I guess what you are saying is that there
9	could be other well, let me make sure I understand
10	what you are saying.
11	You are telling me that the generator that's
12	connected to your system is the same as the generator
13	which was going to be connected to the Tenaska system?
14	A Correct.
15	Q So that's identical, and that you have the
16	same type of combustion turbine, F?
17	A Well, I don't know. They are F, 501F
18	machines, but there has been multiple generations of
19	501F machines in the industry. F I don't know
20	specifically what we have at Bartow, but they go by FD1,
21	FD2, FD3, each subsequent generation has some improved
22	capabilities.
23	I don't know exactly what model the Tenaska
24	501F was compared to the Bartow 501F. They may have
25	been different models of combustion turbine with

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1	different characteristics, probably pretty close to the
2	same, but every time they make a new model, much like a
3	car, a Honda Accord in 2002, when this machine was
4	built, is still different than the Honda Accord in 2009.
5	There has been many generations. It's still a Honda
6	Accord, it's still the same type of machine so I just
7	don't know.
8	Q So your testimony is that the details between
9	those two units could be different and, therefore
10	A Yes, ma'am, that's correct.
11	Q they wouldn't be exactly comparable?
12	Okay. In 2009, Mitsubishi was aware that you
13	were going to run this in a 4-on-1 configuration,
14	correct?
15	A Yes.
16	Q Did Mitsubishi provide operating parameters,
17	pressure temperature, steam volume for each of the three
18	sections of the combustion turbines? Did you get those
19	parameters for the high pressure section?
20	A We did. The parameters for the steam turbine
21	are typically provided for the high pressure section and
22	not for the entire turbine.
23	Q And you had you were given a parameter,
24	were you given a measuring device to measure that
25	parameter?

1	A Yes.
2	Q Okay. And did you have parameters and
3	measuring devices for the intermediate pressure section?
4	A We had measure some measuring devices, but
5	the parameters remember the HP/IP turbine is one
6	machine. And so the operating limits are really the HP,
7	the high pressure steam is the limit.
8	Q Okay. Were you given specific operating
9	parameters for the low pressure section of the turbine?
10	A We were given specific parameters that applied
11	to the exhaust of the low pressure turbine, which is
12	into the condenser, which is very important. You have
13	to know the energy of the steam at the inlet and the
14	energy of the steam at the exhaust of the whole system
15	helps you determine flows and the energy of the product,
16	the substance.
17	Q So the intermediate turbine exhaust pressure
18	was used as a proxy for the low pressure section inlet
19	pressure, is that correct?
20	A Only after the it is correct, but that
21	wasn't an operating parameter provided in 2009, but in
22	2012. After we discovered damage in the spring outage,
23	that's when Mitsubishi lowered made a recommendation
24	that we don't exceed 118 pounds in the exhaust of the
25	intermediate pressure turbine to be used as a proxy of

1	what steam was being emitted to the low pressure
2	turbine.
3	Q And I guess I want to understand this.
4	Initially in June of 2009, were you given a number for
5	the IP exhaust pressure?
6	A No.
7	Q No number?
8	A Correct.
9	Q Did you have a measuring device at the IP
10	exhaust?
11	A I believe we did, yes.
12	Q Okay. But you were not given a pounds per
13	square inch or
14	A It would have been a pounds per square inch
15	gauge, but not an operating parameter for that
16	measurement.
17	Q Okay. And can you show me where that was,
18	please?
19	A So the this the exhaust of the
20	intermediate pressure turbine is shown in this pipe
21	right here, and then the steam would flow up and over
22	and into the middle of the low pressure turbine.
23	Q So where was the exhaust low pressure
24	intermediate pressure exhaust gauge?
25	A It would be somewhere in this vicinity. I

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1	don't know exactly where, and this obviously isn't to
2	scale, but it would be close to the right at the
3	outlet of the IP turbine.
4	Q Would it be before the inlet where steam from
5	the HRSG would enter the system?
6	A I don't know for sure, but, yes, I believe it
7	would be. So there is also some low pressure steam
8	called admission steam that's coming through this line
9	right here from the low pressure drum on the HRSGs, and
10	that comes into this line right here. So I believe it
11	is before, yes.
12	Q Okay. And would it also take into account any
13	steam that was being recycled from the high pressure to
14	the intermediate pressure, from the intermediate
15	pressure to the
16	A That would be the most of the steam would
17	be coming from that direction, yes.
18	Q Okay. Is it possible that the pressure
19	measured at the IP exhaust could deviate from the
20	pressure measured at the low pressure inlet?
21	A I think it's possible. It's unlikely that it
22	would be a lot different. The pressure dropped through
23	this pipe isn't very much, and I do believe Mitsubishi
24	made calculations taking into account potential pressure
25	drop across that pipe.

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1	So they would give us like, let's use an
2	example. It was 118 pounds here on the start of Period
3	2. That may have meant they didn't want to exceed
4	117 pounds here. I am just making that number up. I
5	don't know. But when they used this as a proxy, they
6	took into account the pressure drop possible through
7	that pipe.
8	Q Okay. When you installed a low pressure
9	gauge, where did you put it?
10	A Again, I don't know specifically, but it would
11	be in this vicinity right here.
12	Q Once you installed that low pressure gauge,
13	did you make any comparisons between the pressure
14	recorded at the IP exhaust and the pressure recorded at
15	the low pressure inlet?
16	A I don't know. I suspect our engineers did
17	that comparison. It would make perfect sense, but I
18	just I am not aware of that.
19	Q So you don't know how reliable the low
20	pressure exhaust
21	A The intermediate pressure?
22	Q intermediate pressure exhaust readings were
23	compared to the actual?
24	A I am pretty confident that had they been
25	had we found an issue there, that that would have come

1	out during the root cause, during our analysis. And I
2	didn't hear there was nothing that indicated that
3	once we put this pressure gauge here on the LP inlet,
4	that it showed any inconsistencies with what we were
5	using at the IP exhaust.
6	Q Okay. Thank you.
7	When you first purchased this unit, I assume
8	all the parts get sent to Bartow and you put them all
9	together, and that there is a period of testing for that
10	unit prior to your acceptance of the unit, is that
11	correct?
12	A That is correct.
13	Q So when you are doing this initial testing,
14	are you doing the testing to make sure that the
15	guarantees given in the contract can actually be met?
16	A That's a piece of the testing. There is a lot
17	of testing that goes on, and the contractual guarantee
18	testing would be part of the later tests that are
19	conducted.
20	At first, you want to make sure that, first of
21	all, the equipment operates the way it's supposed to
22	operate; that it can operate over a certain period of
23	time. So typically, there might be a 96-hour run where
24	you monitor conditions and make sure that the equipment
25	is doing what it's supposed to do over a longer run.

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1	There would be tests where you would cycle off
2	and on to make sure that valves and dampers and
3	different pieces of equipment operate the way they are
4	supposed to when you shut down and when you start up a
5	process because those put more stress on equipment when
6	you do startups and shutdowns. So those are all part of
7	the performance tests.
8	Eventually, you would get to contractual
9	testing, just to make sure from the contract that we can
10	execute the contract effectively, and prove that the
11	guarantee was met or not.
12	Q Okay. And I want to go back to Exhibit 110.
13	And look on page 12432, which is 3.2 of the agreement.
14	A Okay. I am there.
15	MR. BERNIER: I am sorry, which page? I am
16	sorry.
17	MS. BROWNLESS: 3-2.1. It's 12432.
18	MR. BERNIER: Thank you.
19	MS. BROWNLESS: Its section 3.2, guaranteed
20	performance.
21	MR. BERNIER: Thanks.
22	MS. BROWNLESS: Are you good?
23	MR. BERNIER: Yep. Thank you.
24	MS. BROWNLESS: Sure.
25	BY MS. BROWNLESS:

1	Q Okay. So I am going to turn to the very next
2	page, 33, and ask about the figures that are on eight,
3	nine and 10 there, LP admission steam pressure, LP
4	admission steam temperature, LP exhaust pressure.
5	A Yes.
6	Q These are in the contract, but if I understand
7	your testimony previously, you had no way to measure any
8	of that directly, is that correct?
9	A Well, these are different points, so let's
10	take one at a time, if we could.
11	No. 8, LP admission steam pressure, let me do
12	eight and nine together, and if I could, I would like to
13	approach the chart again.
14	So LP admission steam pressure and LP
15	admission steam temperature, what this shows is a
16	certain value at No. 8 it says, at LP SV inlet. So
17	that's the low pressure stop value inlet
18	Q Where is that?
19	A and it's admission pressure.
20	So remember, this is the LP admission line,
21	okay. This is not this is not the it's this. So
22	the stop valve is right here. So there is
23	instrumentation or there was at that time, and I have
24	no reason to doubt it's not still there. So the LP
25	admission steam pressure was at this point right here,

1	at this valve. The LP admission steam temperature
2	well, it doesn't say, but I am assuming it's that same
3	line. So it's the admission line.
4	Q Okay.
5	A And then the LP exhaust pressure, it says it's
6	at LP casing outlet. So that's basically in the
7	condenser. The outlet at the low pressure turbine dumps
8	down into the condenser. So there is a measurement of
9	pressure in the condenser.
10	Q Okay. And so were these parameters that you
11	were adhering to throughout your operation in Period 1?
12	A These aren't operating limits. These are from
13	a contractual standpoint in order to achieve the output
14	of, in this case it was 420 in case 48. It was 389
15	in case 24. These are the measurements that were likely
16	when you are achieving that 420 megawatts. It's not
17	thou shalt not exceed this temperature. Thou shalt not
18	exceed this pressure. This is the likely pressure at
19	that production limit.
20	Q Okay. And when you were testing this unit
21	prior to purchase and you met these temperature and
22	pressure limits, did, in fact, you produce the megawatts
23	that were anticipated?
24	A Well, again, I wouldn't call these limits.
25	These are the predicted pressures and temperatures for
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1	the heat cases that were used in the contract. It
2	wasn't a limit that we had to stay below or stay above.
3	It was the predicted outcome.
4	So I am sorry, could you repeat the rest of
5	that question?
6	Q Here's what I am trying to figure out, you
7	were
8	A Oh, I think so did we achieve
9	420 megawatts?
10	Q Yes.
11	A Yes, we did achieve 420 megawatts, with some
12	corrections. There is errors in every instrument, or
13	potential errors in every instrument. And so just like
14	everything else, any time you take a measurement in a
15	complex environment like this, there is debate. There
16	is discussion.
17	I think when they first measured in fact, I
18	think Mr. Rehwinkel pointed out a document earlier.
19	When we first measured the performance test, I think we
20	were achieving 402 megawatts. But then with some
21	corrections to get to what the data should have been
22	that we calculated it would have been 420 megawatts.
23	Q Were you ever given by Mitsubishi a in your
24	operating manual or anything, something that said for
25	the IRP RSV or the LP SV inlet, you cannot exceed X?

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1	A Not that I am aware of. No.
2	Q Okay. Basically, then what you are telling me
3	this says is if you have these conditions in eight, nine
4	and 10, we guarantee that the output will be $$
5	A At least 420 megawatts.
6	Q At least 420 megawatts?
7	A Yes.
8	Q And in your testing, that, in fact, proved to
9	be true?
10	A Correct.
11	Q Okay. Now, can you tell me the difference
12	between the numbers on the guaranteed performance and
13	guaranteed acceptance test that we just discussed, and
14	on the very next page, the liquidated damages guarantee?
15	A If you give me just one moment to look at the
16	difference. So the difference between one 12433 and
17	12434?
18	Q Yes.
19	A Oh, yes, ma'am. So page 12433 is heat balance
20	case 24, which is 4-on-1 configuration with no duct
21	firing. And page 12434 is heat balance case 48, which
22	is 3-on-1 configuration with no duct. So those get
23	different steam flows, pressures, temperatures that were
24	predicted, different megawatt output at the generator
25	predicted.

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1	Q Did Duke personnel believe that knowing the
2	manufacturer's parameters for the LP section of the
3	steam turbine was necessary for operating the unit at
4	420 before March of 2012?
5	A No, it did not.
6	Q And how did you go about establishing
7	parameters for the LP pressure before the planned
8	outage? Is that only parameter you had was the exhaust
9	pressure from the IP?
10	A Before the 2012 outage? Well, it was as a
11	result of the damage we found in 2012. That's when we
12	came up with the new limit measured at that IP exhaust,
13	and that was the best instrument that we had to use for
14	LP in that pressure.
15	Q And before that, you just didn't have any?
16	A Correct.
17	Q Okay. After the March 2014 outage, did DEF
18	personnel bring operating parameters for the LP part of
19	the steam turbine to the attention of DEF's management?
20	A After the spring of 2014 outage, there was
21	much discussion of those parameters, yes. That's when
22	we started operating with an avoidance zone in place,
23	the recommended avoidance zone from Mitsubishi, and so
24	that had a great deal of discussion.
25	Q And so, again, you are measuring it at the IP

1	exhaust?
2	A No. The avoidance zone was a combination
3	of yes. I am sorry. Yes. That's one of the
4	pressures
5	Q You are measuring that's
6	A one of the pressures was measured there,
7	yes.
8	Q And at that time, you are not only bringing it
9	to the attention of your own management, you are
10	bringing it to the attention of Mitsubishi, correct?
11	A Well, Mitsubishi is the one that calculated
12	the avoidance zone and presented it to Duke Energy as a
13	recommendation. So it really worked the other way.
14	Mitsubishi said, in this combination of intermediate
15	pressure, turbine exhaust and condenser vacuum, in these
16	areas, avoid operating.
17	Q Okay. In Period 1, when you were increasing
18	the output of the unit, in your in the time that you
19	were testing the unit before you accepted it, was the
20	plant did you ever let me start over.
21	When the Bartow Unit 4 combined cycle plant
22	was tested prior to its commercial operation in June of
23	2009, was the plant tested in a configuration that
24	reflected commercial operation of the unit in a maximum
25	total megawatt output scenario?

1	A I am confident it was, but I don't have that	
2	data available. I can't show you a document that shows	1
3	that we did that.	

Q Do you know how many combustion turbines were
 operational during the preliminary testing period?

6 Α Well, during the preliminary testing -- the 7 testing goes on for a long period of time, maybe even 8 months, and with four combustion turbines being 9 installed, and so I don't have any personal knowledge of 10 that construction project. But having been involved with other construction projects, the likelihood is that 11 12 as combustion turbines were finished, they were tested 13 while other combustion turbines still had work ongoing.

14 So it's a sequence of events, and then the 15 steam turbine comes on, and then you start testing in 16 combined cycle mode. So I just don't know exactly what 17 time period each different piece of equipment was ready 18 for testing during that construction project.

19 And I guess what I am trying to ask is during Q 20 the preliminary testing period, was there ever a point 21 in time in which all four CTs and all four HRSGs with 22 all the bells and whistles were tested? 23 Α I don't know. I suspect there was, but I just 24 don't know. 25 And do you have any information here today Q

1	what the megawatt output of that full-blown testing was?
2	A I don't.
3	Q Or what megawatt output of just the steam
4	turbine was?
5	A I don't.
6	Q Would that type of testing been used to
7	determine the 420-megawatt nameplate capacity of the
8	unit?
9	A No. The testing would be an agreement between
10	the EPC constructor, the owner of Progress Energy and
11	the various OEMs on which heat balance case to use, and
12	then replicate those conditions and see if those minimum
13	contractual numbers were met.
14	Q Got it.
15	Was your assumption in Period 1, your Period 1
16	operation, that if you stayed within the parameters
17	given to you by Mitsubishi, whatever those parameters
18	were, that any that the flow limits of the low
19	pressure section, turbine section, would be okay, that
20	it would take care of itself?
21	A Yes. That was the assumption.
22	Q Did your operating engineer at the time think
23	that he should know any flow limits for the low pressure
24	section or the inlet pressure for the LP turbine before
25	returning the plant to service in April of 2012?

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1	A When you say operating engineer.
2	Q The guy on the ground. The Mr. Wayne Tom's
3	equivalent?
4	A Okay. Well, there was a lot of discussion
5	between Mitsubishi and Duke Energy during that outage
6	between Periods 1 and 2. And the plant manager and the
7	operating staff at Bartow were part of those
8	conversations when the 118-pound limit on the IP exhaust
9	was recommended by Mitsubishi and we agreed to install
10	that as an operating limit at that point, and we did.
11	So yes, there was discussion around that point.
12	Q When we discussed where the gauges were
13	located before, does your one gauge that you had reflect
14	any additional pressure that comes from the HRSGs?
15	A The one gauge that we had being the IP exhaust
16	that we talked about?
17	Q Yes.
18	A I don't know specifically. I suspect it did
19	not. As we talked about, I think the gauge was likely
20	located between the IP turbine and the point where the
21	admission flow, the LP admission flow enters that line.
22	Q And so that could have caused additional
23	pressure that wouldn't have been reflected?
24	A It could have. Now, there are and I don't
25	know the operating pressures, but there are mechanical

constraints within the HRSG to make sure that we don't go above certain pressures in each section; safety valves, for instance; sky valves; vent valves that are operated as part of startups and shutdowns that are safeguards against over-pressurizing those lines. So I just want you to understand, there are other safeguards involved with that.

Q In 2009, did Mitsubishi provide any operational instructions for blending the steam produced by the four CTs prior to introduction into the steam turbine?

12 A I don't know if Mitsubishi provided blending 13 instructions, or if they were provided. They were more 14 likely provided by the EPC contractor of the project, 15 because the HRSGs were manufactured by a different 16 equipment manufacturer, so the EPC more than likely gave 17 those operating procedures.

18 In other words, the manufacturer of the 0 Okay. 19 HRSGs themselves? 20 Α Gave them to the consortium of Bibb and TIC 21 that I talked about and became Kiewit, and so it 22 probably would have come from Kiewit. 23 In 2009, did Mitsubishi provide any 0 Okay. 24 operating instructions for blending the steam produced 25 by each HRSG with the steam removed from each of the

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1	steam turbine sections?
2	A When you say steam removed from each of the
3	steam turbine sections?
4	Q Recycled to each of the because you had
5	exhaust steam from the high pressure that goes into the
6	intermediate pressure, that then goes into were there
7	any type of blending instructions for that?
8	A Well, again, any instructions like that likely
9	would have come from the Kiewit the EPC.
10	Could I approach the chart again?
11	THE COURT: Sure.
12	THE WITNESS: This is a point that I think you
13	need to understand.
14	The exhaust of the high pressure turbine
15	let me get the exact line here. So here is the
16	inlet steam to the high pressure turbine. It goes
17	through the high pressure turbine in this
18	direction, exits here, and now it's called cold
19	reheat steam. We need to reheat it, get the
20	temperature back up and increase the energy in that
21	steam.
22	So it's sent back to the HRSG and it's
23	reheated. It's made into intermediate pressure
24	steam, which is then comes down in that
25	admission line we talked about before.

1	So again, you are we are mixing up the HRSG
2	with the steam turbine operation, so any procedures
3	having to do with blending steam in and out of
4	different sections would be
5	BY MS. BROWNLESS:
6	Q Between those sections would have to he come
7	from the HRSG?
8	A Right. So the EPC, the Kiewit entity would be
9	taking input from the HRSG manufacturer and the steam
10	turbine manufacturer to provide those type of
11	procedures.
12	Q Okay. In 2009, was there an exhaust system in
13	place with pressure if the low pressure area rose above
14	a certain level?
15	A Yes.
15 16	<ul><li>A Yes.</li><li>Q And can you show me where that is?</li></ul>
16	Q And can you show me where that is?
16 17	Q And can you show me where that is? A Would you ask that again? If pressure I am
16 17 18	Q And can you show me where that is? A Would you ask that again? If pressure I am sorry.
16 17 18 19	Q And can you show me where that is? A Would you ask that again? If pressure I am sorry. Q Was there an exhaust system in place if
16 17 18 19 20	QAnd can you show me where that is?AWould you ask that again? If pressure I amsorry.QWas there an exhaust system in place ifpressure in the low pressure area rose above a certain
16 17 18 19 20 21	<ul> <li>Q And can you show me where that is?</li> <li>A Would you ask that again? If pressure I am</li> <li>sorry.</li> <li>Q Was there an exhaust system in place if</li> <li>pressure in the low pressure area rose above a certain</li> <li>level?</li> </ul>
16 17 18 19 20 21 22	<ul> <li>Q And can you show me where that is?</li> <li>A Would you ask that again? If pressure I am sorry.</li> <li>Q Was there an exhaust system in place if</li> <li>pressure in the low pressure area rose above a certain</li> <li>level?</li> <li>A Well, there is multiple points where there is</li> </ul>

1	ship or a submarine, but manufactured so that when
2	they they will burst and relieve pressure or relieve
3	vacuum. You might really want to relieve vacuum and let
4	air come in. But there are rupture discs around the
5	casing of the low pressure turbine. There are safety
6	valves on the low pressure turbine on the admission
7	steam line. And there are
8	Q On the HRSG?
9	A Yes. And there are things called sky valves
10	which are automatically operated valves that the
11	operator controls to raise or lower pressure as needed
12	to make sure that the pressures are suitable for
13	admission into the system.
14	Q Okay. If I look at what's Exhibit 80, which
15	is the chart, the Table A, do you have that?
16	A Exhibit 80?
17	Q It's Table A.
18	A Oh, Table A. I am sorry. Yes, I have that
19	right in front of me.
20	Q Okay. When was the request made of Mitsubishi
21	to figure out a way to increase the megawatt output of
22	the Bartow steam turbine to 450 megawatts?
23	A That request was made during Period 2, when it
24	became apparent with the 118-pound limit we had placed
25	on the IP turbine exhaust would not allow us to even get

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1	to 420 megawatts. We certainly were far away from the
2	generator's capability of 468 megawatts, and so we
3	started discussions with Mitsubishi on what, if
4	anything, could be done to rectify that.
5	Q Okay. And who made that request? Y'all made
6	it to them? Who made it?
7	A Yes. I don't know specifically who, but Duke
8	Energy made that request to Mitsubishi.
9	Q And why did you decide that you wanted to ramp
10	it up to 450 at that time?
11	A We felt that there was capability in that
12	4-on-1 power block at Bartow that we weren't able to use
13	that we should be able to use specifically with the
14	generator. We knew we could generate steam flow.
15	Think about this for a minute, in case 48,
16	heat balance 48 is three HRSGs three combustion
17	turbines, three HRSGs, duct firing in the HRSG on the
18	steam turbine and we achieved a corrected value of 420
19	point something megawatts in order for the contractual
20	minimum to be met.
21	At that time, everybody involved with the
22	project knew there is more steam flow available. We
23	weren't even using one of the combustion turbines and
24	HRSGs. So we have this expensive power block that we
25	know that there is more capability.

1	I know it's expensive replacing rows of
2	blades, but when you think about a several-hundred-
3	million-dollar project or power block being held up by
4	perhaps the \$3 million row of blades, if there is a way
5	to get all of the output all the capability out of
6	the power block, then that's the prudent thing to do to
7	make sure we can operate as efficiently as possible and
8	as much output as possible for our customers.
9	Q Wasn't the excess capability available when
10	you first accepted the unit? I guess what I am trying
11	to understand is was there anything in the design
12	substantially different from the time you did the
13	initial testing until 2012, when you decided to ask for
14	more megawatts? What was different?
15	A Well, during Period 1, we weren't operating
16	with that 118-pound limit on the intermediate pressure
17	turbine exhaust. So we were adhering to the other
18	operating parameters, making sure we didn't exceed
19	anything that had been provided by the OEM, and trying
20	to take advantage of the full capability of the steam
21	generator.
22	Q Right. And I gets my question is
23	A I am sorry, the electrical generator.
24	Q There was nothing different you didn't add
25	any additional equipment, you didn't do anything, there

1	was nothing different between when you started out in
2	Period 1 and you made this request to increase the
3	nameplate capacity by another 30 megawatts?
4	A That's correct. It was the same set of
5	equipment with just a different operating parameter.
6	Q Right. And the operating parameters had to do
7	with the amount of steam that you were putting through
8	the system?
9	A Ultimately, yes.
10	Q Okay. Because you would have expected that a
11	4-on-1 configuration would give you a higher nameplate
12	capacity than a 3-on-1 configuration?
13	A Well, we would have expected that 4-on-1, if
14	we had at least as much duct firing as the 3-on-1 case,
15	yes, as long as we are staying within the capability of
16	the generator, we should be able to do better than the
17	420 megawatts.
18	Q Okay. And I guess that gets me back to my
19	original question, was why did you think 420 megawatts
20	was acceptable in the first place if you knew you had
21	another combustion turbine available?
22	A So when you mean acceptable, why did we test
23	at 420?
24	Q Why did you accept 420 megawatts from the
25	get-go and not a higher nameplate rating?

1	A Yeah. So I don't know the specifics of why
2	case heat balance case No. 28 and heat balance case
3	No. 48 were selected between the consortium building the
4	project and Progress Energy. Probably it's because we
5	wanted to test or make sure that where we would normally
6	operate the system runs efficiently at that normal
7	operation range.
8	It wasn't a maximum operation. You typically
9	don't run the Bartow combined cycle at maximum output.
10	In fact, we can look at the data and there is many more
11	hours not at maximum output than there are at maximum
12	output.
13	We are following the load of the system and
14	making sure we have the most efficient economic low-cost
15	units in service. Bartow is one of the more efficient
16	units, but we have other units that are more efficient
17	and lower cost than Bartow. So we typically don't
18	operate flat-out high highest load possible.
19	So I am speculating, but that's perhaps why it
20	was tested at those levels. But remember, the
21	420 megawatts for heat balance case No. 48 was the
22	minimum that Mitsubishi had to achieve. It didn't mean
23	that was a limit, or that was a maximum. We should be
24	and were pleased that we could get more than
25	420 megawatts if we still adhered to the operating

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1	pressures that we were given, and temperatures.
2	Q And this may be redundant, but again I just
3	want to make sure I understand.
4	Do you agree that Mitsubishi concluded in its
5	September 22nd, 2017, analysis that excessive blade
6	loading was the cause of the blade failure?
7	A I don't agree with that. Could you show me
8	where that's the document that shows that?
9	MR. BREW: That's the rebuttal exhibit.
10	THE WITNESS: Actually, if we could look at
11	JS-4. It's attached to my testimony.
12	MR. BERNIER: Judge, for what it's worth this
13	is getting into rebuttal.
14	MS. BROWNLESS: Oh, I am sorry if it is.
15	MR. BERNIER: That's okay.
16	MS. BROWNLESS: I will stop.
17	MR. BERNIER: We are pointing it out. I was
18	hearing it over here, and that's correct.
19	MS. BROWNLESS: No problem. No problem.
20	And if you give me just a minute.
21	THE COURT: Just wait for the next question.
22	THE WITNESS: Okay.
23	MS. BROWNLESS: Can I have a minute, please?
24	
	THE COURT: Sure.

1	Thank you.
2	THE COURT: Okay. Mr. Swartz, to plug on, all
3	we have left is redirect.
4	MR. BERNIER: We do, and we need to consult
5	real quick to see what we have for redirect, and it
6	may be more than a half-hour set of questions, so
7	maybe I don't know if we would want to do it in the
8	morning.
9	THE COURT: I will leave that the will the
10	group here. I mean, do we want to put off until
11	tomorrow morning? I am just not sure I mean, I
12	want to make sure we finish this in two days. I
13	mean, is do we expect Mr. Polich to take as long
14	as this did today?
15	MR. BERNIER: I can assure you I do not have
16	as much for Mr. Polich as we have had for
17	Mr. Swartz.
18	THE COURT: Okay. I mean, I am happy to
19	recess if everybody wants to do that, but I was
20	thinking if it's a half hour of questions, we may
21	as well wrap it up and then start fresh in the
22	morning.
23	MR. REHWINKEL: Yeah, I think that would be a
24	good break.
25	THE COURT: We can take five. We can take

1	five.
2	MR. BERNIER: We can take some time.
3	THE COURT: Let's take a recess for about
4	five.
5	(Brief recess.)
6	THE COURT: Okay, redirect.
7	MR. BERNIER: Thank you, Judge. And I
8	appreciate that break. That was helpful. I think
9	we were able to streamline this some.
10	FURTHER EXAMINATION
11	BY MR. BERNIER:
12	Q Mr. Swartz, you have been asked a good number
13	of questions today primarily by Mr. Rehwinkel, but by
14	others, about whether or not Mitsubishi in Period 1
15	specifically ever provided any documentation to Duke
16	Energy stating it was okay to operate over
17	420 megawatts. Do you recall those questions?
18	A Yes.
19	Q Okay. Let me ask this in another way.
20	Did Mitsubishi in Period 1 specifically ever
21	provide Duke Energy a document or any instructions
22	saying do not operate over 420 megawatts?
23	A No.
24	MR. BERNIER: Okay. I think Mr. Hernandez has
25	some questions for you.

1	MR. HERNANDEZ: I do.
2	EXAMINATION
3	BY MR. HERNANDEZ:
4	Q Mr. Swartz, let's stay with Period 1.
5	During Period 1, did Duke operate the steam
6	turbine at less than 420 megawatts?
7	A Yes, for considerable periods of time.
8	Q Can you give us an approximate percentage of
9	the time that it operated under 420?
10	A About half, I think. And how I achieve that
11	is there is a part of Mr. Polich's testimony actually,
12	Exhibit RAP-5, tabulates the number of hours that were
13	over 420 megawatts. So if you just look at that and
14	think about the number of operating hours in that
15	period, which can be found on JS-1 on the Table A on
16	page five and do the math, it's about half of the hours
17	were above and about half of the hours were below
18	420 megawatts.
19	Q Okay. Thank you.
20	You spoke in your testimony about pounds per
21	hour per square footage. Is that something that Duke
22	could have measured while operating the steam turbine?
23	A No. That's a calculated number.
24	Q So that's not a operating parameter that Duke
25	could have followed while operating the steam turbine?

1	A That's correct.
2	Q Okay. Did Mitsubishi participate in any of
3	the inspections that you testified about that Duke
4	conducted as it was replacing blades?
5	A Yes, in fact, every one. Each iteration of
6	installing different LO blades, Mitsubishi was the
7	execution arm of that outage. We had Mitsubishi
8	personnel, engineers on site each time inspecting blades
9	with us, inspecting the entire low pressure turbine.
10	Q And I know that you testified that Duke found
11	no irregularities, no abnormalities, no damage to the
12	steam turbine components aside from the blades, but did
13	Mitsubishi find anything?
14	A Nothing was found. The rest of the low
15	pressure turbine blading diaphragms was all good in each
16	one of those inspections.
17	Q During Period 1, was there any way for Duke to
18	know that it operated within the avoidance zone during
19	Period 1?
20	A No. The avoidance zone wasn't actually
21	calculated until the beginning of Period 3, after we had
22	done testing using the temporary blade vibration
23	monitoring system. And it was only at that time that
24	Mitsubishi provided, or recommended avoidance zone.
25	The only reason that Table A in the Exhibit

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1 JS-1 has hours in the avoidance zone and other periods 2 is because we back calculated that. If it had been in 3 existence, that's how many hours, but it didn't exist 4 until the beginning of Period 3. 5 Q Okav. I want to get some clarification on 6 heat balance testing. Is that something that is 7 actually -- you use the term testing, but is that 8 testing actually performed when the steam turbine is a 9 attached to the generator? 10 The heat balance cases are actually Α No. 11 generated -- in this case, they were generated years 12 prior to construction of the power block. And they are 13 engineering predictions of output and other variables 14 based on different combinations of equipment and 15 operating parameters that may be in place when you get 16 So it's all theoretical. to operation. 17 0 So when actual testing was performed after the 18 steam turbine was actually installed, part of the 19 purpose of that was to determine whether or not the 20 steam turbine would perform in accordance with the heat 21 balance prediction? 22 Α That's correct. And that's really important 23 from an efficiency standpoint especially. We want to 24 make sure we are getting the efficiency -- achieving the efficiency of converting fuel into our product of 25

1 megawatts as designed. The long-term operation, 40
2 years operation of any power plant, that's really the
3 most important thing for the sake of the customer. So
4 that's why --

5QI am sorry.I think you testified that there6were approximately 300 heat balance predictions.During7the course of actual testing of the steam turbine, not8all of those prediction models were tested, correct?9AThat's correct.9A

10 balance cases that were generated years before 11 construction, and then two were included in the contract 12 for liquidated damages purposes.

Q And there were some questions regarding the settlement agreement, and the fact that within the settlement agreement there was language indicating that the parties negotiated an increase of megawattage from 420 to 450.

Can you tell me the significance of those numbers, 420 and 450, in the context of the settlement agreement, why were they put in there?

A Sure. They are good reference numbers. And just like the 420 was a minimum that Mitsubishi had to meet to get full payment on the original project, the 450 was what we wanted to achieve as a minimum with a redefine of the blades.

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1	Q So the 450 in the context of the settlement
2	agreement was similar to the 420 guaranteed amount set
3	forth in the contract by Mitsubishi, is that correct?
4	A Yes, that's accurate.
5	MR. HERNANDEZ: No further questions, Judge.
6	MR. MOYLE: I was going to say so much for the
7	relevancy of the settlement agreement, to tweak my
8	friend Mr. Bernier.
9	THE COURT: I am assuming there is no point
10	starting with another witness this evening. I take
11	it we are all in agreement we should stand in
12	recess until nine o'clock in the morning?
13	MR. MOYLE: Yes. Thank you, Your Honor.
14	THE COURT: See you then.
15	(Whereupon, the proceedings adjourned for the
16	day at 4:50 p.m., and the transcript continues in
17	sequence in Volume 3.)
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1	CERTIFICATE OF REPORTER
2	STATE OF FLORIDA )
3	COUNTY OF LEON )
4	
5	I, DEBRA KRICK, Court Reporter, do hereby
6	certify that the foregoing proceeding was heard at the
7	time and place herein stated.
8	IT IS FURTHER CERTIFIED that I
9	stenographically reported the said proceedings; that the
10	same has been transcribed under my direct supervision;
11	and that this transcript constitutes a true
12	transcription of my notes of said proceedings.
13	I FURTHER CERTIFY that I am not a relative,
14	employee, attorney or counsel of any of the parties, nor
15	am I a relative or employee of any of the parties'
16	attorney or counsel connected with the action, nor am I
17	financially interested in the action.
18	DATED this 18th day of February, 2020.
19	
20	D I I D I I
21	Debbri R Krici
22	DEBRA R. KRICK
23	NOTARY PUBLIC COMMISSION #GG015952
24	EXPIRES JULY 27, 2020
25	

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19	1230 Apalachee Parkway The DeSoto Building,	19		
20	Tallahassee, Florida	20		
21	REPORTED BY: DEBRA R. KRICK Court Reporter	21		
22	APPEARANCES: (As heretofore noted.)	22		
23	PREMIER REPORTING 114 W. 5TH AVENUE	23		
	TALLAHASSEE, FLORIDA (850) 894-0828	24		
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25 14 W. remie	5th Avenue, Tallahassee, FL 32303       premier-reporting.cz         Reporting       Reported by: Debbie Kr         159       P R O C E E D I N G S         THE COURT:       Mr. Rehwinkel, whenever you are         ready, I think we are all set.       MR. REHWINKEL:         MR. REHWINKEL:       Okay.       Thank you, Your Honor.	Premier	(850) 894-0828 Okay. And would it be also r assume, based on the Duke file name, the made some comments or edits to this door A It would. And one correction	Reported by: Debbie Kr 160 easonable to at Paul Crimi ument? , I don't know
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25 14 W. remie 1 2 3 4 5 6 7 8 9	5th Avenue, Tallahassee, FL 32303       premier-reporting or Reported by: Debble Kr         159         P R O C E E D I N G S         THE COURT: Mr. Rehwinkel, whenever you are         ready, I think we are all set.         MR. REHWINKEL: Okay. Thank you, Your Honor.         BY MR. REHWINKEL:         Q I want to take you back to the drafts that we         called that's Exhibit 115. If you can go to that. I         think we will spend most of the rest of the time on that         document.	Premier 1 2 3 4 5 6 7 8 9	(850) 894-0828 Okay. And would it be also reassume, based on the Duke file name, the made some comments or edits to this door A It would. And one correction that Mr. Carbone would have created it, certainly, by the revision date, it appedited it. Q Okay. We wouldn't know necess did it, but it would have been on or af	Reported by: Debbie Ku 160 easonable to at Paul Crimi ument? , I don't know but he ears that he sarily when he
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		CONF	<b>IDEN</b>	IIAL	
1	paragraph and just so we understand what these			1	BY MR. REHWINKEL:
2	documents are, I mean, the night janitor wouldn't be			2	Q The fir
3	able to go and make changes to these things? These			3	A Yes, it
4	are these changes are all by authorized engineers,			4	Q The sec
5	right?			5	A Yes.
6	A That's correct.			6	Q And the
7	Q Okay. So there is a statement here that			7	A That on
8	starts "it is important" could you read that full			8	It was much less
9	paragraph there with those edits?			9	output limit impl
LO	A Yes, sir.			10	of a root cause t
1	"It is important to note that this turbine was			11	statement is true
2	originally designed for another project and built by the			12	Q Well, I
3	OEM but not shipped. It was subsequently reapplied to			13	let me ask it tha
4	the Bartow project with the limitations and turbine			14	A I would
15	outputs shown on the heat balances and other			15	The ope
6	documentation provided. However, it was much less clear			16	turbine are reall
7	about the exhaust flow limit the output limit implied			17	instance, we don'
. 8	since this pressure and flow limit is not clearly stated			18	pressure inlet in
9	on the documentation given."			19	is no way to meas
0	Q Okay. Now, is that isn't that true?			20	sentence is getti
21	MR. HERNANDEZ: Objection, Your Honor,			21	Q Okay.
2	compound.			22	clarity about wha
3	MR. REHWINKEL: I'll ask you this			23	Mr. Crimi here, i
	THE COURT: Overruled. Yeah, you can break it			24	A No, tha
4					Q And if
:5 4 W.	down, I guess. 5th Avenue, Tallahassee, FL 32303 (850) 894-0828 Premier-reporting. Reported by: Debbie H				5th Avenue, Tallahassee, FL 32
emie	5th Avenue, Tallahassee, FL 32303 (850) 894-0828 premier-reporting, Reporting (850) 894-0828 Reported by: Debbie H			114 W. Premier	5th Avenue, Tallahassee, FL 32
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	5th Avenue, Tallahassee, FL 32303 (850) 894-0828 premier-reporting, Reported by: Debbie H			114 W. Premier	5th Avenue, Tallahassee, FL 32 r Reporting Restrictions", do
1 2	5th Avenue, Tallahassee, FL 32303 (850) 894-0828       premier-reporting, Reported by: Debble P         163         A       Okay.         Q       in the keynote section under Period 1.			114 W. Premier	5th Avenue, Tallahassee, FL 32 Reporting Restrictions", do A I do.
25 4 W. emiei 1 2 3	5th Avenue, Tallahassee, FL 32303 (850) 894-0828       premier-reporting, Reported by: Debbie H         163         A       Okay.         Q       in the keynote section under Period 1.         A       Yes.			114 W. Premier	Sth Avenue, Tallahassee, FL 32 r Reporting Restrictions", do A I do. Q All rig
5 4 W. emie 1 2 3 4	5th Avenue, Tallahassee, FL 32303 (850) 894-0828       premier-reporting, Reported by: Debble P         163         A       Okay.         Q       in the keynote section under Period 1.         A       Yes.         Q       It says MHPSA was hired to evaluate ST design			114 W. Premier	Sth Avenue, Tallahassee, FL 32 r Reporting Restrictions", do A I do. Q All rig dash, MHPS intent
1 2 3 4 5	5th Avenue, Tallahassee, FL 32303 (850) 894-0828       premier-reporting. Reported by: Debble 4         163         A       Okay.         Q       in the keynote section under Period 1.         A       Yes.         Q       It says MHPSA was hired to evaluate ST design conditions, parentheses, original design was for Tenaska			114 W. Premier	Sth Avenue, Tallahassee, FL 32 Reporting Restrictions", do A I do. Q All rig dash, MHPS intent do you see that?
5 ww. mie 1 2 3 4 5 6	5th Avenue, Tallahassee, FL 32303 (850) 894-0828       premier-reporting, Reported by: Debble P         163         A       Okay.         Q       in the keynote section under Period 1.         A       Yes.         Q       It says MHPSA was hired to evaluate ST design conditions, parentheses, original design was for Tenaska         3-x-1 heat balance and continue the warranty. Do you			114 W. Premier 1 2 3 4 5 6	Sth Avenue, Tallahassee, FL 32 Reporting Restrictions", do A I do. Q All rig dash, MHPS intent do you see that? A I do.
1 2 3 4 5 6 7	5th Avenue, Tallahassee, FL 32303 (850) 894-0828       premier-reporting, Reported by: Debble 4         163         A       Okay.         Q       in the keynote section under Period 1.         A       Yes.         Q       It says MHPSA was hired to evaluate ST design conditions, parentheses, original design was for Tenaska 3-x-1 heat balance and continue the warranty. Do you see that?			114 W. Premier 1 2 3 4 5 6 7	Sth Avenue, Tallahassee, FL 32 Restrictions", do A I do. Q All rig dash, MHPS intent do you see that? A I do. Q Okay.
25 4 W. emie 1 2 3 4 5 6 7 8	5th Avenue, Tallahassee, FL 32303 (850) 894-0828       premier-reporting, Reported by: Debble 9         163         A       Okay.         Q       in the keynote section under Period 1.         A       Yes.         Q       It says MHPSA was hired to evaluate ST design conditions, parentheses, original design was for Tenaska         3-x-1 heat balance and continue the warranty. Do you see that?         A       I do.			114 W. Premier 1 2 3 4 5 6 7 8	Sth Avenue, Tallahassee, FL 32 r Reporting Restrictions", do A I do. Q All rig dash, MHPS intent do you see that? A I do. Q Okay. Mitsubishi's cont
1 2 3 4 5 6 7 8 9	5th Avenue, Tallahassee, FL 32303 (850) 894-0828       premier-reporting, Reported by: Debble 4         163         A       Okay.         Q       in the keynote section under Period 1.         A       Yes.         Q       It says MHPSA was hired to evaluate ST design conditions, parentheses, original design was for Tenaska         3-x-1 heat balance and continue the warranty. Do you see that?         A       I do.         Q       Okay. And even though it has an A in there,			114 W. Premier 1 2 3 4 5 6 7 8 9	Sth Avenue, Tallahassee, FL 32 Reporting Restrictions", do A I do. Q All rig dash, MHPS intent do you see that? A I do. Q Okay. Mitsubishi's cont limitations that
1 2 3 4 5 6 7 8 9 .0	5th Avenue, Tallahassee, FL 32303 (850) 894-0828       premier-reporting, Reported by: Debble P         163         A       Okay.         Q       in the keynote section under Period 1.         A       Yes.         Q       It says MHPSA was hired to evaluate ST design conditions, parentheses, original design was for Tenaska 3-x-1 heat balance and continue the warranty. Do you see that?         A       I do.         Q       Okay. And even though it has an A in there, there is no that's still Mitsubishi?			114 W, Premier 1 2 3 4 5 6 7 8 9 10	Sth Avenue, Tallahassee, FL 32 Restrictions", do A I do. Q All rig dash, MHPS intent do you see that? A I do. Q Okay. Mitsubishi's cont limitations that correct?
1 1 2 3 4 5 6 7 8 9 .0 1	5th Avenue, Tallahassee, FL 32303 (850) 894-0828       premier-reporting, Reported by: Debble /         163         A       Okay.         Q       in the keynote section under Period 1.         A       Yes.         Q       It says MHPSA was hired to evaluate ST design conditions, parentheses, original design was for Tenaska 3-x-1 heat balance and continue the warranty. Do you see that?         A       I do.         Q       Okay. And even though it has an A in there, there is no that's still Mitsubishi?         A       It is. The A, I believe, stands for America.			114 W. Premier 1 2 3 4 5 6 7 8 9 10 11	Sth Avenue, Tallahassee, FL 32 Restrictions", do A I do. Q All rig dash, MHPS intent do you see that? A I do. Q Okay. Mitsubishi's cont limitations that correct? A Again,
1 4 W. emie 1 2 3 4 5 6 7 8 9 10 11	5th Avenue, Tallahassee, FL 32303 (850) 894-0828       premier-reporting, Reported by: Debble 4         163         A       Okay.         Q       in the keynote section under Period 1.         A       Yes.         Q       It says MHPSA was hired to evaluate ST design conditions, parentheses, original design was for Tenaska         3-x-1 heat balance and continue the warranty. Do you see that?         A       I do.         Q       Okay. And even though it has an A in there, there is no that's still Mitsubishi?         A       It is. The A, I believe, stands for America.         Q       All right. So somebody, when they developed			114 W. Premier 1 2 3 4 5 6 7 8 9 10 11 12	Sth Avenue, Tallahassee, FL 32 Restrictions", do A I do. Q All rig dash, MHPS intent do you see that? A I do. Q Okay. Mitsubishi's cont limitations that correct? A Again, not believe is ac
1 4 W. emie 1 2 3 4 5 6 7 8 9 .0 .1 .2 .3	5th Avenue, Tallahassee, FL 32303 (850) 894-0828       premier-reporting, Reported by: Debble 9         163         A       Okay.         Q       in the keynote section under Period 1.         A       Yes.         Q       It says MHPSA was hired to evaluate ST design conditions, parentheses, original design was for Tenaska         3-x-1 heat balance and continue the warranty. Do you see that?         A       I do.         Q       Okay. And even though it has an A in there, there is no that's still Mitsubishi?         A       It is. The A, I believe, stands for America.         Q       All right. So somebody, when they developed         Appendix A, put 450 megawatts as the steam turbine			114 W. Premier 1 2 3 4 5 6 7 8 9 10 11 12 13	Sth Avenue, Tallahassee, FL 32 Restrictions", do A I do. Q All rig dash, MHPS intent do you see that? A I do. Q Okay. Mitsubishi's cont limitations that correct? A Again, not believe is ac a certain set of
1 2 3 4 5 6 7 8 9 10 11 12 13 14	5th Avenue, Tallahassee, FL 32303 (850) 894-0828       premier-reporting, Reported by: Debble 7         163         A       Okay.         Q       in the keynote section under Period 1.         A       Yes.         Q       It says MHPSA was hired to evaluate ST design conditions, parentheses, original design was for Tenaska 3-x-1 heat balance and continue the warranty. Do you see that?         A       I do.         Q       Okay. And even though it has an A in there, there is no that's still Mitsubishi?         A       It is. The A, I believe, stands for America.         Q       All right. So somebody, when they developed         Appendix A, put 450 megawatts as the steam turbine rating in 2016, do you see that, for Period 1?			114 W, Premier 1 2 3 4 5 6 7 8 9 10 11 12 13 14	Sth Avenue, Tallahassee, FL 32 Restrictions", do A I do. Q All rig dash, MHPS intent do you see that? A I do. Q Okay. Mitsubishi's cont limitations that correct? A Again, not believe is ac a certain set of the intent was to
1 2 4 W. emie 2 3 4 5 6 7 8 9 10 11 2 12 12 12 12 12 12 12 12 12 12 12 1	5th Avenue, Tallahassee, FL 32303 (850) 894-0828       premier-reporting, Reported by: Debble 9         163         A       Okay.         Q       in the keynote section under Period 1.         A       Yes.         Q       It says MHPSA was hired to evaluate ST design conditions, parentheses, original design was for Tenaska         3-x-1 heat balance and continue the warranty. Do you see that?         A       I do.         Q       Okay. And even though it has an A in there, there is no that's still Mitsubishi?         A       It is. The A, I believe, stands for America.         Q       All right. So somebody, when they developed         Appendix A, put 450 megawatts as the steam turbine rating in 2016, do you see that, for Period 1?         A       I do see that.			114 W, Premies 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	Sth Avenue, Tallahassee, FL 32 Restrictions", do A I do. Q All rig dash, MHPS intent do you see that? A I do. Q Okay. Mitsubishi's cont limitations that correct? A Again, not believe is ac a certain set of the intent was to Q And tha
1 4 W. emie 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	5th Avenue, Tallahassee, FL 32303 (850) 894-0828       premier-reporting, Reported by: Debble 4         A       Okay.         Q       in the keynote section under Period 1.         A       Yes.         Q       It says MHPSA was hired to evaluate ST design conditions, parentheses, original design was for Tenaska         3-x-1 heat balance and continue the warranty. Do you see that?         A       I do.         Q       Okay. And even though it has an A in there, there is no that's still Mitsubishi?         A       It is. The A, I believe, stands for America.         Q       All right. So somebody, when they developed         Appendix A, put 450 megawatts as the steam turbine rating in 2016, do you see that, for Period 1?         A       I do see that.         Q       And that turned out to be an error?			114 W, Premier 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	Sth Avenue, Tallahassee, FL 32 Restrictions", do A I do. Q All rig dash, MHPS intent do you see that? A I do. Q Okay. Mitsubishi's cont limitations that correct? A Again, not believe is ac a certain set of the intent was to Q And tha in his statement,
1 4 W.emie 1 2 3 4 5 6 7 8 9 10 11 12 3 4 5 6 7 8 9 10 11 12 13 14 15 16 11 12 13 14 15 16 10 10 10 10 10 10 10 10 10 10	5th Avenue, Tallahassee, FL 32303 (850) 894-0828       premier-reporting, Reported by: Debble 9         A       Okay.         Q       in the keynote section under Period 1.         A       Yes.         Q       It says MHPSA was hired to evaluate ST design conditions, parentheses, original design was for Tenaska 3-x-1 heat balance and continue the warranty. Do you see that?         A       I do.         Q       Okay. And even though it has an A in there, there is no that's still Mitsubishi?         A       It is. The A, I believe, stands for America.         Q       All right. So somebody, when they developed         Appendix A, put 450 megawatts as the steam turbine rating in 2016, do you see that, for Period 1?         A       I do see that.         Q       And that turned out to be an error?         A       Are you asking me if that was an error?			114 W, Premier 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17	Sth Avenue, Tallahassee, FL 32 Restrictions", do A I do. Q All rig dash, MHPS intent do you see that? A I do. Q Okay. Mitsubishi's cont limitations that correct? A Again, not believe is ac a certain set of the intent was to Q And tha in his statement, limitations in tu
1 2 4 4 4 2 3 4 5 6 7 8 9 10 11 12 3 4 5 6 7 8 9 10 11 12 13 14 15 16 11 12 13 14 15 16 10 10 10 10 10 10 10 10 10 10	5th Avenue, Tallahassee, FL 32303 (850) 894-0828       premier-reporting, Reported by: Debble 7         A       Okay.       0         Q       in the keynote section under Period 1.       103         A       Yes.       1t says MHPSA was hired to evaluate ST design conditions, parentheses, original design was for Tenaska         3-x-1 heat balance and continue the warranty. Do you see that?       A       I do.         Q       Okay. And even though it has an A in there, there is no that's still Mitsubishi?         A       It is. The A, I believe, stands for America.         Q       All right. So somebody, when they developed         Appendix A, put 450 megawatts as the steam turbine       rating in 2016, do you see that, for Period 1?         A       I do see that.       Q         Q       And that turned out to be an error?       A         A       re you asking me if that was an error?       Q         Q       Yes.       Yes.			114 W, Premies 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	Restrictions", do A I do. Q All rig dash, MHPS intent do you see that? A I do. Q All rig dash, MHPS intent do you see that? A I do. Q Okay. Mitsubishi's cont limitations that correct? A Again, not believe is ac a certain set of the intent was to Q And tha in his statement, limitations in tu A There i
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19	5th Avenue, Tallahassee, FL 32303 (850) 894-0828       premier-reporting, Reported by: Debble 4         A       Okay.       0         Q       in the keynote section under Period 1.       1         A       Yes.       1t says MHPSA was hired to evaluate ST design conditions, parentheses, original design was for Tenaska         3-x-1 heat balance and continue the warranty. Do you see that?       Do you         A       I do.         Q       Okay. And even though it has an A in there, there is no that's still Mitsubishi?         A       It is. The A, I believe, stands for America.         Q       All right. So somebody, when they developed         Appendix A, put 450 megawatts as the steam turbine rating in 2016, do you see that, for Period 1?         A       I do see that.         Q       And that turned out to be an error?         A       Are you asking me if that was an error?         Q       Yes.         A       It appears it was an error.			114 W, Premies 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19	Restrictions", do A I do. Q All rig dash, MHPS intent do you see that? A I do. Q Okay. Mitsubishi's cont limitations that correct? A Again, not believe is ac a certain set of the intent was to Q And tha in his statement, limitations in tu A There i the sentence i
1 2 4 4 5 6 7 8 9 10 11 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 11 12 13 14 15 16 10 10 10 10 10 10 10 10 10 10	Sth Avenue, Tallahassee, FL 32303 (850) 894-0828       premier-reporting, Reported by: Debble for Reported by:			114 W, Premies 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	Restrictions", do A I do. Q All rig dash, MHPS intent do you see that? A I do. Q All rig dash, MHPS intent do you see that? A I do. Q Okay. Mitsubishi's cont limitations that correct? A Again, not believe is ac a certain set of the intent was to Q And tha in his statement, limitations in tu A There i the sentence i Q As a lin
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21	Sth Avenue, Tallahassee, FL 32303 (850) 894-0828       premier-reporting, Reported by: Debble for Reported by:			114 W, Premies	Restrictions", do A I do. Q All rig dash, MHPS intent do you see that? A I do. Q All rig dash, MHPS intent do you see that? A I do. Q Okay. Mitsubishi's cont limitations that correct? A Again, not believe is ac a certain set of the intent was to Q And tha in his statement, limitations in tu A There i the sentence i Q As a Lin A The lim
4 W. mmee 4 W. mmee 1 2 3 3 4 5 5 6 7 8 9 9 0 1 1 2 3 3 4 5 5 6 7 8 9 9 0 1 1 2 3 4 4 5 5 6 6 7 8 9 9 0 0 1 2 3 4 4 5 6 6 7 8 9 9 0 0 1 1 2 3 4 4 5 5 6 6 7 8 9 9 0 0 1 1 2 3 4 4 5 6 7 8 9 9 0 0 1 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1	Sh Avenue, Tallahassee, FL 32303 (850) 894-0828       premier-reporting, Reported by: Debbler         A       Okay.         Q       in the keynote section under Period 1.         A       Yes.         Q       It says MHPSA was hired to evaluate ST design conditions, parentheses, original design was for Tenaska 3-x-1 heat balance and continue the warranty. Do you see that?         A       I do.         Q       Okay. And even though it has an A in there, there is no that's still Mitsubishi?         A       It is. The A, I believe, stands for America.         Q       All right. So somebody, when they developed         Appendix A, put 450 megawatts as the steam turbine rating in 2016, do you see that, for Period 1?         A       I do see that.         Q       And that turned out to be an error?         A       Are you asking me if that was an error?         Q       Yes.         A       It appears it was an error.         Q       Okay. But if we go back let's go back to page 175 now. Let's go go out a year in time.         A       175?			114 W, Premies	Sth Avenue, Tallahassee, FL 32         Sth Avenue, Tallahassee, FL 32         Restrictions", do         A       I do.         Q       All rig         dash, MHPS intent         do you see that?         A       I do.         Q       Okay.         Mitsubishi's cont         limitations that         correct?         A       Again,         not believe is ac         a certain set of         the intent was to         Q       And tha         in his statement,         limitations in tu         A       There i         the sentence i         Q       As a li:         A       The lim
4 W. mmie 4 W. mmie 1 2 3 4 4 5 6 7 8 9 9 00 11 12 13 14 15 16 6 7 7 8 9 9 00 11 12 13 14 15 16 16 17 18 19 10 10 12 12 13 14 15 16 16 16 16 16 16 16 16 16 16	Sth Avenue, Tallahassee, FL 32303       premier-reporting, Preported by: Debble Preported			114 W, Premier 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23	Sth Avenue, Tallahassee, FL 32 Restrictions", do A I do. Q All rig dash, MHPS intent do you see that? A I do. Q Okay. Mitsubishi's cont limitations that correct? A Again, not believe is ac a certain set of the intent was to Q And tha in his statement, limitations in tu A There i the sentence i Q As a Li A The lim heat balances, ye Q Okay.
25 4 W. emile 1 2 3 4 5 6 7 8 9 10 11 2 3 4 5 6 7 8 9 10 11 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 10 10 10 10 10 10 10 10 10 10	Sh Avenue, Tallahassee, FL 32303 (850) 894-0828       premier-reporting, Reported by: Debbler         A       Okay.         Q       in the keynote section under Period 1.         A       Yes.         Q       It says MHPSA was hired to evaluate ST design conditions, parentheses, original design was for Tenaska 3-x-1 heat balance and continue the warranty. Do you see that?         A       I do.         Q       Okay. And even though it has an A in there, there is no that's still Mitsubishi?         A       It is. The A, I believe, stands for America.         Q       All right. So somebody, when they developed         Appendix A, put 450 megawatts as the steam turbine rating in 2016, do you see that, for Period 1?         A       I do see that.         Q       And that turned out to be an error?         A       Are you asking me if that was an error?         Q       Yes.         A       It appears it was an error.         Q       Okay. But if we go back let's go back to page 175 now. Let's go go out a year in time.         A       175?			114 W, Premies	Sth Avenue, Tallahassee, FL 32         Sth Avenue, Tallahassee, FL 32         Restrictions", do         A       I do.         Q       All rig         dash, MHPS intent         do you see that?         A       I do.         Q       Okay.         Mitsubishi's cont         limitations that         correct?         A       Again,         not believe is ac         a certain set of         the intent was to         Q       And tha         in his statement,         limitations in tu         A       There i         the sentence i         Q       As a li:         A       The lim

#### The first sentence is true, is it not? Q A Yes, it is true. The second sentence is true, is it not? Q A Yes. Q And the third sentence is true? A That one is difficult to say a true or false. as much less clear about the exhaust flow limit the out limit implied -- again, it's a working document root cause team. You are just asking me if that ement is true or false, that sentence? Q Well, I am asking you if you agreed with that, me ask it that way. A I would say I generally agree with that. The operating parameters to operate the steam oine are really on -- you know, we, like -- for ance, we don't have, as I stated earlier, a low ssure inlet instrument, so exhaust flow limit, there o way to measure that, so I think that's what this ence is getting at. Q Okay. But there is no expression of a lack of rity about what the heat balances represent by Crimi here, is there? A No, that's correct. Q And if we go to page 27 -ue, Tallahassee, FL 32303 premier-reporting.com Reported by: Debbie Krick (850) 894-0828

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	164
1	Restrictions", do you see that caption?
2	A I do.
3	Q All right. And for Period 1, it says none,
4	dash, MHPS intent was to follow heat balance diagrams,
5	do you see that?
6	A I do.
7	Q Okay. So that's consistent, is it not, with
8	Mitsubishi's contention that the heat balances were
9	limitations that for operating the steam turbine,
10	correct?
11	A Again, calling heat balances limitations I do
12	not believe is accurate. They are predictions based on
13	a certain set of criteria, and so what this is saying is
14	the intent was to follow those predictions.
15	Q And that's what Mr. Crimi said a year earlier
16	in his statement, right, that the heat balances were
17	limitations in turbine output, back on page 19, right?
18	A There is a reference to the heat balances in
19	the sentence in the paragraph I read.
20	Q As a limitation, right?
21	A The limitations in turbine output shown on the
22	heat balances, yes.
23	Q Okay.
24	A Now, again, that's with other operating
25	variables, okay. So a limitation is according to
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	165	IDENTIA	<u> </u>		
1	whatever the other variables are for that specific heat		1	October 11	th
2	case, which there are dozens, as we've seen.		2	question h	as
3	Q So let's go to page 195, and this is it's		3	A	Wha
4	got the draft water mark on it. So I am going to refer		4	Q	Wel
5	to this as the final draft, is that fair?		5	A	Ιt
6	A I am almost there.		6	refers to	the
7	Q Okay. Sorry, this is Document 18.		7	it refers	to
8	A Yes, that's fair.		8	am not sur	e 1
9	Q All right. So Table A is here, and we see		9	Q	So
10	if you go back to what did I have you look at? 175.		10	and let's	jus
11	Why don't you keep your finger on 195.		11	which is the	he
12	A Okay.		12	A	Tak
13	Q So this document here, we saw that says		13	Q	Yes
14	operating restrictions, right? For on 175 for the		14	page 195,	riç
15	one, two, three, fourth column for the fourth row		15	A	Yes
16	down.		16	Q	Oka
17	A Oh, yes, I see where, yes.		17	this headi	ng
18	Q Okay. And then if we flip back over to 195,		18	exhaust pr	ess
19	it now says MHPS IP exhaust pressure operating limits.		19	given is d	iff
20	A Yes.		20	says machin	ne
21	Q And then for Period 1, it now says machine		21	limits. I	t
22	control to HP, IP and condenser design limits; do you		22	A	Соз
23	see that?		23	Q	Oka
24	A I do.		24	were the o	peı
25	Q Okay. Now, isn't what's happened between the		25	column one	or
	. 5th Avenue, Tallahassee, FL 32303 premier-reporting.com er Reporting (850) 894-0828 Reported by: Debbie Krick			. 5th Avenue, Tallaha r Reporting	issee

167 were the operating limits. They said 420 was the 1 2 operating limit, right? 3 А No, that's not correct. 4 0 For Period 1? 5 That is not correct. А 6 0 In all of their documents that they provided 7 that you provided us, they don't ever say that's the 8 operating limit for Period 1, do they? 9 A 420 is a predicted megawatt output if a whole 10 bunch of variables, dozens of variables are controlled 11 at certain points, 420 was predicted as the generator 12 output at a power factor of .949, or a power factor of 13 .9. 14 You have to look at each heat case 15 specifically. That is not an operating limit. 420 was 16 the minimum contractual amount that Mitsubishi had to 17 achieve in order to avoid liquidated damages on the 18 project. 19 0 I mean, that's your opinion, right? 20 A That's not my -- I believe it to be a fact. 21 0 Okay. 2.2 А I think we've looked at several pages that 23 show it's a fact. 24 0 Well, in the RCA process, Duke Engineering 25 didn't see it that way, did they, until you got to the 114 W. 5th Avenue, Tallahassee, FL 32303

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1	October 11th draft and February 6th draft is that the
2	question has been changed?
3	A What question?
4	Q Well, what the operating restrictions are.
5	A I think it's pretty clear on page 175, it
6	refers to the heat balance diagrams. And on page 195,
7	it refers to the HP, IP and condenser design limits. $\ensuremath{\mathrm{I}}$
8	am not sure I understand the question.
9	Q So if I'm looking at Table A on page 195
0	and let's just go back to page five of the exhibit,
1	which is the final
2	A Table A of JS-2?
3	Q Yes, JS-2. It's identical, it appears, to
4	page 195, right?
5	A Yes.
6	Q Okay. So now just working off of this one,
7	this heading seems to ask what are the Mitsubishi IP
8	exhaust pressure operating limits. And then the answer
9	given is different than on the October 11th draft. It
0	says machine control to HP, IP and condenser design
1	limits. It doesn't refer to heat balances, right?
2	A Correct.
3	Q Okay. And Mitsubishi never said that these
4	were the operating limits, these meaning what's in
5	column one on page five here. They never said these
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168 1 final document? 2 А I disagree with that. I don't see how you can 3 draw that conclusion. 4 Q Let's go back and look at Document 3, which is at Bates 23. 5 6 A Document -- I am sorry, JS-3? No, sir. Document 3 in 115. 0 No. Oh, okay. I am sorry. 8 A 9 0 That's okay. 10 A Okay. 11 0 And just so I understand, this is a document 12 that you have agreed you edited, right -- or you had an 13 opportunity to edit? 14 А Yes, that's correct. 15 Okay. And at the time you edited this 0 16 document, you had both access to both the heat balances 17 and the contract and the IP, HP and condenser limits, 18 correct? 19 А I could have had those available, yes. 20 0 Okay. I mean, none of that was new 21 information. That all existed back in 2006? 2.2 А Right. 23 Q Okay. So if I look at on page 24, if I could 24 get you to turn to that. 25 A Okay. 114 W. 5th Avenue, Tallahassee, FL 32303 (850) 894-0828

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	169			IDENTIA	•
1	Q In the first paragraph, about halfway down,	Ŭ			2
2	there is a sentence on the far right that starts MHPS,				
3	do you see that?				
4	A Yes.				
5	Q So it says: MHPS Engineering indicated that				1,
6	Bartow Unit 4S was an outlier relative to the Mitsubish	i			,
7	40-inch LO fleet with several operating hours above the	•			
8	design limit of 15,000 I am stumbling over that				;
9	foot pounds per hour squared, parenthesis, the				1
10	Mitsubishi 40-inch L0 fleet average was closer to 12,00	0		:	1
11	foot pounds squared per hour, close parenthesis; do you	ı		:	1:
12	see that?			:	1:
13	A I do.			:	1:
14	Q Okay. You didn't propose to make a change to	•			1
15	that in your edit, did you?				1
16	A It does no, I did not.			:	1
17	Q Is that because it's factual?				1
18	A I don't believe it to be factual. Remember,				1
19	this is a draft document, and there is a lot of people $% \left( {{{\left( {{{\left( {{{\left( {{{}}} \right)}} \right)}} \right)}} \right)} \right)$			:	1
20	looking at it, and I wasn't privy to all the			:	21
21	conversations that took place over a long period of time	ıe		:	2
22	with this root cause team, but $\ensuremath{I}$ have not seen any			:	2:
23	Mitsubishi documentation that calls it a design limit.			:	2
24	I have seen documentation from Mitsubishi that refers t	0			2
25	their fleet maybe their fleet average or their				2
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1	Q Okay. Those two groups of engineers and some
2	outside consultant engineers and yourself would have
3	been all part of bigger Duke Engineering, right?
4	A Yes.
5	Q Okay. So this sentence says: While Duke
6	Engineering agrees that back-end loading should be
7	considered a significant contributing factor toward root
8	cause, one cannot definitively conclude that it has been
9	the root cause of all five of the documented LO events.
10	You didn't propose to change that sentence?
11	A Correct.
12	Q Do you believe it to be true?
13	A Well, I know that there is some issues with
14	that sentence. For example, there were really four $\mbox{L0}$
15	events. And then there was a fifth iteration where we
16	replaced blades proactively to try to get a new design
17	that would provide more megawatt output of the
18	generator, just to make that part clear.
19	Q Okay. Well, that's sort of a detail, isn't
20	it? It's not really that material to what's going on
21	here, is it? It would cover Period 1, and it would
22	cover Period 5, right?
23	A Right.
24	Q Okay. And, in fact, just so we can
25	understand, let's go to page one of this document, and I
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1	normal their fleet operating experience, but that the
2	15,000 and 17,000 pounds per hour per square foot was
3	beyond their fleet experience and put them in a zone of
4	uncertainty.
5	Q You okay. The next sentence I mean, the
6	next paragraph, it starts, "While Duke Engineering", do
7	you see that?
8	A Yes.
9	Q So would you be considered part of Duke
10	Engineering for purposes of the RCA?
11	A Would I be?
12	Q Yes. I mean, you are an engineer. This is in
13	your area. You were overseeing the root cause team?
14	A We can assume that. Technically I am not and
15	never have been part Duke Engineering, but, yes, I can
16	see I was overseeing the process.
17	Q Right. And I accept that. Just to for the
18	judge to understand, Duke, big Duke that serves multiple
19	states has a centralized engineering area, which you
20	call Central Engineering, right?
21	A Correct.
22	Q And you also have engineers that are in your
23	direct chain of command that report to you, up the chain
24	to you, right?
25	A That is correct, yes.
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	112
1	just want to ask you something that struck me curious
2	about this sentence.
3	It says: Duke Engineering concluded that
4	there was no correlation between any one of the above
5	listed factors and the five failure periods, is that
6	accurate?
7	A Could you show me where on page one that
8	Q Oh, I am sorry. I apologize. It's in the
9	next to the last paragraph.
10	A Oh, page one of JS-1?
11	Q Yes, sir.
12	A I am sorry. I was on the wrong document.
13	THE COURT: I was on yeah, final report.
14	THE WITNESS: Could you point to that sentence
15	again, please?
16	BY MR. REHWINKEL:
17	Q Okay. Go to the second to the last paragraph.
18	A Okay.
19	Q And it says: Duke Engineering concluded that
20	there was no correlation between any one of the above
21	listed factors and the five failure periods.
22	Is it events or periods that you are looking
23	at here? I mean, just to go to your point about there
24	were only four events, five periods, but
25	A Yeah. Well, I think it's both, right? There
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and flat where where a load damae, but they was the four state of the periods can observe the periods of the periods can observe the periods of the period of the periods of the period		174
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<ul> <li>a in iteration where we should that we have each ends that could be a should be an order in order in order in order in order in the iteration of blacks, here we have a should be an order in or</li></ul>		
<ul> <li>4 us to shot down, or we didn't find something on an first short head of the object of the ledge to charge and allocate, but as what down in core is to taking and allocate, but as what down in core is to taking a the sequence is the ledge of the core but is to be bud on the core is the ledge of the core bud of the core bud</li></ul>		····· /·· ···· /······················
<ul> <li>impaction that is due to change out blanks, but as shart</li> <li>due to intrain a new sharp of blanks, so that</li> <li>becan faired b. Back you can't that a new sharp of blanks, so that</li> <li>containing area on the new of any that you contained.</li> <li>containing area on the new of any that you contained.</li> <li>containing area on the new of any that you contained.</li> <li>containing area on the new of any that you contained.</li> <li>containing area on the new of any that you contained.</li> <li>containing area on the new of any that you contained.</li> <li>containing area on the new of any that you contained.</li> <li>containing area on the new of any that you contained.</li> <li>containing area on the new of any that you contained.</li> <li>containing area on the new of any that you contained.</li> <li>containing area on the new of any that you contained.</li> <li>containing area on the new of any that you contained.</li> <li>containing area on the new of any that you contained.</li> <li>containing area on the new of any that you contained area of a start of the new of any that you contained area.</li> <li>contained area of the new of any that you contained area.</li> <li>contained area of the new of any that you contained area.</li> <li>contained area of the new of any that you contained area.</li> <li>contained area of the new of any that you contained area.</li> <li>contained area of the new of any that you contained area.</li> <li>contained area of the new of any that you contained area.</li> <li>contained area of the new of any that you contained area.</li> <li>contained area of the new of any that you contained area.</li> <li>contained area of the new of any that you contained area.</li> <li>contained area of the new of any that you contained area.</li> <li>contained area of the new of any that you contained area.</li> <li>contained area of the new of any that you contained area.</li> <li>contained area of the new of any that you contained area of the new of any that you area of any</li></ul>		
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<ul> <li>r lages having 3. has you can't do the rest name on (at a problem on (at a problem</li></ul>	5 inspection that led us to change out blades, but we shut	5 zero hours respectively. This indicates that back-end
<ul> <li>a periods or just weeks. It's all wecomparing.</li> <li>a 0 Nor, So in that context - well - so going</li> <li>be to to pay all muthat mathematical and the considered a significant balance of the total decise of the t</li></ul>		6 loading was not the cause of any of the reported blade
<ul> <li>a take out har y spreament that Duke Ingiteering had that</li> <li>back and its page 24 now that I understand beyon are</li> <li>back and its page 24 now that I understand beyon are</li> <li>back and loading at the page 24 now that I understand beyon are</li> <li>back and loading at the page 24 now that I understand beyon are</li> <li>back and loading at the page 24 now that I understand beyon are</li> <li>back and loading at the page 24 now that I understand beyon are</li> <li>back and loading at the page 24 now that I understand beyon are</li> <li>back and loading at the page 24 now that I understand beyon are</li> <li>back and loading at the page 24 now that I understand beyon are</li> <li>c is and page 24 now that I understand beyon are</li> <li>c is and page 24 now that I understand beyon are</li> <li>c is and page 24 now that I understand beyon are</li> <li>c is and page 24 now that I understand beyon are</li> <li>c is and page 24 now that I understand beyon are showned.</li> <li>c is and page 24 now that I understand beyon are showned.</li> <li>c is and page 24 now that I understand beyon are showned.</li> <li>c is and page 24 now that I understand beyon are showned.</li> <li>c is and page 24 now that I understand beyon are showned.</li> <li>c is and page 24 now that I understand beyon are showned.</li> <li>c is and page 24 now that I understand beyon are showned.</li> <li>c is and page 24 now that I understand beyon are showned.</li> <li>c is and page 24 now that I understand beyon are showned.</li> <li>c is and page 24 now that I understand beyon are showned.</li> <li>c is and page 24 now that I understand beyon are showned.</li> <li>c is and page 24 now that I understand beyon are showned.</li> <li>c is and page 24 now that I understand beyon is an ison of the page 24 now the ison are that ison are ison are page 24 now that ison are that ison are that iso</li></ul>	7 began Period 3. But you can't do the root cause on just	7 indications failures during those periods of operation.
10       back to get 24 now that 1 understand how you are         11       locking at it.         12       NB. MONDERSE. Encrose may, of which document?         13       00 7 25-27         14       10. REAR MONDERSE. The stores may, of which document?         15       10. REAR MONDERSE. The stores may, of which document?         16       10. REAR MONDERSE. The stores may, of which document?         17       10. REAR MONDERSE. The stores may, of which document?         18       10. REAR MONDERSE. The stores may, of which document?         19       10. REAR MONDERSE. The stores may, of which document?         10       10. REAR MONDERSE. The store store, store which this store the store of the store o	8 periods or just events. It's all-encompassing.	8 Q So you are saying that that undermines, or it
11       looking if it.         12       looking if it.         13       O J-2         14       looking if. Lit.         15       O J-2         16       looking if. Lit.         17       looking if. Lit.         18       REGRETION I. If a present end of a present it.         19       O. Josh by model people have got a class. St. Handle is the it.         10       the balance strand, right?         11       Decomposition of the state it.         12       M. NUMENDER: Table strand, document is in the vertice it.         13       A. I think if a proceeding of a booked it.         14       Decomposition of the strand it.         15       Decomposition of the strand it.         16       Decomposition of the strand it.         17       Decomposition of the strand it.         18       Decomposition of the strand it.         19       Coll and the strand it.       Decomposition of the strand it.         10       Decomposition of the strand it.       Decomposition of the strand it.         11       Decomposition of the strand it.       Decomposition of the strand it.         11       Decomposition of the strand it.       Decomposition of the strand it.         11       Decomposition of the s	9 Q Okay. So in that context well so going	9 takes out any agreement that Duke Engineering had that
<ul> <li>12 M.S. INCOMPLEES: Taches are, of which document?</li> <li>13 Or JJ-27</li> <li>14 N.S. REMEMBER: I'm just working in Bubbis</li> <li>15 137.</li> <li>15 M.S. REMEMBER: I'm just working in Bubbis</li> <li>16 M.S. REMEMBER: I'm just working in Bubbis</li> <li>17 M. S. REMEMBER: I'm just working in Bubbis</li> <li>18 M.S. REMEMBER: I'm just working in Bubbis</li> <li>19 M.S. REMEMBER: I'm just working in Bubbis</li> <li>10 M.S. REMEMBER: I'm just working in Bubbis</li> <li>11 M.S. REMEMBER: I'm just working in Bubbis</li> <li>12 M.S. REMEMBER: I'm just working in Bubbis</li> <li>13 M.S. REMEMBER: I'm just working in Bubbis</li> <li>14 the have number.</li> <li>15 M.S. REMEMBER: Take 1 and to varied about</li> <li>16 M.S. REMEMBER: Take 1 and to varied about</li> <li>17 M.S. REMEMBER: Take 1 and to varied about</li> <li>18 M.S. REMEMBER: Take 1 and to varied about</li> <li>19 M.S. REMEMBER: Take 1 and to varied about</li> <li>20 M.S. REMEMBER: Take 1 and to varied about</li> <li>21 M.S. REMEMBER: Take 1 and to varied about</li> <li>22 M.S. REMEMBER: Take 1 and to varied about</li> <li>23 O So yes and there was really four events</li> <li>24 Distance 1 have about the base southers</li> <li>25 problem are shown th have southers</li> <li>26 D So yes and there was really four events</li> <li>27 M.S. REMEMBER: Take 1 and the souther of the base southers</li> <li>28 Droke state 1 and the south of a southers</li> <li>29 M.S. REMEMBER: Take 1 and the south of a southers</li> <li>20 D South the black 2 for that</li> <li>21 Baddes, we still had damage with the black 2 for that</li> <li>21 Baddes, we still had damage with the black 2 for that</li> <li>21 Baddes, we still had damage with the black 2 for that</li> <li>21 Baddes, we still had damage with the black 2 for that</li> <li>22 Date that yes the questions have, you agree</li> <li>32 A is not 100 percent such that yes have a south at that a south 1 and that and that</li> <li>33 Or state yes that hadde that</li> <li>34 Din the loop south the that that that</li></ul>	10 back to page 24 now that I understand how you are	10 back-end loading should be considered a significant
<ul> <li>13 Cr JP-77</li> <li>14 MR. REFERENCE: The just working in Bahlbit</li> <li>15 MR. REFERENCE: State working in Bahlbit</li> <li>16 MR. REFERENCE: State working in Bahlbit</li> <li>17 MR. REFERENCE: State working in Bahlbit</li> <li>18 MR. REFERENCE: State working in Bahlbit</li> <li>19 MR. REFERENCE: State working in Bahlbit</li> <li>10 MR. REFERENCE: State working in Bahlbit</li> <li>11 MR. REFERENCE: State working in Bahlbit</li> <li>12 MR. REFERENCE: State working in Bahlbit</li> <li>13 MR. REFERENCE: State working in Bahlbit</li> <li>14 MR. REFERENCE: State working in Bahlbit</li> <li>15 MR. REFERENCE: State working in Bahlbit</li> <li>16 MR. REFERENCE: State working in Bahlbit</li> <li>17 MR. REFERENCE: State working in Bahlbit</li> <li>18 MR. REFERENCE: State working in Bahlbit</li> <li>19 MR. REFERENCE: State working in Bahlbit</li> <li>21 MR. REFERENCE: State working in Bahlbit</li> <li>21 MR. REFERENCE: State working in Bahlbit</li> <li>21 MR. REFERENCE: State working in Bahlbit</li> <li>22 MR. REFERENCE: State working in Bahlbit</li> <li>23 MR. REFERENCE: State working in Bahlbit</li> <li>24 MR. REFERENCE: State working in Bahlbit</li> <li>24 MR. REFERENCE: State working in Bahlbit</li> <li>24 MR. REFERENCE: State working in Bahlbit</li> <li>25 MR. REFERENCE: State working in Bahlbit</li> <li>26 MR. REFERENCE: State working in Bahlbit</li> <li>27 MR. REFERENCE: State working in Bahlbit</li> <li>28 MR. REFERENCE: State working in Bahlbit</li> <li>29 MR. REFERENCE: State working in Bahlbit</li> <li>20 MR. State working in Bahlbit</li> <li>20 MR. State working in Bahlbit</li> <li>21 MR. REFERENCE: State working in Bahlbit</li> <li>21 MR. REFERENCE: State working in Bahlbit</li> <li>22 And MR. REFERENCE: State working in Bahlbit</li> <li>23 MR. State working in Bahlbit</li> <li>24 MR. State working in Bahlbit</li> <li>24 MR. REFERENCE: State working in Bahlbit</li> <li>25 MR. State working in Bahlbit</li> <li>26 MR. State working in Bahlbit</li> <li>27 MR. State working in Bahlbit</li> <li>28 MR.</li></ul>	11 looking at it.	11 contributing factor toward root cause?
14       Ms. MEMORANEL: 1°s just working in Schibit         15       16       Ms. MEMORANEL: 2°s when 1 say a poor, 1 sean         16       Ms. MEMORANEL: So when 1 say a poor, 1 sean         17       Ms. MEMORANEL: So when 1 say a poor, 1 sean         18       the mease number.         19       MR. MEMORANEL: Yeah, 1 as not worked about         20       Ms. MEMORANEL: Yeah, 1 as not worked about         21       Ms. MEMORANEL: Yeah, 1 as not worked about         22       Ms. MEMORANEL: Yeah, 1 as not worked about         23       but the document is numbered.         24       Ms. MEMORANEL:         25       M. MEMORANEL:         26       M. MEMORANEL:         27       M. Statushi's class at the same call by core and about         28       A. Bartow sith this same call.         29       M. Memorane Call Call         20       Ms. Memorane Call Call         21       The same call Call Call Call Call Call Call Call	12 MS. BROWNLESS: Excuse me, of which document?	12 A Again, this is not the root cause document.
<ul> <li>115, 115, 115, 115, 115, 115, 115, 115,</li></ul>	13 Of JS-2?	13 This is notes, draft notes of a team. So there is no
<ul> <li>16 M. SECONTERS: Okay. Bo you are on 107</li> <li>17 M. SETURATION DATA TO a when T say a page, J man</li> <li>18 the Backer samper.</li> <li>19 M. SETURATION DATA TO an ore vertical about</li> <li>19 M. SETURATION DATA To an ore vertical about</li> <li>10 M. SETURATION DATA To an ore vertical about</li> <li>10 M. SETURATION DATA To an ore vertical about</li> <li>11 M. Seturation Data that and the says is that Data Data the real-like operating apperiance</li> <li>11 So a power tablewes 5. 2009</li> <li>12 clearly show the lack of data grammatic theory of Bachesis To about the says is that Data Data the real-like operating apperiance</li> <li>12 clearly show the lack of data grammatic theory of Bachesis To about the says is that Data Data the real-like operating apperiance</li> <li>10 Data as sak you about page seven of Bathbit</li> <li>11 S.</li> <li>12 clearly show the lack of data grammatic theory of Bachesis To about the says are the say of the says are the say of the says are the says are the says are the says are cleared to access the says are access are cleared to access the says are access the says are cleared to access the says are access to access are cleared to access the says are access to access are cleared to access the says are access to access are cleared to access the says are access to access are cleared to access the says are access are cleared t</li></ul>	14 MR. REHWINKEL: I'm just working in Exhibit	14 conclusion here.
<ul> <li>A. I white the later number.</li> <li>THE COURT: Bates stamp, right?</li> <li>MR. NEWNENE: Yeah. I am not worled about how the document is numbered.</li> <li>W MR. NEWNENE: Yeah. I am not worled about have the document is numbered.</li> <li>W MR. NEWNENE: Yeah. I am not worled about have the document is numbered.</li> <li>W MR. NEWNENE: Yeah. I am not worled about have the document is numbered.</li> <li>W MR. NEWNENE: Yeah. I am not worled about have the document is numbered.</li> <li>W MR. NEWNENE: Yeah. I am not worled about have the document is numbered.</li> <li>W MR. NEWNENE: Yeah. I am not worled about have the document is numbered.</li> <li>W MR. NEWNENE: Yeah. I am not worled about have the document is numbered.</li> <li>W MR. NEWNENE: Yeah. I am not worled about have the issue that the server the decay of the document is numbered.</li> <li>I haddes, we still had domage with the blades. So that</li> <li>Clearly shows the lack of design margin.</li> <li>I haddes, we still had domage with the blades. So that</li> <li>I haddes, we still had domage with the blades. So that</li> <li>I haddes, we still had domage with the blades. So that</li> <li>I haddes, we still had domage with the blades. So that</li> <li>I haddes, we still had domage with the blades. So that</li> <li>I haddes, we still had domage with the blades. So that</li> <li>I haddes, we still had domage with the blades. So that</li> <li>I haddes, we still had domage with the blades. So that</li> <li>I haddes, we still had domage with the blades. So that</li> <li>I haddes, we still had domage with the blades. So that</li> <li>I haddes, we still had down had bat as at turking ablad.</li> <li>I had to creakly and don't have.</li> <li>I had to creakly and failure that yeah addet in the output had.</li> <li>I had to creakly and down have that</li> <li>I hat have booken have that</li> <li>I had the creakly and do</li></ul>	15 115.	15 Q So why would people have put stuff in here it
<ul> <li>1 the Bates number.</li> <li>1 THE CORF. Bates number.</li> <li>2 BY BK, REMINING:</li> <li>3 By Below:</li> <li>2 BY BK, REMINING:</li> <li>3 By Below:</li> <li>4 By B</li></ul>	16 MS. BROWNLESS: Okay. So you are on 18?	16 if they didn't believe it to be true?
<ul> <li>THE COURT: Rates stamp, right?</li> <li>WE SHEWENNEL:</li> <li>We show the document is numbered.</li> <li>We show the document is numbered.</li> <li>We show the second the stamp of the second the stamp of the second the second the stamp of the second the second the second the second the stamp of the second the second the stamp of the second the second the second the second the second the stamp of the second the sec</li></ul>	17 MR. REHWINKEL: So when I say a page, I mean	17 A I think it's a process, as we've talked about
<ul> <li>M. RENNINGL: Yeah. I am not worried about how the document is numbered.</li> <li>Problems are the owner. Is numbered.</li> <li>Problems are there with this seatence?</li> <li>Mitsubishi's fleet experience on steam flow loading one document. We document is numbered.</li> <li>Mitsubishi's fleet experience on steam flow loading on the document. If 2000 geto at a seater with this seatence?</li> <li>Mitsubishi's fleet experience on steam flow loading on the document. If 2000 geto at a seater with this seatence?</li> <li>Mitsubishi's fleet experience on steam flow loading on the document. If 2000 geto at a seater with the lands: a behavior of 2000 geto at a seater with the lands of the seater the seater the seater the seater the seater the searer and the seater the seater the searer the sea</li></ul>	18 the Bates number.	18 before, working through probable, possible things that
Internal in number of the second se	19 THE COURT: Bates stamp, right?	19 could impact the blades that could cause the damage that
2       by MR. REMINENCE:         2       0       So you said there was really four events         21       intend of five events. Apart from that, what that         22       agrees that back-end leading meder the event index end user that event         21       intended of five events. Apart from that, what that         22       agrees that back-end leading meder the event index end user that event         23       the when you look at the real-life operating experience         24       in these periods when we can lower that event         25       Nisublahi's fleet experience on stean flow looding on         14       With Amars. This was the leades of the back-end indication through the back-end indication the event indication the event indication the event indication through were the experience on stean flow lood at the real-life operating experience         24       in these periods were were and the event indication through were the event indication through a turbine indication through a turbine indication through user groups, and you said there was the leader of the event indication through user groups, and you said there was in each or event.         15       The KITHESS: Mixeubishi make that         16       The KITHESS: Mixeubishi make that         17       The KITHESS: Mixeubishi make that         18       The KITHESS: Mixeubishi make that         19       The KITHESS: Mixeubishi make that         10       <	20 MR. REHWINKEL: Yeah. I am not worried about	20 we saw.
3       0       So you said there was really four events         3       inttail of fire events. Apart from that, what other         23       inttail of fire events. Apart from that, what other         23       problems are there with this sentence?         24       in these periods when we ran lower than even         25       Mitsubishi's fleet experience on stam flow loading on         26       in these periods when we ran lower than even         25       Mitsubishi's fleet experience on stam flow loading on         26       in these periods when we ran lower than even         27       Mitsubishi's fleet experience on stam flow loading on         28       mitsubishi's fleet experience on stam flow loading on         29       Lat me ask you about page serven of Bohibit         4       115.       Secret ask you about page serven of Bohibit         3       Q       Lat me active that you had in         3       Betrow is that correct?       S         4       interse infinitulial inter that you had in         3       Betrow is that correct?       S         4       A i an on tolo percent sure that's acourate.       S         10       It's I just don't know.       S         11       The WITNESS: Nit sublishi make that       S	21 how the document is numbered.	21 The I think what this says is that Duke
<ul> <li>a so you said there was really four events</li> <li>intend of five vorats. Apart from that, what other</li> <li>problems are there with this sentence?</li> <li>a thread between the sentence?</li> <li>a blades, we still had damage with the blades. So that</li> <li>c clearly shows the lack of design margin.</li> <li>a Q Lat me ask you shout page seven of Bohibit</li> <li>it.</li> <li>Before I ask you shout page seven of Bohibit</li> <li>it.</li> <li>Before I ask you the questions here, you agree</li> <li>that no other Mitsubishi L0 40-inch blade stam turbine</li> <li>exercised that is do for a set you had in</li> <li>Betory: is that correct?</li> <li>A I an not 100 percent sure that's accurate.</li> <li>it's I just don't know.</li> <li>THE WITNESS: They did.</li> <li>With a lequipment manufacturers of</li> <li>turbines with 0 blades was due to erosion, which</li> <li>is not surprising. That's the same problem arress</li> <li>the fladestry with all equipment manufacturers of</li> <li>turbines.</li> <li>turbines.</li> <li>turbines with 20 shows due to erosion, which</li> <li>the takes people who have attended user groups, and se</li> <li>turbines with 0 blades was due to erosion, which</li> <li>the takes that through a turbine and</li> <li>turbines with 0 blades was due to erosion, which</li> <li>the takes with with all equipment manufacturers of</li> <li>turbines.</li> <li>turbines with 0 blades was due to erosion, which</li> <li>the takes with with all equipment manufacturers of</li> <li>turbines.</li> <li>turbines.</li> <li>the takes throwels hore and lower pre</li></ul>	22 BY MR. REHWINKEL:	22 agrees that back-end loading needs to be looked at, but
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			FIDENTI
1	conversa	ations was you gave a presentation, and somebody	
2	came up	to you afterwards and said I am interested in	
3	what you	are talking about?	
4	A	That is true.	
5	Q	Okay. But that person never said that that	
6	utility	had any problems with Mitsubishi that were the	
7	same as	yours?	
8	A	He indicated that they had similar issues.	
9	Q	Did he give you any information?	
10	A	No.	
11	Q	Okay. And did you present any of that	
12	informat	tion in the root cause analysis?	
13	A	No.	
14	Q	And you had that information before 2018,	
15	right?		
16	A	I don't know the relative dates of that user	
17	group me	eeting compared to the root cause.	
18	Q	If I asked you that in your deposition and you	
19	said it	was, do we need to go look at it?	
20	A	Okay, then	
21	Q	Okay.	
22	A	I agree.	
23	Q	And there was an inci there was a situation	
24	in Louis	siana where someone came up to Mr. Salvarezza and	
25	said he	was interested, right, in what was going on at	
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1	that now. In fact, I know there are more than that now.
2	Q But at that time, there was 32 or 33?
3	A Yes. Yes.
4	Q And that was, like, 55 or 57 rows of blades
5	among all those units?
6	A Oh, yes, that's it was in the fifties.
7	Q Okay. And you have provided no evidence that
8	any unit other than Bartow among that fleet had blade
9	failures based on excessive vibration like you
10	experienced?
11	A That's accurate.
12	Q Okay. And you also agree, I think we just
13	talked about it in that draft, is that Duke Bartow was
14	an outlier compared to all of the other Mitsubishi LO
15	40-inch blade steam turbines?
16	A It was an outlier on steam flow pounds per
17	hour per square foot, right.
18	Q Wasn't it also an outlier in blade failure
19	experience?
20	A Yes.
21	$\ensuremath{\mathbb{Q}}$ Okay. Now, just to be clear in the R in
22	the if we go back to JS-2, the word outlier has been
23	taken out of the root cause analysis. In other words,
24	it doesn't show up in there with respect to how you
25	compare to Mitsubishi, right?
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1	Bartow?
2	A Yes.
3	Q But he didn't say that they had L0 blade
4	problems, that they had failures like you had with
5	excessive vibration, right?
6	A That's correct.
7	Q Okay. And that was before 2018, correct?
8	A Yes.
9	Q And that didn't show up in the RCA or any of
10	the documentation that we were provided other than that
11	Q&A in the depo, right?
12	A We tried to verify through various means. The
13	fleet operating experience is obviously very important.
14	We rely on our OEMs for that information typically,
15	whether it's GE or Siemens or Mitsubishi. User groups
16	are also important, but we couldn't find any
17	documentation that there were similar failures to what
18	we've experienced at Bartow.
19	Q Now, would you agree with me that there are 32
20	Mitsubishi LO 40-inch blade steam turbines out there in
21	the world? I don't know if that includes you or not.
22	A $\;$ I think at the time of this document, that was
23	the number that was used, right.
24	Q So you are one of 32 or you are one of 33?
25	A I don't know. There is probably more than
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1	A How the Bartow plant compares to Mitsubishi?
2	Q Yes.
3	A I will take your word for it.
4	Q Okay. I mean, isn't it also true that in
5	these documents that were that preceded the final
6	draft, there was a reference to the Mitsubishi
7	experience and that got converted to industry
8	experience. So you took out the comparison of
9	Mitsubishi plants with respect to the blade failure
10	experience comparison, right?
11	MR. HERNANDEZ: Objection, Your Honor. We are
12	talking about a lot of documents. He is
13	referencing specific language in those documents.
14	If the witness could see the documents to answer
15	the question specifically.
16	THE COURT: Sure.
17	MR. REHWINKEL: Sure. I mean, we can go
18	through it.
19	BY MR. REHWINKEL:
20	Q Let's go to page 125. Just pick one. And
21	this is Document 13 under the tabs.
22	A Okay. I am there.
23	Q And if you go back to 123, it looks like it
24	was a October 12th document.
25	A Okay.
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	181	IDENTIAL	182
1	Q And back on page 125, and the one, two, third		BY MR. REHWINKEL:
2	full paragraph there, halfway down it starts on the	2	Q In the second full paragraph it starts "based
3	right-hand side, the number of blade failures and	3	on", do you see that?
4	problems with ST L0 blade performance is not typical,	4	A I do.
5	i.e., these issues are outliers among the Duke CC fleet	5	Q This is your ultimate conclusion, right?
6	as well as the Mitsubishi 40-inch L0 fleet.	6	A It is. We discussed that before.
7	Did I read that right?	7	Q And this doesn't mention a comparison to
8	A Yes.	8	elsewhere in the industry, but elsewhere in the industry
9	Q And that's true, isn't it?	9	referenced there is really Mitsubishi, right?
10	A As far as I know, that is true.	10	A No, that's not accurate. If you look at the
11	Q Okay. Now, is it fair to say and if you go	11	footnote at the end of that paragraph, that refers down
12	back to JS-2, which is Document 1, that sentence does	12	to the I will read it to you.
13	not reappear, does it or let me withdraw that and say	13	The most commonly reported issue with the
14	that sentence does not appear?	14	40-inch LO blade design elsewhere is water erosion,
15	A It doesn't, but I don't again, we talked	15	which both Duke and MHP also agree is not a contributing
16	about this before. All these documents you are going	16	factor to the Bartow failures. So I really was
17	through are drafts of a working team. There is notes.	17	referencing the industry in general.
18	They are not a final root cause, and I wouldn't expect	18	Q Okay. So but the outlier language and the
19	the final root cause to be identical to any of these	19	comparison to Mitsubishi and those other 32 plants,
20	documents.	20	experience is not contained in the final report that the
21	Q Well, let's look at page two of Exhibit 15,	21	Public Service Commission gets to see, right?
22	it's also JS-2.	22	A It's not in the root cause. And by agreeing
23	MR. BERNIER: So two of JS-2?	23	to what you just said, I am agreeing that these are
24	MR. REHWINKEL: Yes.	24	various drafts of root cause documents, which I don't
25	MR. BERNIER: Thank you.	25	agree with that.
	183		184
1	Q Wait, now, you don't agree that Bartow and	1	current IP turbine exhaust pressure operating limits
2	Period 1 was an outlier compared to the rest of the	2	because of potential impacts to upstream blading. That
3	Mitsubishi L0 40-inch steam turbine fleet?	3	is the L1 blade sets. This suggests that MHPS is unsure
4	A An outlier from the standpoint of steam flow,	4	what effect, if any, is created by its avoidance zone,
5	and an outlier from the blade, the snubber and Z-lock	5	and more importantly, points to a design flaw that
6	damage we talked about, yes, I agree that it was an	6	affect more than the LO blades.
7	outlier.	7	Q Now, this statement about a design flaw, is
8	Q Okay. All right. So now I started this line	8	there an analysis that was conducted to determine that
9	of questioning by asking you to go to page seven, and	9	there was a design flaw in the L in the Mitsubishi
10	look at footnote six.	10	steam turbine that you bought?
11	MR. BERNIER: Seven of which? I am sorry.	11	A I think this statement is pointing to the fact
12	MR. REHWINKEL: Of 115.	12	that Mitsubishi couldn't relieve the operating
13	MR. BERNIER: Got you.	13	constraints that were in place. Even after we took the
	MR. BERNIER: Got you. MR. REHWINKEL: It's the same as	13 14	constraints that were in place. Even after we took the LO blades out and put a pressure plate in, Mitsubishi
13	-		
13 14	MR. REHWINKEL: It's the same as	14	LO blades out and put a pressure plate in, Mitsubishi
13 14 15	MR. REHWINKEL: It's the same as THE WITNESS: Okay. I am there.	14 15	LO blades out and put a pressure plate in, Mitsubishi still said you need to operate at a more conservative
13 14 15 16	MR. REHWINKEL: It's the same as THE WITNESS: Okay. I am there. BY MR. REHWINKEL:	14 15 16	LO blades out and put a pressure plate in, Mitsubishi still said you need to operate at a more conservative or the more conservative operating parameter led Duke to
13 14 15 16 17	MR. REHWINKEL: It's the same as THE WITNESS: Okay. I am there. BY MR. REHWINKEL: Q You are there. And you see footnote six down	14 15 16 17	LO blades out and put a pressure plate in, Mitsubishi still said you need to operate at a more conservative or the more conservative operating parameter led Duke to believe that there is more concern on Mitsubishi's
13 14 15 16 17 18	MR. REHWINKEL: It's the same as THE WITNESS: Okay. I am there. BY MR. REHWINKEL: Q You are there. And you see footnote six down there?	14 15 16 17 18	LO blades out and put a pressure plate in, Mitsubishi still said you need to operate at a more conservative or the more conservative operating parameter led Duke to believe that there is more concern on Mitsubishi's standpoint that perhaps it's not just an LO issue,
13 14 15 16 17 18 19	MR. REHWINKEL: It's the same as THE WITNESS: Okay. I am there. BY MR. REHWINKEL: Q You are there. And you see footnote six down there? A I do.	14 15 16 17 18 19	LO blades out and put a pressure plate in, Mitsubishi still said you need to operate at a more conservative or the more conservative operating parameter led Duke to believe that there is more concern on Mitsubishi's standpoint that perhaps it's not just an LO issue, perhaps it's an issue elsewhere in the low pressure
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13 14 15 16 17 18 19 20 21 22 23	<pre>MR. REHWINKEL: It's the same as THE WITNESS: Okay. I am there. BY MR. REHWINKEL: Q You are there. And you see footnote six down there? A I do. Q Would you mind reading that aloud? And I am going to ask you about the last sentence. A Okay. Even though the LO blades are no longer in the ST and the pressure plate has been installed,</pre>	14 15 16 17 18 19 20 21 22 23	L0 blades out and put a pressure plate in, Mitsubishi still said you need to operate at a more conservative or the more conservative operating parameter led Duke to believe that there is more concern on Mitsubishi's standpoint that perhaps it's not just an L0 issue, perhaps it's an issue elsewhere in the low pressure turbine, and that perhaps they are questioning their own design. Q Well, what is elsewhere in your opinion? The upstream blades? The nozzles? Anything?

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1	this picture.
2	So upstream would be so remember the steam
3	goes in the middle of the turbine and then goes this way
4	and this way. So here's the LO blade, the largest
5	blades. Upstream of that would be this row of blades
6	and this row of blades.
7	So there was concern that perhaps we need to
8	continue operating at that lower pressure limit because
9	maybe there would be damage to other blades that
10	Mitsubishi appeared to be questioning their own design,
11	and that perhaps those rows of blades might become
12	damaged.
13	Q But beyond this footnote, there is no analysis
14	where you determine that there was something wrong with
15	the turbine, is there?
16	A There is not. But I can tell you we obviously
17	very concerned every time we opened up this machine, and
18	we had multiple opportunities to do very detailed
19	inspections on the steam turbine, many more so times
20	than is the norm.
21	At the end of Period 1, we did an inspection.
22	At the end of Period 2 at the end of every single
23	period, we did a very detailed inspection of those
24	blades, so we had to gather that information.
25	Q How many 4-x-1 combined cycle units did Duke
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187 MR. BERNIER: Judge, I am going to have to 1 2 object to this. I am not sure how any resolution 3 Duke was trying to work out with Mitsubishi has 4 anything to do with how the unit was operated 5 leading up to 2017, or after 2017 when the pressure 6 plates were put in. And I think those are the two 7 issues that we are here to talk about today. And I 8 am not sure how a settlement agreement is relevant. 9 THE COURT: Well, you are going to show us 10 it's relevant? 11 MR. REHWINKEL: Yes. 12 THE COURT: Okay. 13 BY MR. REHWINKEL: 14 0 And my question is: You signed -- you 15 provided -- you finalized an RCA and you filed it with 16 the Public Service Commission on March 1st, right? 17 А I don't know that that was the date of filing, 18 but ves. 19 0 Sometime in March? 20 A It was done in February -- it requires it's 21 finalized in February, so that makes sense. 22 0 And you filed testimony in March of 2018? 23 А Yes. Yes. Yes. March 1st, you are right. 24 Thank you. 25 Okay. And in this document, it says there was 0 114 W. 5th Avenue, Tallahassee, FL 32303 premier-reporting.com Reported by: Debbie Krick (850) 894-0828 Premier Reporting

	100
1	have experience with before you commissioned Bartow?
2	A This is Duke's only 4-x-1.
3	Q Okay. And how many 4-x-1 so would it be
4	fair to say that you did not have robust operating
5	experience with a 4-x-1 combined cycle unit?
6	A Yes.
7	Q Are you familiar with Exhibit 106 it's the
8	August 13, 2018 called the settlement.
9	MR. BERNIER: 106?
10	MR. REHWINKEL: Yeah, 106.
11	THE WITNESS: Yes, I am.
12	BY MR. REHWINKEL:
13	Q Okay. Now, is it
14	MR. BERNIER: Give us one second, Charles. I
15	am trying to find it.
16	MR. REHWINKEL: Oh, I am sorry.
17	MR. BERNIER: Okay.
18	BY MR. REHWINKEL:
19	Q So if we go to the back, page 11, we see Tony
20	Salvarezza signed this thing on October 13, 2018?
21	A Yes, I do.
22	Q And you would agree that Duke was having
23	discussions and trying to either work well, trying to
24	work out a resolution of these matters with Mitsubishi
25	at sometime not long after the RCA was completed?
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188 1 a design flaw in the turbine, right? 2 A Could you point to where you are looking at? 3 I am sorry. When I say this document, I am Q pointing to your root cause analysis at page seven. 4 A Page seven of the root cause analysis? 5 6 0 Yeah, footnote six that we were just talking about. 8 So, yes, it says it suggests that Mitsubishi А is unsure, and that there may be a design issue. 9 10 0 And it says, more importantly, points to a 11 design flaw that may affect more than the LO blades, 12 right? 13 А Yeah. 14 0 Okay. So my question to you is, you just said 15 there was a design flaw in February. In August you 16 signed an agreement where you gave up all your rights to sue under the contract that you bought the unit for, 17 18 isn't that right? 19 MR. BERNIER: I'm going to go back to 20 objecting, Your Honor. I just don't see how that's 21 relevant to how we operated the unit, how Duke 22 operated the unit in 2017, the decision whether or 23 not to settle any potential contract claim. I just 24 don't see the relevance to the two issues we've got 25 identified here today.

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	189 _		190
1	MR. REHWINKEL: My response to that, Your		right to sue. That's an inconsistency that we
2	± • ·	2	
3	Honor, is that the root cause analysis we	3	would like you to consider in your fact-finding.
	established early on today that this is their		THE COURT: I am going to allow it, but I
4	principle evidence to meet their burden of proof.	4	mean, it's without prejudice. I mean, you can
5	This root cause analysis purports to be what	5	continue to argue that it's not relevant. I am not
6	happened, and they are asking the Public Service	6	sure that you are totally tying it up, but I am
7	Commission to rely on it to absolve them of any	7	going to at least let them present it.
8	liability to the customers for replacement power.	8	MR. BERNIER: Understood.
9	One the problems that we've raised is that the	9	BY MR. REHWINKEL:
10	way they ran the unit in the first period has	10	Q Okay. So my question to you was is that what
11	caused problems in later periods. They have and	11	happened?
12	part of our case is that their explanations about	12	A Well, I think there is more to this agreement
13	the blade are inconsistent with the experience	13	that you are not talking about that's pretty important,
14	other units have had.	14	and you need to also think about the whole timeline of
15	Now, in the root cause analysis, they are	15	events and what the warranty provisions were in the
16	saying that there may be a design fault with the	16	contract, which I don't know specifically, but
17	turbine itself, not the blades, which is what their	17	typically, there is about a three-year warranty period.
18	whole case is about, but the turbine itself; and	18	It's typically one year for some pieces. It may be two
19	they are asking the Commission to rely on that	19	years, three years if you are lucky, all right. So
20	while they are settling with Mitsubishi to give up	20	that's from '09 when we first started operating. This
21	their right to sue for a design flaw.	21	agreement was in 2018, six years later. So I don't know
22	It doesn't so we are offering this as	22	is that we had any warranty claim left on the original
23	impeachment to the conclusions in the RCA because	23	blades, and I think that's what you are inferring.
24	the RCA is submitting that there is a design flaw	24	Q Well, if you are saying there is a design
24 25	the RCA is submitting that there is a design flaw while, at the same time, they are giving up their	24	Q Well, if you are saying there is a design defect?
25 114 W		25	
25 114 W	while, at the same time, they are giving up their .5th Avenue, Tallahassee, FL 32303 premier-reporting.com	25	defect?  . 5th Avenue, Tallahassee, FL 32303 premier-reporting.com
25 114 W	while, at the same time, they are giving up their 5th Avenue, Tallahassee, FL 32303 r Reporting (850) 894-0828 Reported by: Debbie Krick 191	25	defect? 7. Sth Avenue, Tallahassee, FL 32303 er Reporting (850) 894-0828 premier-reporting.com Reported by: Debbie Krick 192
25 114 W Premie	while, at the same time, they are giving up their 5 th Avenue, Tallahassee, FL 32303 r Reporting (850) 894-0828 Reported by: Debble Krick 191 A Even for a design defect.	25 114 V Premi	defect? 7. Sth Avenue, Tallahassee, FL 32303 er Reporting (850) 894-0828 reported by: Debbie Krick 192 sets of blades, which we know from very detailed
25 114 W Premie	while, at the same time, they are giving up their .5th Avenue, Tallahassee, FL 32303 er Reporting (850) 894-0828 191 A Even for a design defect. Q Okay. And we don't know and I am not	25 114 V Premi	defect? 1.5th Avenue, Tallahassee, FL 32303 (850) 894-0828 premier-reporting.com Reported by: Debbie Krick 192 sets of blades, which we know from very detailed examination didn't have any damage. We looked way more
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25 114 W Premie 1 2 3 4 5 6	while, at the same time, they are giving up their Sth Avenue, Tallahassee, FL 32303 (850) 894-0828 Premier-reporting.com Reported by: Debble Krick 191 A Even for a design defect. Q Okay. And we don't know and I am not asking you to resolve that question because I know you are not an attorney, right. But the my original question that started this line is what analysis did you do to demonstrate that there was a design flaw in the	25 114 W Premi 1 2 3 4	defect? 7.5th Avenue, Tallahassee, FL 32303 (850) 894-0828 premier-reporting.com Reported by: Debble Krick 192 sets of blades, which we know from very detailed examination didn't have any damage. We looked way more times than we should have, but we gained a lot of information doing those inspections. Q And is there did you present any evidence in this RCA concurrent with this assertion here in this
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25 114 W Premie 1 2 3 4 5 6 7 8 9	while, at the same time, they are giving up their Sth Avenue, Tallahassee, FL 32303 (850) 894-0828 Premier-reporting.com Reported by: Debble Krick 191 A Even for a design defect. Q Okay. And we don't know and I am not asking you to resolve that question because I know you are not an attorney, right. But the my original question that started this line is what analysis did you do to demonstrate that there was a design flaw in the turbine? And I don't think there was one, was there? A I think we are well, what we are saying is that there was inadequate design margin at the very	25 114 W Premi 1 2 3 4 5 6 7 8 9	defect?         1. 5th Avenue, Tallahassee, FL 32303       premier-reporting.com         re Reporting       (850) 894-0828         192         sets of blades, which we know from very detailed         examination didn't have any damage. We looked way more         times than we should have, but we gained a lot of         information doing those inspections.         Q       And is there did you present any evidence         in this RCA concurrent with this assertion here in this         footnote that any other Mitsubishi L0 40-inch steam         turbine units were having the same kind of problems, or         had a design defect or flaw in them?
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25 114 W Premie 1 2 3 4 5 6 7 8 9 10 11 12	<pre>while, at the same time, they are giving up their "Sth Avenue, Tallahassee, FL 32303 (850) 894-0828 premier-reporting.com Reported by: Debble Krick 191 A Even for a design defect. Q Okay. And we don't know and I am not asking you to resolve that question because I know you are not an attorney, right. But the my original question that started this line is what analysis did you do to demonstrate that there was a design flaw in the turbine? And I don't think there was one, was there? A I think we are well, what we are saying is that there was inadequate design margin at the very least. Q That was for the blades, right? A Well, you are I think you are</pre>	25 114 W Premi 1 2 3 4 5 6 7 8 9 10 11 12	defect? 2. 5th Avenue, Tallahassee, FL 32303 (850) 894-0828 premier-reporting.com Reported by: Debbie Krick 192 sets of blades, which we know from very detailed examination didn't have any damage. We looked way more times than we should have, but we gained a lot of information doing those inspections. Q And is there did you present any evidence in this RCA concurrent with this assertion here in this footnote that any other Mitsubishi LO 40-inch steam turbine units were having the same kind of problems, or had a design defect or flaw in them? A That wasn't the question of the root cause. The question of the root cause is why did these snubbers and these Z-locks fail?
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25 114 W Premie 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	<pre>while, at the same time, they are giving up their "Sth Avenue, Tallahassee, FL 32303 (850) 894-0828 premier-reporting.com Reported by: Debble Krick "Premier Tallahassee, FL 32303" Premier-reporting com Reported by: Debble Krick "Premier Tallahassee, FL 32303" Premier-reporting com Reported by: Debble Krick "Premier Tallahassee, FL 32303" Premier-reporting com Reported by: Debble Krick "Premier Tallahassee, FL 32303" Premier-reporting com Reported by: Debble Krick "Premier Tallahassee, FL 32303" Premier-reporting com Reported by: Debble Krick "Premier Tallahassee, FL 32303" Premier-reporting com Reported by: Debble Krick "Premier Tallahassee, FL 32303" Premier Reported by: Debble Krick "Premier Tallahassee, FL 32303" Premier Reported by: Debble Krick "Premier Tallahassee, FL 3230" Premier Reported by: Debble Krick "Premier Tallahassee, Tallahassee, Tallahassee, FL 3230" Premier Tallahassee, Tallaha</pre>	25 114 V Premi 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	defect? 2.5th Avenue, Tallahassee, FL 32303 (850) 894-0828 premier-reporting.com Reported by: Debbie Krid 192 sets of blades, which we know from very detailed examination didn't have any damage. We looked way more times than we should have, but we gained a lot of information doing those inspections. Q And is there did you present any evidence in this RCA concurrent with this assertion here in this footnote that any other Mitsubishi LO 40-inch steam turbine units were having the same kind of problems, or had a design defect or flaw in them? A That wasn't the question of the root cause. The question of the root cause is why did these snubbers and these 2-locks fail? And so, yes, you take into consideration what is that fleet experience? And the root cause shows, or says we reviewed, the team knew that the fleet experience at the Bartow plant was an outlier compared
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20 design flaw that may affect more than the LO blades. So 21 what do you mean when you say the turbine?

22 Q Well, the part of the turbine that's not the
23 LO blades, everything else that you showed the judge on
24 the picture.

A So -- which would be the L1 blades, the other

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the other 32 units, right?

22

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20 about -- we didn't do a root cause on Mitsubishi's

21 issues. We did a root cause on Duke Energy's issues.

23 have been just -- not a manufacturing flaw, you are

24 saying it's a design flaw. That would have applied to

Q But if there was a design flaw, it wouldn't

	193	CONFIDENTI
1	MR. HERNANDEZ: Objection, Your Honor,	
2	foundation.	
3	THE COURT: Overruled. I mean, I think it's	
4	understandable.	
5	THE WITNESS: Potentially it could be	
6	applicable to the other units. And you have to	
7	look at the design conditions, the operating	
8	parameters of each of those 30-some units, or	
9	50-some rows of blades that we talked about. And	
10	if any of those other 50 blades were operated the	
11	same way as Bartow within the guidelines	
12	established by the OEM, I would be pretty worried	
13	if I owned one of those other sets of blades.	
14	BY MR. REHWINKEL:	
15	Q Well, you agreed you are an outlier, and they	
16	didn't have any of the same kind of problems, right?	
17	A Correct.	
18	Q So why wouldn't isn't that just as	
19	correlative that there is not a design flaw in there	
20	because they are not having any problems and only you	
21	are?	
22	A Not necessarily. That's a factor that you	
23	have to take into account, but the operating parameters $% \left( {{{\left( {{{\left( {{{\left( {{{c}}} \right)}} \right.}} \right)}_{0,2}}}} \right)$	
24	at Bartow we just talked about how Bartow is a 4-on-1	
25	combined cycle. We talked about how it's an outlier	
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1	different ways. Not necessarily at Bartow.
2	Q Right. It specifically mentioned you could
3	use it on the blades, but you could use it elsewhere
4	under other conditions, right?
5	A Correct.
6	Q Okay. And it can be read in here, right?
7	A Yes.
8	Q So let's just go to page one, and I just want
9	you to read for the record the last two whereas clauses
10	aloud, please.
11	A Okay. Whereas, after the steam turbine was
12	commissioned in June 2009, MHPS designed enhanced L0
13	blades that would endeavor to allow Bartow station to
14	increase its output from 420 megawatts to 450 megawatts,
15	and whereas, the parties entered into purchase order
16	718383 on February 10th, 2014, whereby MHPS was to
17	design and install such enhanced design L0 blades at a
18	\$6 million cost to DEF, which amount DEF has paid.
19	Q Okay. So this is a document that Mr.
20	Salvarezza signed on behalf of the company, right?
21	A Yes.
22	Q So he agreed to what is stated in these two
23	whereas clauses, correct?
24	A Yes.
25	Q And doesn't that say that, reading these two
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	compared to the Mitsubishi fleet. It's about 15 the
2	calculation is about 15,000 pounds per hour per square
3	foot of impact on the last stage blades, which is an
4	outlier to the Mitsubishi fleet, but we operated within
5	the design parameters given by Mitsubishi.
6	They didn't say, don't operate beyond 15,000
7	or 17,000. There is no way to measure that. They said,
8	don't operate beyond this operating pressure. Don't
9	operate besides this beyond this operating
10	temperature, which we did.
11	Q Would you agree with me that Exhibit 106
12	covers claims that dated back to Period 1?
13	A Yes.
14	Q Okay. And what basically what you did
15	here, I and tell me if I am oversimplifying it, is
16	you had they had a claim against you for, like, \$10.2
17	million and you had a claim against them for \$6 million,
18	and you settled it where you gave them \$3 million and
19	they gave you a \$2 million credit on the next set of
20	blades, is that
21	A That's a fair summary.
22	Q Okay. So I just want to ask you about
23	A I am sorry, with one exception. I am sorry.
24	Q Sure.
25	${\tt A}$ $$ The credit could have been used in many
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196 1 together, that the output of the steam turbine was 2 420 megawatts and you wanted to increase it to 450, 3 right? 4 A Generally that's correct. 5 Q And that specifically is in Period 1 that it's 420, right? 6 7 A Yes. 8 MR. REHWINKEL: Your Honor, I believe if we 9 take a short break here, I can substantially 10 shorten the day at least from what I am 11 contributing to it. 12 THE COURT: How long do you need? 13 MR. REHWINKEL: Just five minutes. 14 THE COURT: Five minutes. Sure, we will take 15 five. 16 (Brief recess.) 17 THE COURT: Back on. 18 Whenever you are ready, Mr. Rehwinkel. 19 MR. REHWINKEL: Thank you for that, Your 20 Honor. And I think it did help a great deal. 21 Thank you. 22 THE COURT: Yep. 23 BY MR. REHWINKEL: 24 Q Let's go to -- we are still on Exhibit 115, 25 and go to page two.

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1	A Okay.		casi	ing, everything associated with the low pressure	e
2	Q And if you wouldn't mind reading the second	2	turk	pine.	
3	paragraph above where it says historical overview, where	3	BY MR. RE	CHWINKEL:	
4	it says for Bartow, just that sentence.	4	Q	Thank you.	
5	A Starting with the words "for Bartow"?	5		And it says and/or there, is that correct?	
6	Q Yes, sir.	6	A	It does.	
7	A For Bartow, the long-term solution is to	7	Q	Now, I am not trying to just for factual	
8	replace the LO blades with blades of a different design	8	purposes,	in October, November of this year, you	
9	and/or to retrofit the LP steam path and/or continue	9	actually	put in the solution that you chose, which was	
10	operation with pressure plate.	10	we call t	the Period 7 blades?	
11	Q All right. Would you mind explaining, so	11	A	We are on Period 7. Yeah, we put in another	
12	that to the judge what is referred to there as the $\mathtt{LP}$	12	iteration	n of blades redesigned that had very significant	C
13	steam path?	13	testing o	done at a facility in Japan that we witnessed.	
14	A Yes, sir.	14	Those bla	ades were installed November, December	
15	May I stand up, Your Honor?	15	timeframe	e. I can't remember the date we started up, but	ũ
16	THE COURT: Sure.	16	it was ir	n, I think, early December. So we are operating	J
17	THE WITNESS: So the three options are	17	with thos	se that generation of blades right now.	
18	essentially replace the LO row again, the two rows	18	Q	Okay. So is it fair to say that well, so	
19	with another design of blades, or when we say the	19	now Mitsu	bishi has installed the fourth set of blades or	n
20	whole low pressure steam path, it would basically	20	this c	on that low pressure turbine, is that fair, or a	a
21	be lifting this section of the overall turbine	21	different	set?	
22	generator out and putting a different low pressure	22	A	Well, we installed one end at the start of	
23	turbine in.	23	Period 2,	then both ends at the start of Period 3, both	
24	So that would entail all rows of blades, all	24	ends at t	the start of Period 4, both ends at the start of	E
25	rows of fixed diaphragms in between the blades, the	25	Period 5.	The start of period six had pressure plates.	
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1	So to your point, this is really the start of Period 7	1	pote	entially cause what we would call domestic	
2	with new blades, but I think it's more than four.	2	obje	ect damage inside the turbine.	
3	Q So it's five sets?	3		That gives us much greater confidence that we	
4	A Yes.	4	will	find an issue prior to any type of vibration	

6	not suggesting that it's not going to work. But if
7	there is a problem with this set of blades, will you
8	replace the steam path for certain?

Now, this is just a hypothetical, because I am

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9 MR. BERNIER: I'm going to object. Again, we 10 are going back to the two issues of operation, and 11 now we are dealing with a hypothetical about what 12 could happen in the future.

13 THE COURT: That's -- well, I will overrule it 14 again. I mean, Mr. Swartz, if you have any notion, 15 you can answer.

16 THE WITNESS: Well, let me start by saying one 17 big difference in this iteration is we've installed 18 a permanently-mounted blade vibration monitoring 19 system along with the new sets of LO blades. So as 20 we increase load, we can take data.

21 It's very much like the temporary system that 2.2 was used at the beginning of Period 3, where we 23 came up with the avoidance zones. This is a 24 permanently mounted system, much more robust, so

25 it's made so it's not going to come apart and

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have to -- like, how would they fail? I mean -and I am not trying to be funny, but was it an erosion issue? Was it high cycle fatigue? Was it a snubber? Was it a shroud? I think it depends on the type of failure. If

did with this iteration of blades.

that would lead to component failure. So I think

if this set of blades failed? Really, we would

that's a really significant difference with what we

You know, the hypothetical, what would we do

15 it's an erosion issue, for instance, there are ways 16 to deal with that. So it really depends. 17 I think where you are going, though, is, you 18 know, our appetite -- my personal appetite for 19 putting in more sets of blades is very low, you 20 know, that's why we put a pressure plate in at the 21 start of Period 6. No more trying. We've got to 2.2 figure something else out, and our customers can't 23 stand that. 24

And I think that was a really good decision, a very sound decision, because once we put that

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		VFIDENT	TIAL	202
1	pressure plate in in the spring of 2017, we finally		1	Q And GE was a close second to the solution that
2	had two-and-a-half years of nothing happening.		2	you put in in the fall of '19, right?
3	Yes, we ran about 40 megawatts lower from the total		3	A They were.
4	output. Instead of a 1,200-ish megawatt site, it		4	Q Okay. And the fact that it says and/or means
5	was 40 megawatts lower than that. But we didn't		5	that you still haven't completely given up on maybe
6	have any issues where we had to shut down for the		6	replacing the steam path, right?
7	low pressure turbine, and I think that was really		7	A I think the and/or is really just trying to
8	good for customers.		8	show that there were three options, that they're not
9	It was the right decision while we were		9	mutually exclusive, right? Let me get back to the
10	figuring out what we could do for the next		10	sentence and read it again.
11	iteration, which I do believe will be the long-term		11	Right. So it might require new designed L0
12	solution, but Period 7 is going to go on for a long		12	blades and a new steam path. That's what the root cause
13	time.		13	is showing. But at the point of this root cause, we
14	BY MR. REHWINKEL:		14	didn't know what the long-term solution was. So we're
15	Q Just on your blade vibration monitor point, it		15	just leaving all options open while the team studied
16	is true, as is stated in the next sentence, that even		16	what the ultimate long-term solution would be, which we
17	had you replaced the steam path, you still would have		17	then decided, you know, long after, months after this.
18	insisted on a blade vibration monitor as a part of		18	Q Okay. When you did your industry experience
19	anything that was done, right?		19	research, you didn't find any instance of an L 40 an
20	A That was Duke Energy's position. We wanted to		20	LO 40-inch steam turbine in the Mitsubishi fleet having
21	make sure that that was part of the solution. Not all		21	to replace even one set of blades in 11 after only 11
22	the not all vendors agreed to that.		22	years of operation, did you?
23	Q All right.		23	A I am not sure. I actually suspect that there
24	A So it actually disqualified some from the		24	were issues, but likely caused by erosion.
25	from that project.		25	Q Okay. I should have added based on a
	r Reporting (850) 894-0828 Reported by: Debbie Krick			Reporting (850) 894-0828 Reported by: Debbie Krid
	203			204
1	vibration-induced damage?		1	204 A All right. I am there.
2	203 vibration-induced damage? A Right. No snubber or shroud issues like we've		2	204 A All right. I am there. Q So my question to you is: Can you tell me why
	203 vibration-induced damage? A Right. No snubber or shroud issues like we've experienced at Bartow.			A All right. I am there. Q So my question to you is: Can you tell me why Citrus L0 is the header for the far-right column?
2 3 4	203 vibration-induced damage? A Right. No snubber or shroud issues like we've		2	A All right. I am there. Q So my question to you is: Can you tell me why Citrus LO is the header for the far-right column? A I don't know specifically, but what I do know
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1 2		IDENTIAL	
2	you are putting on as a type as a Period 5 blade, and		outage on a steam turbine, which we had just had an
	that's	2	outage at the start of Period 4. Our Duke Engineering
3	A I know we obviously had concern with this	3	wasn't convinced.
4	Citrus project because of what were finding out, or what	4	It's an unexplained change in vibration,
5	we found out here. So we are just showing for	5	you know, typically well, you monitor vibration for
6	comparison purposes what is installed at Citrus.	6	increases. If there is an increase in vibration, you
7	Q Okay. I understand that.	7	need to understand why, and if you can't figure it out,
8	And can you tell me, do you know at what point	8	if it gets beyond a certain point, you typically stop
9	in any of the periods any of the damage to your LO	9	operation and go conduct inspections, because that can
10	blades occur at Bartow?	10	lead to damage very significant issues in multiple
11	A We do know. If we could look if we look at	11	components.
12	that same exhibit and go to just because it's going	12	In this case, there were slight changes and
13	to help me remember some things. If we go to page five.	13	there were reductions, but after inspection, we when
14	It's Table A.	14	what we found, we found, looking at row broken snubbers
15	During Period 4, we were able to pinpoint when	15	in the row that's titled "Broken Z-locks", we found one
16	some of the damage occurred. We had if you look at	16	broken snubber on the generator end of the machine, one
17	the keynotes from period row and go over to that Period	17	broken Z-lock on the turbine end of the machine, and two
18	4 column, it said it shows the two separate step	18	broken Z-locks on the generator end of the machine, and
19	changes that were actually reductions, decreases in	19	so that's one, two that's four pieces of metal.
20	vibration, led Duke Engineering recommendation to remove	20	Small pieces of metal. Remember, we are talking about
21	the steam turbine from service for inspection.	21	the snubbers and the Z-lock. But two of those instances
22	So there was discussion with Mitsubishi after	22	were almost certainly the times we saw the slight
23	we noticed these reductions in vibration. It's	23	reductions in vibration.
24	interesting, Mitsubishi believed it to be bearing	24	So the fact that we shut down to do an
25	settling in, just some normal course of action after an	25	inspection and take a look was the right thing to do,
1	207		208
1	the prudent thing to do. Before we could operate any		
2		1	
	more, we had to replace blades yet again.	2	that failure occurred as well. So Period 4 and 5, we do
3	<pre>more, we had to replace blades yet again. Q So is that the only</pre>	2 3	-
4	Q So is that the only A That's not the only time. I am sorry. Back	2 3 4	that failure occurred as well. So Period 4 and 5, we do know when those happened. Period 1, we don't know when that happened.
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	<sup>209</sup>	ONF	IDENTIAL		210
1	A Yes, sir, I have.	0.11	1	Q	Would you mind just reading that into the
2	Q Okay. Are you familiar with the U.S. Energy		2	record?	
3	Information Administration?		3	A	Generator nameplate capacity installed. The
4	A Not really. No, sir.		4	maximum	rated output of a generator, prime mover, or
5	Q EIA, you have never		5	other el	ectric power production equipment under specific
6	A It's somewhat familiar, but I wouldn't say I		6	conditio	ns designated by the manufacturer designated
7	am the acronym is, rather, but ${\ensuremath{I}}$ am not familiar with		7	by the m	anufacturer. Installed generator nameplate
8	what it does.		8	capacity	is commonly expressed in megawatts and is
9	MR. MOYLE: I have a document if I can just		9	usually	indicated on a nameplate physically attached to
10	show him?		10	the gene	rator.
11	THE COURT: Sure.		11	Q	Okay. Are you comfortable with that
2	THE WITNESS: Thank you.		12	definiti	on for generator nameplate capacity?
.3	BY MR. MOYLE:		13	A	I am.
4	Q Sir, I have handed you a document from U.S.		14	Q	Okay. And a couple of follow-ups on that.
5	Energy Information Administration. It's a glossary of		15		Does the unit that we are talking about here
6	terms under the letter G, right?		16	have a,	you know, have a nameplate on it?
7	A Yes.		17	A	I don't know.
8	Q Okay. I might have handed you my copy that		18	Q	If you were to show me around, you could you
9	had a little star on it.		19	say, Mr.	Moyle, let me show you our nameplate, and it
20	A Oh, it has the answer on it.		20	would be	right there, and I would see 420?
21	Q The generator nameplate capacity, which is on		21	A	I wish I could tell you. I don't know if it
22	page three of six, do you see that?		22	has a ph	ysical nameplate or not.
23	A Generator nameplate capacity?		23	Q	So you just don't know one way or the other on
24	Q Right.		24	that?	
25	A Yes, sir.		25	A	I don't. But what I can tell you is in the

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1	contract we looked a little bit earlier today at the
2	generator capability curves, and that does include the
3	nameplate ratings of the generator.
4	Q Right. And there is nameplate I mean, we
5	have it throughout these documents, right? You looked a
6	it, and that chart you were looking at it says 420,
7	right, in your root cause analysis?
8	A Right.
9	Q And I just want to get your understanding on
10	the record with respect to nameplate and what it means.
11	Also, with respect to when Duke or others
12	announce a project, don't they typically announce it by
13	using the megawatts that are expected from the
14	nameplate?
15	A Yes, I would agree with that.
16	Again, we typically that's our product.
17	That's what people are familiar with, and that would
18	make sense to make announcements in that manner.
19	Q Okay. I am wanting to ask you some questions
20	about the root cause analysis.
21	If I understand I mean, the history of this
22	generator is, is that it's referred to in some of your
23	documents as it got picked up on the gray market, right?
24	You have to say yes or no.
25	A Yes, I am sorry, yes.
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1	Q The court reporter needs to put nodding head
2	
	yes.
3	A Sorry.
4	Q Anyway, that's all right.
5	And so the gray market is, you know, kind of
6	an interesting term. What does that mean, the gray
7	market for generators?
8	A So the gray market would mean it wasn't
9	bought or a piece of equipment isn't bought from the
10	original equipment manufacturer. In this case, the
11	steam turbine that was installed at the Bartow project
12	was purchased it was originally manufactured for a
13	different company for a different project, and so and
14	that project fell through. I don't know why it didn't
15	come to fruition. And so instead of going to the
16	original equipment manufacturer and buying something
17	directly from them, it was this one that was already
18	there that was really owned by a company called Tenaska,
19	and we purchased that one. So that would be the gray
20	market.
21	Q Yeah. Would it be somewhat analogous to if I
22	was going to buy a Ford F150 truck, I can buy it from
23	the dealership and nobody had owned it before, or I
24	could buy it from somebody who bought it from a
25	dealership and then drove it home and then said, you
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	6	HMC)	IDENTIAL		
1	know, I don't really like it and left it in his garage			L	purchase for you all, how long did it stay in the
2	for a few years and I bought it from him in his garage		2	2	warehouse?
3	after a few years; is that fair?		3	3	A I am sorry, I don't know that number.
4	A I don't think it's exactly fair.		4	1	Q It was more than a year, was it not?
5	In this case, the turbine was never delivered		5	5	A It was more than a year, yes.
6	to Tenaska. It was kept in storage at Mitsubishi, so it		6	5	Q Do you know if it was more than five years?
7	was subject to the same whenever Mitsubishi or any		7	7	A I don't think it was more than five. It may
8	turbine manufacturer makes a product, they are		8	3	have been around four, if I remember correctly.
9	manufacturing it and they are storing it under a certain		9	9	Q Yeah. Are I have a boat. And people tell
10	set of conditions. So this one was stored in those same		10	)	me on my boat that the best thing you can do for it is
11	sets of conditions as a regular new turbine, never left		11	L	use it, run the engine, that you need to run the engine
12	Mitsubishi, but stayed or never yeah, never left		12	2	to make it operate okay. Have you ever heard anything
13	Mitsubishi, so it yeah, it didn't go to that other		13	3	like that being an engineer, it helps to run things?
14	person's garage in your		14	1	A I have heard similar things like that, but I
15	Q Yeah. And so you as we sit here today, you		15	5	would also tell you that that engine then is going to
16	know for sure it didn't get in a warehouse somewhere		16	5	need more frequent maintenance intervals because you put
17	else. It stayed on Mitsubishi grounds and stayed in		17	7	on run hours.
18	their warehouse, or you are not sure of that?		18	3	Q Yeah. Yeah. The engine the turbine you
19	A No. It's my understanding Mitsubishi had		19	9	bought, it was not run while it was in the warehouse,
20	possession, and we've actually looked at well, the		20	)	correct?
21	project team involved in the project looked at all kinds		21	L	A Correct.
22	of documentation of the storage conditions from		22	2	Q Okay. And if things are not run, there are
23	manufacture to the date of purchase and to inspections		23	3	issues that can arise from an engineering standpoint,
24	as well.		24	1	correct?
25	Q How long from date of manufacture to date of		25	5	A Not necessarily. Again, you have to think
	. Sth Avenue, Tallahassee, FL 32303 er Reporting (850) 894-0828 Reported by: Debbie Krick				th Avenue, Tallahassee, FL 32303 premier-reporting.com Reporting (850) 894-0828 Reported by: Debbie Krick
	215				216
1	about how this turbine is stored, and it was actually		1	L	Q Okay. And you were not on that seven-member

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2	stored under inert gas pressure in casings with the
3	pressure monitored so the regular atmosphere that we are
4	breathing now never even got to the turbine, so that
5	prevented corrosion, for example.
6	Q Was the plant near the sea? I mean, Japan is
7	surrounded by a lot of water, is it not?
8	A I don't know.
9	Q You don't know where it was?
10	A I don't know where the plant was.
11	Q There have been a lot of questions about root
12	cause analysis, or RCA, and let me just make sure I got
13	this right. You all, Duke, did a root cause analysis,
14	correct?
15	A Correct.
16	Q And that was comprised of seven people who are
17	all Duke employees, correct?
18	A I think that's what this says. One of them
19	was actually a consultant, as Mr. Rehwinkel pointed out,
20	a former Duke employee, that at the time of the root
21	cause was actually a consultant back for the company.
22	Q Okay. So you had six Duke employees and some
23	person who was a Duke employee for a number of years
24	that recently left and came back in?
25	A Yes, sir.
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## 2 team? 3 A That's correct. 4 Q Okay. So some of the questions that Mr. 5 Rehwinkel asked you, you were struggling a little bit 6 and surmising, and there were a couple of objections from your lawyer about I don't want you to have to 7 8 guess. I assume that's because you weren't involved in 9 drafting the report, correct? 10 A That's correct. 11 0 All right. Mitsubishi, they also did a root 12 cause analysis, did they not? 13 A They did. In fact, I think they've done 14 multiple root causes. 15 Q Right. And their first take at it, their 16 first take at it was essentially too much steam is being 17 put through the process, correct? 18 A Too much steam to the low pressure turbine, 19 yes. 20 Q Right. And your -- your being Duke -- root 21 cause analysis, you spent a lot of time with Mr. Rehwinkel on it. I am going to try to characterize it 22 at a high level and see if I can get you to agree that 23 24 $\,$ you are comfortable with this, but that there were 25 identified a number of possible causes for the problems (850) 894-0828

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1	that happened to the turbines, correct?		1	periods.
2	A Correct.		2	Q Yeah. And blade flutter, that's like
3	Q And you all couldn't really come to		3	vibration, right?
4	100 percent conclusion, decisive conclusion as to what		4	A It is. Same thing.
5	caused the problem, but you said, here are what we think		5	Q And you can get vibrations caused by a whole
6	are our best ideas as to what caused the problem,		6	bunch of things, correct?
7	correct?		7	A Yes.
8	A That's correct. And we are able to conclude		8	Q Yeah. Including putting too much steam
9	based on in-depth analysis that that lack of blade		9	through. If you are putting too much steam and it's n
10	design margin was the root cause.		10	designed for that, that can cause vibration or flutter
11	Q Right. And it struck me a little bit as,		11	correct?
12	like, well, you couldn't figure out exactly what it was,		12	A That's correct.
13	so it was, like, well, it wasn't designed right. But I		13	Q All right. And it could be some other thing
14	am I was a little curious about how you all followed		14	A Yes.
15	up on that, and you I think Mr. Rehwinkel asked you		15	Q Okay. But in terms of Duke looking at it, y
16	what was the design flaw. I think you said, well, it		16	all never came to a conclusion with respect to I
17	wasn't designed within the right margins, is that right?		17	wrote it down the margin. You said they didn't
18	A I don't know if that's what I said, but as far		18	design it and they didn't have enough design margin, I
19	as follow-up, it's difficult at that point because		19	think; is that right?
20	essentially Duke Energy is saying, Mitsubishi, we		20	A Right.
21	believe you have an inadequate lack of design margin in		21	Q And design margin, what is design margin? I
22	your blades. The OEM does not want to admit to that.		22	assume it's like a level of tolerance. They say, ch,
23	They did admit in their later presentation in the fall		23	well we can, you know, do this or do that. Is that
24	of 2017 that the blade flutter was caused by or that		24	right?
25	the failures were caused by blade flutter in all of the		25	- A It is. For many pieces of equipment, they m
	· · · · · · · · · · · · · · · · · · ·			
1	be designed for a certain level, but there is an		1	designed within the right amount of tolerances, can yo
2	engineering design margin or extra capacity that's built		2	tell me anything about that? Like, did you say, oh, y
3	in, or design factor that if someone were to go above or		3	only gave it a five-percent tolerance, or a 20-percent
4	if the limit is low or below, then there won't be a		4	tolerance? I mean, do you have anything substantively
5	failure or an issue with that particular component.		5	more than a conclusionary statement that it wasn't
6	Q Yeah. And that wouldn't make a lot of sense,		6	designed within a range of tolerance?
7	would it, if somebody was operating an expensive piece		7	A Well, I think
8	of equipment that you had, you know, zero tolerance,		8	Q If you give the answer yes, no, and then
9	right?		9	explain it, that would be great.
10	A It would not make sense, right.		10	A Well, it's difficult to say yes or no becaus
11	Q And wouldn't it make sense for a manufacturer		11	it's a complicated issue, and I think it's most
12	also to make sure that the equipment is not torn up to		12	important to go back and look at what happened across
13	say, here, y'all should operate it, you know, at this		13	all the periods. So you keep talking about steam flow
14	level, you know, give you some good parameters in which		14	and operating above a certain amount of steam flow.
15	to operate the piece of equipment?		15	Starting with Period 2, the operating
16	A Yes.		16	pressures that we ran the steam turbine at were reduce
17	Q All right. And given the definition we just		17	and then throughout Period 2, 3, 4 and 5. In fact, in
18	read, you know, the federal government with respect to		18	Period 5, they were very low, but yet the blades still
19	their definition of generator nameplate capacity, they		19	had damage to the snubbers or the airfoil tips even wi
20	call it the maximum out maximum rated output of a		20	lower steam flows, even with lower steam flows than wh
21	generator is what that 420 would be, right?		21	the Mitsubishi fleet had experienced. I think that th
22	A That's what that said, yes.		22	shows that there wasn't enough design margin in the
23	Q Okay. And when you were doing your		23	blades.
24	investigation, or your critical your root cause		24	Q And can you describe the failure of design
		· I		
25	analysis and you said, well, we don't think it was		25	margin in any order of magnitude?

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1	A I don't have a percentage for that. No.	1	Q Okay. And do you know if that blade was cast
2	Q Or any narrative description for it?	2	in a single casting? Do you know what I mean by single
3	A I think it would be difficult to do that	3	casting?
4	without testing with instrumentation and breaking them	4	A I do. I don't know the specifics of the
5	on purpose with instrumentation hooked up so that you	5	manufacturing process.
6	could see when they break, and you know what all the	6	Q Right. So just to make sure we are on the
7	different parameters were at the point of the failure	7	same page. Like a single casting is you got a form and
8	occurring.	8	you put in the metal, and then it hardens and that's it,
9	Q I want to shift a little bit and talk about	9	and you don't have to weld anything else on to it,
10	the blade a little bit. You guys were running a blade	10	correct?
11		11	A Oh, so I do know the answer then. It's not a
12	which I have gone over and looked at. It is pretty	12	.,
	heavy.		single casting.
13	A It is.	13	Q And the things that were breaking off, I
14	Q Do you know if Mitsubishi made that blade or	14	looked at that, they looked to me like they were welded
15	whether they had it made by a subcontractor and had it	15	on; is that right?
16	casted by a third party?	16	A I believe they are, yes. And there is other
17	A It's my understanding that Mitsubishi does	17	pieces like the tip of the airfoil, I believe, is not
18	that themselves.	18	part of the forge, the original forging.
19	Q Okay. Are you aware that in the turbine	19	Q Right. So from the engineering standpoint,
20	business, that some turbine blades are made by third	20	when you weld something on and you have a single form
21	parties?	21	that's cast, the weakest part is where something has
22	A Iam.	22	been welded on, all other things being equal; correct?
23	Q But you got affirmation that Mitsubishi said,	23	A There are certainly stress risers that at the
24	no, it's on us, this is our blade?	24	heat affected zone of a weld. That doesn't mean
	A That's my understanding.	25	necessarily that it's the weakest point, though. And in
4 W	5th Avenue, Tallahassee, FL 32303 r Reporting (850) 894-0828 Reported by: Debbie Krick		. Sth Avenue, Tallahassee, FL 32303 r Reporting (850) 894-0828 Reported by: Debbie Krick
14 W	5th Avenue, Tallahassee, FL 32303 (850) 894-0828 Premier-reporting com Reported by: Debbie Krick		. 5th Avenue, Tallahassee, FL 32303 r Reporting (850) 894-0828 Reported by: Debbie Krici 224 Q And all other things being equal, wouldn't you
Premie	r Reporting (850) 894-0828 Reported by: Debbie Krick	Premie	rr Reporting (850) 894-0828 Reported by: Debbie Krick
14 W remie	r Reporting (850) 894-0828 Reported by: Debbie Krick 223 the case of these blades, it didn't fail at the heat	Premie	r Reporting (850) 894-0828 Reported by: Debbie Krick 224 Q And all other things being equal, wouldn't you
14 W remie	r Reporting (850) 894-0828 Reported by: Debbie Krick 223 the case of these blades, it didn't fail at the heat affected zone in the weld. The snubbers and the Z-locks	Premie	er Reporting       (850) 894-0828       Reported by: Debbie Krid         224       224         Q       And all other things being equal, wouldn't you         think it's more likely that for that to happen if you
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			226
1			start slowly blending. You start increasing the
2	said about 15 percent of the time. Does that sound	2	percentage of steam that's input to the steam turbine,
3		3	so more to the steam turbine, less to the condenser
4	A It does, yes.	4	until all of it is going into the steam turbine.
5		5	If you are going from 3-on-1 to 2-on-1
6		6	configuration, it's just the opposite. You start taking
1		7	it out of the steam turbine and bypassing steam to the
8		8	condenser, and then you shut down the HRSG and start
9		9	exhausting out to the atmosphere.
10	· · · · · · · · · · · · · · · · · · ·	10	Q And this is a 4-on-1, right?
11		11	A This is a 4-on-1.
12		12	Q But you can run it 3-on-1, 2-on-1?
13			
	· · · · · · · · · · · · · · · · · · ·	13	A We can run it in any of those other
14		14	combinations.
15		15	Q So if you are not blending, you know, the way
16		16	you are supposed to do it, the way you described it,
17	generator. The exhaust, remember, is going out the	17	what are the consequences of that?
18	3 stack. It's not going to the HRSG yet. When you	18	A Well, that's something we looked at in the
19	start then you start warming up the heat recovery	19	root cause. In fact, Duke Energy made up our own
20	) steam generator. You start generating steam. You don't	20	definition of what a high-energy blend was because
21	immediately put the steam into the turbine. You have to	21	that's a possibility that that could exert more energy
22	wait for certain conditions to be met on the steam. You	22	on the LO blades because, as I described, there is steam $% \left( {{{\left[ {{\left[ {{\left[ {\left[ {\left[ {{\left[ {{\left[ {{$
23	don't want to put water in the steam turbine.	23	flow that's being put into the condenser. It goes into
24	So what you do is you bypass steam to the	24	the condoner nearby the LO blades, so that's something
25	condenser, and then once steam conditions are met, you	25	we needed to look at.
	227		228
1	. Because there is no industry standard for the	1	country how much of the energy is supplied by combined
2	amount of energy that's put in the condenser during a	2	cycle units, what would you say, 40, 50 percent?
3	blend, we looked at a lot of data. We came up with a	3	A It's growing. It's probably 40-ish percent,
4	method for classifying and a definition for high energy,	4	plus or minus.
5	and it was just based on the change in temperature over	5	Q Yeah. There was something that caught my eye
6	a certain period of time. More than a certain change in	6	in one of the documents Mr. Rehwinkel was discussing
-	temperature in a minute's time, we said, let's just call	7	with you, and I will refer it to you. It's on his
8	b that high energy, and it happens so many times over	8	Exhibit 115, and it's on Tab No. 6, and it's on Bates
ç	if you have this many blends, we see that this many	9	number 49.
10	of the blends, a percentage of the blend.	10	A Okay. I am there.
11		11	$\sim$ And there is about middle of the page there
12		12	it says, blending operation, do you see that?
13		13	A Yes.
14		14	Q Just read the quote, if you would, underneath
15		15	there.
16		16	A It says: We've had bad blends during all five
17		17	periods of operation.
18		18	
			Q Yeah. And you said you came up with a
19		19	definition for the energy. I mean, what's a bad blend?
20		20	where the state of
21	with other units.	21	I assume that's something that's not good just by the
22			term, right?
23		22	<pre>term, right?     A Yeah. I would say this is a good example of</pre>
	of people are running combined cycle units, right?	22 23	<pre>term, right?     A Yeah. I would say this is a good example of why this is a draft document, and why we go through a</pre>
24	of people are running combined cycle units, right? A Oh, yes.	22 23 24	<pre>term, right?     A Yeah. I would say this is a good example of why this is a draft document, and why we go through a lot of iterations before putting out a final document.</pre>
24	of people are running combined cycle units, right? A Oh, yes.	22 23	<pre>term, right?     A Yeah. I would say this is a good example of why this is a draft document, and why we go through a</pre>

		<u> </u>	
1	place of high-energy.	1	know how many o
2	During the course of this root cause, we were	2	It changes the
3	developing this high energy blend definition. Maybe we	3	less efficient
4	didn't have it at this time. I don't know. I don't	4	are placed in o
5	want to speculate, but I believe it means the same thing	5	based on what t
6	as a high-energy blend.	6	may or may not
7	Q Do you know who came up with that word, which	7	least one in se
8	member of the seven-member team?	8	periods.
9	A I do not.	9	Q Yeah.
10	Q Did you ever talk to anybody about what that	10	efficiency, jus
11	meant, or are you just kind of saying, oh, I think it	11	negative effect
12	means high-energy and surmising that?	12	in simple cycle
13	A I don't know.	13	the HRSG system
14	Q Yeah.	14	of these issues
15	A I didn't have that discussion.	15	A Corre
16	Q And that's fair, because you didn't, you know,	16	Q So ju
17	you didn't work on the report. You weren't in all those	17	recovery system
18	meetings.	18	what would you
19	A Correct.	19	the combined cy
20	Q Okay. I just want to make sure the record is	20	A Well,
21	clear. When these problems occurred, you opted to just	21	about oh, wh
22	run the Bartow facility on the simple cycle, not	22	Q Right
23	combined cycle, right?	23	A When
24	A During the periods when we were replacing	24	are missing tha
25	blades, we were running in simple cycle mode. I don't	25	where we were r
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231 turbines, the four combustion turbines are nominally 2 around 200 megawatts. Again, as I have described, they 3 can do more than that depending on the ambient 4 conditions in the heat of the summer they may not make 5 that much. But let's say they are 200-megawatt units, 6 we had about 200 megawatts capacity instead of about 1,200 megawatts of capacity. 7 8 Okay. So about a third is knocked out? Q 9 А During the outages. 10 0 Right. 11 A During the outages, right. 12 Okay. And then for that third, you had to go 0 13 find that power somewhere else, either run it on your 14 system or buy it in the market; is that right? 15 That's correct. If it was needed. A 16 So with respect to -- you got on -- you 0 testified on this a little bit with Mr. Rehwinkel about 17 18 the status of Mitsubishi blades in the market. Duke has a lot of other Mitsubishi blades, do they not? 19 20 A I don't believe Duke has a lot of other 21 Mitsubishi blades. In steam -- well, I mean, correct 2.2 that. So in steam turbines, we do have other combustion 23 turbines that are Mitsubishi. Combustion turbines have 24 blading. I am not aware of any other Mitsubishi steam 25 turbines other than what's installed at Bartow and the 114 W. 5th Avenue, Tallahassee, FL 32303

f the simple cycles were in operation. economics of those units. They are much obviously in simple cycle mode. So they our dispatch order changes. And then the system load is on any given day, they be asked to run, but there is always at ervice, I know, during all these time So just in terms of the impact on t give the judge an idea about the on efficiency if you are only running it and not using the heat recovery system, , which you have done as a result of some , correct? ect. st is it about a third -- is the heat about a third? Use the 420 nameplate, not realize not being able to run it in cle mode? from a production standpoint, it was en the steam turbine was not in service? the steam turbine was not in service, we at 380 to 420 megawatts, depending on running at the time. The combustion 32303 premier-reporting.com Reported by: Debbie Krick (850) 894-0828 232

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1	two that we have at Citrus.
2	Q Okay. And you haven't had any similar
3	problems with the turbines at those other Duke units
4	that you have experienced at Bartow, correct?
5	A Well, the two Citrus steam turbines didn't
6	start up until late in 2018.
7	Q Yeah. And we are not looking for problems,
8	it's okay to say there are no problems?
9	A Yeah, no problems.
10	Q I am not disappointed, you know.
11	A The operating experience is limited to about a
12	year-and-a-half.
13	Q Right. Right.
14	And you have no personal knowledge with
15	respect to anybody else having any problems with
16	Mitsubishi blades of the ilk that are at your Bartow
17	unit, correct?
18	A Other than what we had discussed earlier.
19	There is some discussion at user group meetings and some
20	interest in our issues, but nothing that I can show you
21	in documents.
22	Q Yeah. In these administrative proceedings, we
23	treat hearsay a certain way, so if I ask you have
24	personal knowledge if somebody told you I am having
25	something going on, correct? That's the only

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1	information you have that somebody else may have an
2	issue?
3	A That's correct. That's correct.
4	Q Yeah. And the what company was that? Do
5	you remember the company that
6	A I don't remember. Mr. Rehwinkel thought it
7	was in Louisiana, I think he said. I have no reason to
8	doubt that.
9	Q I'm asking you the name of the company, like
10	energy or somebody from energy?
11	A I don't remember.
12	Q You don't remember who it was?
13	A I don't.
14	MR. MOYLE: Okay. I think that's Judge, if
15	I could just get one quick second?
16	THE COURT: Sure.
17	MR. MOYLE: Thank you. That's all I have.
18	THE COURT: Mr. Brew.
19	MR. BREW: May I approach the witness, Your
20	Honor?
21	THE COURT: Sure.
22	EXAMINATION
23	BY MR. BREW:
24	Q Good afternoon. These are the two exhibits I
25	want to show you. Your Honor, you have them there. I

235 run down to the steam turbine? 2 А Yes, sir. 3 0 We've gone through where the steam goes in 4 through the middle, goes out both sides and into the 5 condensers? 6 A From the low pressure turbine. 7 0 From the low pressure turbine eventually, yes. 8 And you can run any one of those sets 1-x-1, 2-x-1, 3-x-1, 4-x-1? 9 10 А Yes. 11 0 Okay. You can -- for any of the CTs, you can 12 do duct firing, which is to add gas to the combustion 13 gas, much like an afterburner on a jet? 14 А Yes, sir. That's right. 15 0 Okay. And so you can do that for short 16 periods for peaking because it gives you real punch on 17 your output, but it's not particularly efficient? 18 А That's accurate 19 0 Okay. And you also can divert steam, I think, 20 from the intermediate pressure to the CT itself for what 21 you call power augmentation? 22 А Correct. 23 Okay. And that's sort of like supercharging a 0 24 car. You smoosh more stuff into the combustion zone and 25 you get more power out of it?

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17	<u>۱</u>		234
17		am going to talk about this one.	
	2	A Okay.	
	3	Q Thanks.	
	4	Good afternoon, Mr. Swartz, one of the	
	5	advantages of going at the tail end is that many of	my
	6	questions have been answered. The downside is that	: I
	7	will be jumping all over the place.	
	8	First, I want to just really quickly run	
	9	through some stuff that's been covered in different	:
	10	pieces about the function and operation of Bartow.	
	11	A Yes, sir.	
	12	Q It was originally designed and built for	a
	13	3-x-1 configuration, right?	
	14	A That's correct.	
	15	Q Okay. And Duke decided when it did its	
	16	repowering program that it might be better do a 4-x	r-1
	17	operation, right?	
	18	A That's correct.	
	19	Q And that's eventually what was built?	
	20	A Yes.	
	21	Q Okay. And so we have 4 CTs, combustion	
	22	turbines, that produce electricity and exhaust gas	that
	23	run through the heat recovery steam generators, rig	nt?
	24	A Yes.	
	25	Q And then the steam from those steam gener	ators

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236 1 Yes, sir. That's right. A 2 0 Again, that's not the most efficient way to do 3 it either in terms of heat rate in the operational plant, right? 4 A Yes, sir. 5 6 0 Okay. So when -- the Bartow unit went into service in June of '09, right? 8 А Yes. And in your 2010 10-year site plan filed with 9 0 10 the Public Service Commission, you listed the max 11 generation capability in megawatts of the unit is 1,253 12 megawatts; is that right? 13 А I would have to look at that. I am not familiar with that document. 14 15 Okay. But that would be about right, 1,200 0 16 megawatts? 17 That's about right, ves. А 18 о And of that 1,200 megawatts, about 19 420 megawatts would have been ascribed to the steam 20 turbine, right? 21 А That's about right. 2.2 Okay. Now, the different modes of operation, Q 23 the plant does not simply run 4-x-4 all the time, right? 24 А Correct -- 4-x-1, right. 25 It could be 4-x-4-x-1, it could be in any 0 114 W. 5th Avenue, Tallahassee, FL 32303 premier-reporting.com Reported by: Debbie Krick (850) 894-0828 Premier Reporting

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1	possible combinations		
2	A Yes, sir. That's right.		
3	Q as you ramp it up and ramp it down?		
4	A Yes.		
5	Q And as you're ramping up it up, if you are		
6	adding another heat recovery system to the steam, as you		
7	said, you would bypass that steam to the condenser to		
8	blend it before introducing it into the steam turbine,		
9	right?		
10	A Yes.		
11	Q Okay. So you have a number of ongoing		
12	systems normal operation is, in fact, a constant set		
13	of dynamic changes, where you are going up, you are		
14	going down, you are ramping up, you are ramping down,		
15	you are taking parts off, you are adding parts on; is		
16	that right?		
17	A Yes, part of the value of the Bartow combined		
18	cycle is the operational flexibility that it provides so		
19	that we can change the operation as you described to		
20	meet the customer needs.		
21	Q And so when the units first well, let me		
22	back up a little bit, I guess. You have been asked this		
23	question around-about, but I want to ask it directly.		
24	The company's position on what is wrong with		
25	the zero blades is captured in your root cause analysis,		
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1	Q That wasn't my question. Are you asking
2	consumers to pay the bill or are you asking Mitsubishi
3	to pay the bill?
4	A Well, as far as asking Mitsubishi to pay the
5	bill, I think that goes back to contract language that
6	we have found it's very unlikely, if not impossible to
7	get manufacturers or vendors to agree to clauses that
8	would include lost business. It simply will back out of
9	that contract before agreeing to that.
10	Q You said that in your direct testimony. Would
11	you refer to it for a minute on page seven? I am
12	pointing to the answer that begins on line nine. This
13	is of your original direct testimony, because that's
14	what we are talking about right now.
15	A Page seven?
16	Q Page seven. The answer on lines nine to 13.
17	A Okay. I am there.
18	Q Okay. Actually above that, the answer on
19	lines one through three, where you talk about the
20	unwillingness of original equipment manufacturers to
21	accept the risk of paying consequential damages; do you
22	see that?
23	A $\ $ I must be on the wrong document. I do not see
24	that.
25	Q I am looking at your March 19th March 1
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1	right?
2	A Yes.
3	Q JS-1, JS-2, whatever one we want to refer to?
4	A Yes.
5	Q Is it the company's position that the zero
6	level blades were insufficiently designed for
7	450 megawatts or the originally promised 420?
8	A It's actually neither. The inadequate design
9	for the operating pressures and temperatures that we
C	were given as operating parameters.
1	Q Okay. So are you saying is the company
2	saying that the blades as designed were not sufficient
3	to meet the specifications per your agreement with what
4	Mitsubishi had to do?
5	A Yes.
б	Q Okay. And the company's proposal is that
7	ratepayers be insurers for that design defect by paying
8	for all the replacement power costs?
9	A I am not sure what you mean by insurers.
C	Q You want us to pay the bill?
1	A Well, our company's position is that we
2	prudently operated the equipment within the parameters
3	provided to us from the equipment manufacturers, and we $% \left( \left( {{{\boldsymbol{x}}_{i}}} \right) \right) = \left( {{{\boldsymbol{x}}_{i}}} \right) \left( {{{{\boldsymbol{x}}_{i}}} \right) \left( {$
4	did that each period of operation and we took action
	each period of operation.

			240
1	March 1,	2019, direct testimony.	
2	A	Okay. I was looking at the March 18	
3	testimony		
4	Q	Okay. You have a question: In your	
5	experienc	e, do DEF's agreements with OEMs usually	
6	include a	similar disclaimer of liability? You a	re
7	talking a	bout consequential damages, do you see t	hat?
8	A	Yes, I do. That's row 22, or line 22?	
9	Q	Yeah, that's	
10	A	I don't have page numbers on mine.	
11	Q	Okay. I am looking at the answer that	you
12	gave ther	e	
13	A	Okay.	
14	Q	that starts with the word yes.	
15	A	Right.	
16	Q	Okay. You say: To my knowledge, this	is the
17	case thro	ughout the industry. What industry do y	ou
18	mean?		
19	A	The utility industry.	
20	Q	The utility	
21	A	Well, to clarify, so I have experience $% \left[ {{\left[ {{{\left[ {{{\left[ {{{c_1}}} \right]}_{{{\rm{T}}}}} \right]}_{{{\rm{T}}}}}} \right]}_{{{\rm{T}}}}} \right]_{{{\rm{T}}}}} \right]_{{{\rm{T}}}}}$	in the
22	utility is	ndustry, obviously, but also in the pulp	and
23	paper man	ufacturing industry, and then before tha	t in
24	the Navy.	But in my 35 years of experience in th	ose
25	entities,	I have not experienced a company willin	g to
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1	take on business interruption risk.	1	Q Okay. And when you went to Mitsubishi in 2012
2	Q So for a combined cycle unit that's sold to a	2	and asked them to look into going to 450 megawatts, or
3	merchant generator, to the extent that they can't	3	higher steam loading levels, you had described it as
4	recover consequential damages for a design defect from	4	their initial response is that they didn't have any
5	the OEM, that becomes the responsibilities of their	5	experience with the loadings at that level in their
6	investors?	6	steam turbines; is that right?
7	A I am not familiar with exactly the financing	7	A I don't know that that was their original
8	of a merchant generator. I have not worked in that	8	response. I think what I said is when they first
9	business, but that sounds plausible.	9	when we first experienced the damage, or discovered the
10	Q Okay. Somebody that can't recover their cost	10	damage in 2012, that was one of Mitsubishi's responses,
11	of operations through regulated rates?	11	is that the calculated steam flow on your L0 blades at
12	A Right.	12	Bartow is beyond our industry experience.
13	(Discussion off the record.)	13	Q Okay. So it was beyond their experience.
14	BY MR. BREW:	14	Isn't it true that it was also beyond yours, because as
15	Q You had talked about on a number of occasions	15	you noted, Bartow is only 4-x-4-x-1 combined cycle,
16	- that, I don't know if it's common, but a typical failure	16	right?
17	mode of L0 blades elsewhere in the industry was erosion?	17	A It is our only 4-on-1 combined cycle, but I
18	A Yes, sir.	18	don't know what the pounds per hour per square foot is
19	Q Which basically in the turbine and gas,	19	on LO blades on any other units.
20	excessive moisture in the blade areas and the water	20	Q Okay. All right. And you did the comparison
21	starts pounding in at 3,600, but you and Mitsubishi	21	and your root cause analysis for blending counts,
22	agreed that in this case that the root cause was too	22	particularly with your Lee and Hines combined cycles?
23	much vibration, or flutter, that was affecting the zero	23	A Yes.
24	level blades; is that right?	24	Q Now, the Lee combined cycle is a 3-x-1, right?
25	A Yes, that's correct.	25	A Correct.
1	Q And the Hines a series of 2-x-1s?	1	I would say they are likely very similar to Bartow, but
2	A Correct.	2	I wanted to characterize your it's an
3	Q Okay. So neither one of them would operate at	3	oversimplification to say a 4-on-1 has more energy than
4	a same energy levels as, say, going from a 3-x-4	4	a 3-on-1.
5	operation blending operation at Bartow?	5	Q Okay. But you don't know what the steam
6	A Well, when you talk about energy we probably	6	pressures were for Lee are?
7	need to define that. But I also would say that the	7	A Correct.
8	reason H.F. Lee and Hines we are using for comparison is	8	Q Okay. After the I get hung up on the
9	because those are the installations that have 40-inch L0	9	period statements, but after the, I guess the third
10	blades. Other installations have different sized	10	period failure in 2014 is when Duke and Mitsubishi
11	blades, so we wanted to make sure we used installations	11	agreed to actually test for vibration levels by doing
12	that had similar blades. But the pressure the energy	12	the telemetry test and installing the vibration monitor?
13	that you are stating really goes back to the pressure	13	A Well, not exactly. It was during Period 2
14	and temperature of the steam, and that's the pressure	14	when we were running with the second set of blades in
15	that equates to the mass flow rate.	15	one end of the machine and still had original blades in
16	So whether you are in 2-on-1 or 3-on-1, it	16	the generator end of the machine when we contracted with
17	depends on the design of the heat recovery steam	17	Mitsubishi to make a new design of blade called a Type 3
18	generators. It might be a heat recovery steam generator	18	blade that was installed during that outage between
19	that's capable of producing twice as much steam as the	19	Period 2 and Period 3.
20	ones at Bartow at much higher pressures. And then even	20	So when we started up in Period 3, we had this
21	though it's a 2-on-1, it could be more energy into the	21	new design blade. Part of that project was also to
22	<pre>low pressure turbine than a 4-on-1 at lower pressures. Q Is that the case in Hines 2-x-1 steam</pre>	22	install the temporary blade vibration monitoring system and take data at the very beginning of Period 3 so that
23	Q is that the case in Hines 2-x-1 steam pressures?	23	
			we could come up with any additional operating
			we could come up with any additional operating
25	A I don't know that the exact steam pressures.	25	we could come up with any additional operating parameters that we may need to protect the system. .5th Avenue, Tallahassee, FL 32303 premier-reporting.com

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1 Q Okay. With that clarification, Duke and	ONFIDENTIAL 1 A That's an issue with the condenser, right.
2 Mitsubishi jointly agreed to install the temporary	2 Q Okay. So you had that information, and if I
3 vibration monitoring telemetry to get actual information	3 can ask you to take a look at the document that I showed
4 using string gauges on the stresses at the zero level	4 you, the one-pager, that is a diagram that's listed
5 blades, right?	5 bypass connection locations, do you see that?
6 A Yes, that's correct.	6 A Yes, I do.
	7 Q Are you familiar with this diagram?
× · · 1 · · · · · · · · · · · · · · · ·	~ · · · · · · · · · · · · · · · · · · ·
8 the testing and installation that Duke was not onboard 9 with for the vibration limit?	
10 A Not that I am aware of.	10 It's in JS-4. It appears in a number of places on the
11 Q Okay. And you got the result of that	11 exhibits. And I will represent to you that it's a
12 vibration monitoring testing, and it was at that point	12 diagram for where the, I guess you call them spargers or
13 that Mitsubishi recommended establishing the avoidance	13 dump tubes go when you are sending steam to the
14 zone?	14 condensers in bypass mode?
15 A That's correct.	15 A Yes, that's correct.
16 Q Okay. And so and specifically what we're	16 Q And that the C and D hot reheat tubes are
17 talking about is you had two other data points. You had	17 located closer to the exhaust, right?
18 the outlet pressure from the intermediate turbine	18 A I don't know if that's correct or not. I
19 turbine pressure area, and you had condenser vacuum or	19 can't tell from this diagram.
20 back pressure?	20 Q Isn't it true that Mitsubishi found that when
21 A Correct.	21 $$ you were engaging the D and C tubes is when they
22 Q Okay. And the problem with the condenser is	22 experienced more vibration in the zero level blades?
23 that if you put too much steam energy in there, it can	23 A I do believe that there as document that shows
24 lose vacuum and that's when you get back pressure and	24 that. I know our concern and what we saw in operation
25 this can cause other problems?	25 was that alpha and delta concerned us more actually, A
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1 and D.	1 Commissioners would, but then he will come back and
2 <b>Q A</b> and <b>D</b> .	2 do his rebuttal testimony.
3 A I'm sorry, I default to the phonetic. And the	3 THE COURT: Okay. I just want to be sure. I
4 $$ reason why is A and D are physically farther from the	4 don't want to
5 condenser than B and C, and so there is more likelihood	5 MS. BROWNLESS: Can I just ask a question?
6 of water entrainment in the A and D lines.	6 Most of the testimony filed by Mr. Swartz is
7 Q Okay. And so my question, then, is there is	7 rebuttal testimony, and many of the questions that
8 nothing about the final fix that's been implemented that	8 have been asked today concern those areas. So just
<sup>9</sup> has changed the design or the configuration within the	9 so I am clear, would it not be appropriate to allow
10 condenser, right?	10 us to ask our questions about all of Mr. Swartz's
11 A Not for the sparger tubes that you are talking	11 testimony, subject to, of course, you being able to
12 about.	12 go at the very end and do redirect?
13 Q Right. That's what I am talking about.	13 MR. BERNIER: After Mr. Polich testifies?
14 A Yeah. I believe there were some other minor	14 Because I thought that was the agreement that we

15 changes, but not to what we are looking at here to my 16 knowledge. 17 MR. BREW: Okay. We are sticking to direct

right, not rebuttal?
MR. BERNIER: That's correct. Mr. Swartz is
excited to come back for rebuttal.
MR. BREW: All right. Then I will wait.
THE COURT: So there is no redirect, is

22 THE COURT: So there is no redirect, is
23 that -- or is there?

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24 MR. BERNIER: Typically we do redirect after 25 staff would go through, or actually after the

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Perhaps I was confused.

about his rebuttal?

MS. BROWNLESS: That's fine. I'm sorry.

we have strayed around a little bit, but we have

stayed really close to the root cause analysis.

will be he will retake the stand and talk about

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rebuttal and we will have a chance to ask questions

MS. BROWNLESS: Thank you.

MR. BERNIER: That's okay. I understand that

MR. MOYLE: Just to be clear, then, the plan

		D
1	MR. BERNIER: That's correct.	
2	MR. MOYLE: Okay.	
3	MR. BERNIER: Unless when he gets done y'all	
4	want to let him go.	
5	MS. BROWNLESS: Thank you.	
6	THE COURT: Was there anything from the	
7	Commission?	
8	MS. BROWNLESS: No, sir. I am good. Thank	
9	you, sir.	
10	MR. BERNIER: Can we have one minute?	
11	THE COURT: Sure. Take 10.	
12	MS. BROWNLESS: Oh, I am sorry.	
13	MR. BREW: I'm not finished.	
14	THE COURT: Oh, I am sorry. I thought you	
15	were done.	
16	MS. BROWNLESS: Yeah.	
17	MR. BREW: No. No. I had an exhibit	
18	THE COURT: I knew you never got to this one.	
19	MR. BREW: Right.	
20	THE COURT: I thought you were waiting for	
21	rebuttal.	
22	MR. BREW: Well, I am waiting for rebuttal on	
23	that one, but that's why I asked a clarifying	
24	question.	
25	THE COURT: The floor is yours.	

251 1 We suspect that the pressure plate caused some 2 pressure waves or vibration inside the casing that was  $^{3}$   $\,$  different than operation with blades. So we had to do 4 extra stiffeners in some locations, and we actually 5 removed some unnecessary things like ladders that were 6 attached to the inside of the casing. 7 So nothing that impacted the operation, and 8 the stiffeners worked well because in subsequent 9 inspections, we didn't see any issues. 10 Q So running with the pressure plate for 11 two-and-a-half years, it was noisy and vibrated a lot 12 because of the impingement of steam and stuff through 13 the pressure plate hold? A Well, it's all relative. When you say 14 15 vibrating a lot, there was no turbine centerline 16 vibration. The unit ran very well at low vibration 17 levels. There was obviously vibration in the casing. 18 And, yes, it was louder operating with a pressure plate 19 than with a set of blades in the LO position. To be 20  $\,$  honest, it was not as loud as what we had thought it 21 might be. 2.2 Q And the new redesigned Level 0 blades were 23 installed in December, and the unit is now back in 24 operation for what we now call Period 7? 25 A Yes, sir.

-	250
1	BY MR. BREW:
2	Q You talked a little bit with Mr. Rehwinkel
3	about what happened after Period 5, but I just wanted to
4	clarify that, too.
5	What we will call Period 6 is when you
6	installed the pressure plate beginning around April of
7	2017?
8	A Yes, sir. That's right.
9	Q And you finally removed that with the outage
10	that occurred fourth quarter of last year?
L1	A Correct.
L2	Q And so during that entire time, your max
13	generation was confined to about 380 megawatts from the
14	steam turbine?
.5	A That's accurate.
L 6	Q Okay. And did you experience any ancillary
17	damage from the use of the pressure plate?
18	A We did experience some damage. Nothing to the
19	steam turbine itself, or the steam the centerline
20	turbine components. What we found during a routine
21	inspection, we didn't shut down in a forced manner for
22	this, but during a routine inspection, we found that
23	some, like, ladders, some supports for different things
24	inside the casing of the low pressure turbine had been

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	252
1	Q And it's too early to tell whether that is
2	has any results to speak of, or are you operating at 450
3	or 420?
4	A There are some results so far, and this is
5	somewhat of a understand why we haven't run it there
6	yet, during that same fall outage where we installed the
7	blades, we also did maintenance on the combustion
8	turbines. Two of the combustion turbines were at their
9	major maintenance interval and two of the combustion
10	turbines generators were at their major maintenance
11	interval. During testing of one of those generators, we
12	experienced a generator failure that we had to rewind
13	the stator, which is the bars that go around the
14	rotating part of the generator. We just finished that
15	project about two weeks ago, so we didn't have the
16	capability to run it 4-on-1 configuration until about
17	two weeks ago.
18	We didn't immediately go to 4-on-1. In fact,
19	we still haven't gone to 4-on-1. We wanted to
20	coordinate with Mitsubishi. We have this permanently
21	installed blade vibration monitoring system. When we
22	first operated with the steam turbine in December, we
23	did a lot of testing with Mitsubishi, and we operated in
24	a lot of different combinations, 1-on-1, 2-on-1, 3-on-1,
25	duct burners, no duct burners, made sure we were looking
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		FIDE
1	at the response, or lack thereof, on the blade vibration	
2	monitor, and everything looked really good for up to	
3	3-on-1 operation with full duct burners.	
4	We will continue that testing protocol	
5	starting this coming Monday as a matter of fact.	
6	Mitsubishi will be on site and will be stepping through	
7	in 4-on-1 configuration.	
8	Q Okay. So you mentioned it earlier, but the	
9	blade vibration monitoring system has now been made	
10	permanent?	
11	A Correct.	
12	Q And to this date, you haven't gone back up to	
13	full power operation?	
14	A Correct.	
15	MR. BREW: Thank you. That's all I have.	
16	THE COURT: Still nothing?	
17	MS. BROWNLESS: I will pass these out.	
18	THE COURT: Oh, okay.	
19	MR. BERNIER: I am sorry, James, did you want	
20	to mark this?	
21	MR. BREW: That was marked for identification	
22	as I believe 113.	
23	THE COURT: It's already been marked?	
24	MR. BERNIER: Yes.	
25	THE COURT: Are we talking about the	

255 A Could I ask which page you are referring to 1 2 just so I make sure I verify? That does sound correct, 3 I just want to verify the type of combustion. 4 Q If you look at the very last page, it says 5 M501F cast turbine. A Yes, that's correct. I see it. 6 7 And the original Tenaska configuration was to Q 8 produce gross steam turbine output of 420 megawatts, is 9 that correct? 10 A That's correct. 11 Q The type of steam turbine that you have 12 connected that's 401 is also a 501F type CT, right? 13 A The four combustion turbines, yes, they are 14 also 501 technology. 15 Q Okay. And I am curious as to why you were 16 willing to accept -- well, let me refer you to Exhibit 17 110. If I look on page -- let me -- it's Bates page 18 12432, and the page 3-2-1; do you see it, sir? 19 A I do. 20 0 It's under 3.2, guaranteed performance and 21 other guarantees of acceptance tests? 22 А I see that. 23 Q Okay. It indicates here under the liquidated 24 damage performance guarantees that the MPS net steam 25 turbine maximum electrical output would be 420.07

₩	
1	one-pager?
2	MR. BREW: The one-pager was marked as 113.
3	The other one was actually marked as 112.
4	THE COURT: Okay.
5	EXAMINATION
6	BY MS. BROWNLESS:
7	Q Good afternoon.
8	A Good afternoon.
9	Q It's been a long day.
10	I want to start by asking some pretty basic
11	questions. The original
12	MR. REHWINKEL: Is your mic on? I think there
13	is look underneath, there as button.
14	MS. BROWNLESS: It's green.
15	THE COURT: You need to really lean into it
16	maybe.
17	MS. BROWNLESS: Oh, thank you, Judge.
18	MR. REHWINKEL: Okay. I just couldn't hear
19	you down there.
20	BY MS. BROWNLESS:
21	Q The original Tenaska contract, an excerpt of
22	which I provided as Exhibit 111.
23	A Okay.
24	Q The original Tenaska plan was to connect three
25	M501F CTs to the steam turbine, is that correct?
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1	megawatts, is that correct?
2	A Yes, it is.
3	Q And so I guess I am curious why the 3-on-1
4	configuration with F type combustion turbines would
5	produce 420 and Mitsubishi is saying that your 4-on-1
6	configuration would also produce 420.07?
7	A Well, I don't know the specifics about the
8	Tenaska 3-on-1 that was originally considered or
9	contemplated for that contract. It could have had it
10	may not have had duct burners installed, which makes a
11	very significant difference whether they have duct
12	burners installed or not. That's one variable that
13	could be different. But I just not knowing the
14	specifics of that Tenaska contract, I don't know that I
15	can explain that contract.
16	Q Okay. Well, I guess if there were duct
17	burners on the Tenaska contract, then that would make it
18	comparable to your contract where there were duct
19	burners, correct?
20	A It would, yes.
21	Q Okay. And if there were no duct burners,
22	wouldn't that result in potentially a lower megawatt
23	maximum electrical output?
24	A Well, the maximum electrical output really
25	goes back to the generator, the electrical generator.
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	257		258
1	And so the generator is the same for the Tenaska		different characteristics, probably pretty close to the
2	project, we bought that generator for the Progress	2	same, but every time they make a new model, much like a
3	Energy project. And at a power factor of .90, as we	3	car, a Honda Accord in 2002, when this machine was
4	looked at in the generator capability curve, the maximum	4	built, is still different than the Honda Accord in 2009.
5	electrical output is 420 megawatts, approximately.	5	There has been many generations. It's still a Honda
6	Actually the generator performance curve shows 421.2	6	Accord, it's still the same type of machine so I just
7	megawatts.	7	don't know.
8	Q And I guess what you are saying is that there	8	Q So your testimony is that the details between
9	could be other well, let me make sure I understand	9	those two units could be different and, therefore
10	what you are saying.	10	A Yes, ma'am, that's correct.
11	You are telling me that the generator that's	11	Q they wouldn't be exactly comparable?
12	connected to your system is the same as the generator	12	Okay. In 2009, Mitsubishi was aware that you
13	which was going to be connected to the Tenaska system?	13	were going to run this in a 4-on-1 configuration,
14	A Correct.	14	correct?
15	Q So that's identical, and that you have the	15	A Yes.
16	same type of combustion turbine, F?	16	Q Did Mitsubishi provide operating parameters,
17	A Well, I don't know. They are F, 501F	17	pressure temperature, steam volume for each of the three
18	machines, but there has been multiple generations of	18	sections of the combustion turbines? Did you get those
19	501F machines in the industry. F I don't know	19	parameters for the high pressure section?
20	specifically what we have at Bartow, but they go by FD1, $% \left( {{\left( {{{\left( {{{\left( {{{}_{{\rm{T}}}}} \right)}} \right)}_{{\rm{T}}}}} \right)} \right)$	20	A We did. The parameters for the steam turbine
21	FD2, FD3, each subsequent generation has some improved	21	are typically provided for the high pressure section and
22	capabilities.	22	not for the entire turbine.
23	I don't know exactly what model the Tenaska	23	Q And you had you were given a parameter,
24	501F was compared to the Bartow 501F. They may have	24	were you given a measuring device to measure that
25	been different models of combustion turbine with	25	parameter?
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1	what steam was being emitted to the low pressure
2	turbine.
3	Q And I guess I want to understand this.
4	Initially in June of 2009, were you given a number for
5	the IP exhaust pressure?
6	A No.
7	Q No number?
8	A Correct.
9	Q Did you have a measuring device at the IP
10	exhaust?
11	A I believe we did, yes.
12	Q Okay. But you were not given a pounds per
13	square inch or
14	A It would have been a pounds per square inch
15	gauge, but not an operating parameter for that
16	measurement.
17	Q Okay. And can you show me where that was,
18	please?
19	A So the this the exhaust of the
20	intermediate pressure turbine is shown in this pipe
21	right here, and then the steam would flow up and over
22	and into the middle of the low pressure turbine.
23	Q So where was the exhaust low pressure
24	intermediate pressure exhaust gauge?
25	A It would be somewhere in this vicinity. I
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6 machine. And so the operating limits are really the HP, 7 the high pressure steam is the limit. 8 Okay. Were you given specific operating Q 9 parameters for the low pressure section of the turbine? 10 We were given specific parameters that applied A 11 to the exhaust of the low pressure turbine, which is into the condenser, which is very important. You have 12 13 to know the energy of the steam at the inlet and the 14 energy of the steam at the exhaust of the whole system 15 helps you determine flows and the energy of the product, 16 the substance. 17 So the intermediate turbine exhaust pressure 0 18 was used as a proxy for the low pressure section inlet 19 pressure, is that correct? 20 А Only after the -- it is correct, but that 21 wasn't an operating parameter provided in 2009, but in 22 2012. After we discovered damage in the spring outage, 23 that's when Mitsubishi lowered -- made a recommendation 24 that we don't exceed 118 pounds in the exhaust of the 25 intermediate pressure turbine to be used as a proxy of

Okay. And did you have parameters and

We had measure -- some measuring devices, but

measuring devices for the intermediate pressure section?

the parameters -- remember the HP/IP turbine is one

1

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Q

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Yes.

	261	ONF			262
1	don't know exactly where, and this obviously isn't to		1		So they would give us like, let's use an
2	scale, but it would be close to the right at the		2	exan	mple. It was 118 pounds here on the start of Period
3	outlet of the IP turbine.		3	2.	That may have meant they didn't want to exceed
4	Q Would it be before the inlet where steam from		4		pounds here. I am just making that number up. I
5	the HRSG would enter the system?				't know. But when they used this as a proxy, they
6	-		6		
7					k into account the pressure drop possible through
	would be. So there is also some low pressure steam				t pipe.
8	called admission steam that's coming through this line		8		Q Okay. When you installed a low pressure
9	right here from the low pressure drum on the HRSGs, and		ġ	2	ge, where did you put it?
10	that comes into this line right here. So I believe it		10		A Again, I don't know specifically, but it would
11	is before, yes.		11	be i	in this vicinity right here.
12	Q Okay. And would it also take into account any		12		Q Once you installed that low pressure gauge,
13	steam that was being recycled from the high pressure to		13	did	you make any comparisons between the pressure
14	the intermediate pressure, from the intermediate		14	reco	orded at the IP exhaust and the pressure recorded at
15	pressure to the		15	the	low pressure inlet?
16	A That would be the most of the steam would		16		A I don't know. I suspect our engineers did
17	be coming from that direction, yes.		17	that	t comparison. It would make perfect sense, but I
18	Q Okay. Is it possible that the pressure		18	just	t I am not aware of that.
19	measured at the IP exhaust could deviate from the		19		Q So you don't know how reliable the low
20	pressure measured at the low pressure inlet?		20	pres	ssure exhaust
21	A I think it's possible. It's unlikely that it		21		A The intermediate pressure?
22	would be a lot different. The pressure dropped through		22		Q intermediate pressure exhaust readings were
23	this pipe isn't very much, and I do believe Mitsubishi		23	comp	pared to the actual?
24	made calculations taking into account potential pressure		24		A I am pretty confident that had they been
25	drop across that pipe.		25	had	we found an issue there, that that would have come
	5th Avenue, Tallahassee, FL 32303 Reporting (850) 894-0828 Reported by: Debbie Krick	n K		w. 5th Aver hier Reporti	enue, Tallahassee, FL 32303 premier-reporting.cc ting (850) 894-0828 Reported by: Debbie Kri
1	263	]			264
1	out during the root cause, during our analysis. And I	]	1		There would be tests where you would cycle off
2	out during the root cause, during our analysis. And I didn't hear there was nothing that indicated that		2	and	There would be tests where you would cycle off on to make sure that valves and dampers and
	out during the root cause, during our analysis. And I didn't hear there was nothing that indicated that once we put this pressure gauge here on the LP inlet,			and diff	There would be tests where you would cycle off on to make sure that valves and dampers and ferent pieces of equipment operate the way they are
2 3 4	out during the root cause, during our analysis. And I didn't hear there was nothing that indicated that once we put this pressure gauge here on the LP inlet, that it showed any inconsistencies with what we were		2	and diff supp	There would be tests where you would cycle off on to make sure that valves and dampers and ferent pieces of equipment operate the way they are posed to when you shut down and when you start up a
2 3 4 5	out during the root cause, during our analysis. And I didn't hear there was nothing that indicated that once we put this pressure gauge here on the LP inlet, that it showed any inconsistencies with what we were using at the IP exhaust.		2 3 4 5	and diff supp proc	There would be tests where you would cycle off on to make sure that valves and dampers and ferent pieces of equipment operate the way they are posed to when you shut down and when you start up a cess because those put more stress on equipment when
2 3 4	out during the root cause, during our analysis. And I didn't hear there was nothing that indicated that once we put this pressure gauge here on the LP inlet, that it showed any inconsistencies with what we were		2	and diff supp proc	There would be tests where you would cycle off on to make sure that valves and dampers and ferent pieces of equipment operate the way they are posed to when you shut down and when you start up a
2 3 4 5 6 7	out during the root cause, during our analysis. And I didn't hear there was nothing that indicated that once we put this pressure gauge here on the LP inlet, that it showed any inconsistencies with what we were using at the IP exhaust. Q Okay. Thank you. When you first purchased this unit, I assume		2 3 4 5 7 7	and diff supp proc you the	There would be tests where you would cycle off ton to make sure that valves and dampers and ferent pieces of equipment operate the way they are posed to when you shut down and when you start up a cess because those put more stress on equipment when
2 3 4 5 6 7 8	out during the root cause, during our analysis. And I didn't hear there was nothing that indicated that once we put this pressure gauge here on the LP inlet, that it showed any inconsistencies with what we were using at the IP exhaust. Q Okay. Thank you. When you first purchased this unit, I assume all the parts get sent to Bartow and you put them all		2 3 4 5 7 8	and diff supp proc you the	There would be tests where you would cycle off I on to make sure that valves and dampers and ferent pieces of equipment operate the way they are posed to when you shut down and when you start up a cess because those put more stress on equipment when I do startups and shutdowns. So those are all part of performance tests. Eventually, you would get to contractual
2 3 4 5 6 7 8 9	out during the root cause, during our analysis. And I didn't hear there was nothing that indicated that once we put this pressure gauge here on the LP inlet, that it showed any inconsistencies with what we were using at the IP exhaust. Q Okay. Thank you. When you first purchased this unit, I assume all the parts get sent to Bartow and you put them all together, and that there is a period of testing for that		2 3 4 5 7 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	and diff supp proc you the test	There would be tests where you would cycle off I on to make sure that valves and dampers and ferent pieces of equipment operate the way they are posed to when you shut down and when you start up a cess because those put more stress on equipment when I do startups and shutdowns. So those are all part of performance tests. Eventually, you would get to contractual ting, just to make sure from the contract that we can
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1			266
	Q Okay. So I am going to turn to the very next	1	at this value. The LP admission steam temperature $% \left( {{{\left( {{{L}} \right)}}_{i}}_{i}} \right)$
2	page, 33, and ask about the figures that are on eight,	2	well, it doesn't say, but I am assuming it's that same
3	nine and 10 there, LP admission steam pressure, LP	3	line. So it's the admission line.
4	admission steam temperature, LP exhaust pressure.	4	Q Okay.
5	A Yes.	5	A And then the LP exhaust pressure, it says it's
6	Q These are in the contract, but if I understand	6	at LP casing outlet. So that's basically in the
7	your testimony previously, you had no way to measure any	7	condenser. The outlet at the low pressure turbine dumps
8	of that directly, is that correct?	8	down into the condenser. So there is a measurement of
9	A Well, these are different points, so let's	9	pressure in the condenser.
10	take one at a time, if we could.	10	Q Okay. And so were these parameters that you
11	No. 8, LP admission steam pressure, let me do	11	were adhering to throughout your operation in Period 1?
12	eight and nine together, and if I could, I would like to	12	A These aren't operating limits. These are from
13	approach the chart again.	13	a contractual standpoint in order to achieve the output
14	So LP admission steam pressure and LP	14	of, in this case it was 420 in case 48. It was 389
15	admission steam temperature, what this shows is a	15	in case 24. These are the measurements that were likely
16	certain value at No. 8 it says, at LP SV inlet. So	16	when you are achieving that 420 megawatts. It's not
17	that's the low pressure stop value inlet	17	thou shalt not exceed this temperature. Thou shalt not
18	Q Where is that?	18	
19	Q where is that? A and it's admission pressure.	19	exceed this pressure. This is the likely pressure at that production limit.
20	So remember, this is the LP admission line,	20	-
21	okay. This is not this is not the it's this. So	21	
	-		prior to purchase and you met these temperature and
22	the stop valve is right here. So there is	22	pressure limits, did, in fact, you produce the megawatts
23	instrumentation or there was at that time, and I have	23	that were anticipated?
24	no reason to doubt it's not still there. So the LP	24	A Well, again, I wouldn't call these limits.
25	admission steam pressure was at this point right here,	25	These are the predicted pressures and temperatures for
1	267 the heat cases that were used in the contract. It	1	268 A Not that I am aware of. No.
2	wasn't a limit that we had to stay below or stay above.	2	Q Okay. Basically, then what you are telling me
3			
4	It was the predicted outcome.	3	this says is if you have these conditions in eight, nine
5	*	3	
	It was the predicted outcome. So I am sorry, could you repeat the rest of that question?	3 4 5	and 10, we guarantee that the output will be
6	So I am sorry, could you repeat the rest of	4	and 10, we guarantee that the output will be
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7 8 9 10 11 12 13 14 15 16 17 18 19 20	So I am sorry, could you repeat the rest of that question? Q Here's what I am trying to figure out, you were A Oh, I think so did we achieve 420 megawatts? Q Yes. A Yes, we did achieve 420 megawatts, with some corrections. There is errors in every instrument, or potential errors in every instrument. And so just like everything else, any time you take a measurement in a complex environment like this, there is debate. There is discussion. I think when they first measured in fact, I think Mr. Rehwinkel pointed out a document earlier. When we first measured the performance test, I think we were achieving 402 megawatts. But then with some	4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	<pre>and 10, we guarantee that the output will be</pre>
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7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23	So I am sorry, could you repeat the rest of that question? <b>Q</b> Here's what I am trying to figure out, you were A Oh, I think so did we achieve 420 megawatts? <b>Q</b> Yes. A Yes, we did achieve 420 megawatts, with some corrections. There is errors in every instrument, or potential errors in every instrument. And so just like everything else, any time you take a measurement in a complex environment like this, there is debate. There is discussion. I think when they first measured in fact, I think Mr. Rehwinkel pointed out a document earlier. When we first measured the performance test, I think we were achieving 402 megawatts. But then with some corrections to get to what the data should have been that we calculated it would have been 420 megawatts. <b>Q</b> Were you ever given by Mitsubishi a in your	4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23	<ul> <li>and 10, we guarantee that the output will be <ul> <li>A At least 420 megawatts.</li> <li>A tleast 420 megawatts?</li> <li>A Yes.</li> <li>Q And in your testing, that, in fact, proved to be true?</li> <li>A Correct.</li> </ul> </li> <li>Q Okay. Now, can you tell me the difference between the numbers on the guaranteed performance and guaranteed acceptance test that we just discussed, and on the very next page, the liquidated damages guarantee?</li> <li>A If you give me just one moment to look at the difference. So the difference between one 12433 and 12434?</li> <li>Q Yes.</li> <li>A Oh, yes, ma'am. So page 12433 is heat balance case 24, which is 4-on-1 configuration with no duct firing. And page 12434 is heat balance case 48, which is 3-on-1 configuration with no duct. So those get different steam flows, pressures, temperatures that were</li> </ul>

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1	Q Did Duke personnel believe that knowing the	ONF	
2	manufacturer's parameters for the LP section of the		2
3	steam turbine was necessary for operating the unit at		3
4	420 before March of 2012?		4
5	A No, it did not.		5
6	Q And how did you go about establishing		6
7	parameters for the LP pressure before the planned		7
8	outage? Is that only parameter you had was the exhaust		8
9	pressure from the IP?		9
10	A Before the 2012 outage? Well, it was as a		10
11	result of the damage we found in 2012. That's when we		11
12	came up with the new limit measured at that IP exhaust,		12
13	and that was the best instrument that we had to use for		13
14	LP in that pressure.		14
15	Q And before that, you just didn't have any?		15
16	A Correct.		16
17	Q Okay. After the March 2014 outage, did DEF		17
18	personnel bring operating parameters for the LP part of		18
19	the steam turbine to the attention of DEF's management?		19
20	A After the spring of 2014 outage, there was		20
21	much discussion of those parameters, yes. That's when		21
22	we started operating with an avoidance zone in place,		22
23	the recommended avoidance zone from Mitsubishi, and so		23
24	that had a great deal of discussion.		24
25	$\ensuremath{\mathbb{Q}}$ $\ensuremath{}$ And so, again, you are measuring it at the IP		25
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271 A I am confident it was, but I don't have that 2 data available. I can't show you a document that shows 3 that we did that. 4 Do you know how many combustion turbines were Q operational during the preliminary testing period? 5 6 A Well, during the preliminary testing -- the 7 testing goes on for a long period of time, maybe even months, and with four combustion turbines being 8 9 installed, and so I don't have any personal knowledge of 10 that construction project. But having been involved 11 with other construction projects, the likelihood is that 12 as combustion turbines were finished, they were tested 13 while other combustion turbines still had work ongoing. 14 So it's a sequence of events, and then the 15 steam turbine comes on, and then you start testing in 16 combined cycle mode. So I just don't know exactly what time period each different piece of equipment was ready 17 18 for testing during that construction project. 19 0 And I guess what I am trying to ask is during 20 the preliminary testing period, was there ever a point 21 in time in which all four CTs and all four HRSGs with 22 all the bells and whistles were tested? 23 I don't know. I suspect there was, but I just А 24 don't know. 25 And do you have any information here today 0 114 W. 5th Avenue, Tallahassee, FL 32303 premier-reporting.com Reported by: Debbie Krick (850) 894-0828 Premier Reporting

## exhaust? 2 A No. The avoidance zone was a combination 3 of -- yes. I am sorry. Yes. That's one of the pressures --4 5 0 You are measuring -- that's --6 -- one of the pressures was measured there, Α 7 ves. 8 0 And at that time, you are not only bringing it 9 to the attention of your own management, you are 10 bringing it to the attention of Mitsubishi, correct? 11 Well, Mitsubishi is the one that calculated A 12 the avoidance zone and presented it to Duke Energy as a 1.3 recommendation. So it really worked the other way. 14 Mitsubishi said, in this combination of intermediate 15 pressure, turbine exhaust and condenser vacuum, in these 16 areas, avoid operating. 17 Q Okay. In Period 1, when you were increasing 18 the output of the unit, in your -- in the time that you 19 were testing the unit before you accepted it, was the 20 plant -- did you ever -- let me start over. When the Bartow Unit 4 combined cycle plant 21 22 was tested prior to its commercial operation in June of 23 2009, was the plant tested in a configuration that 24 reflected commercial operation of the unit in a maximum 25 total megawatt output scenario?

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1	what the megawatt output of that full-blown testing was?
2	A I don't.
3	Q Or what megawatt output of just the steam
4	turbine was?
5	A I don't.
6	Q Would that type of testing been used to
7	determine the 420-megawatt nameplate capacity of the
8	unit?
9	A No. The testing would be an agreement between
10	the EPC constructor, the owner of Progress Energy and
11	the various OEMs on which heat balance case to use, and
12	then replicate those conditions and see if those minimum
13	contractual numbers were met.
14	Q Got it.
15	Was your assumption in Period 1, your Period 1
16	operation, that if you stayed within the parameters
17	given to you by Mitsubishi, whatever those parameters
18	were, that any that the flow limits of the low
19	pressure section, turbine section, would be okay, that
20	it would take care of itself?
21	A Yes. That was the assumption.
22	Q Did your operating engineer at the time think
23	that he should know any flow limits for the low pressure
24	section or the inlet pressure for the LP turbine before
25	returning the plant to service in April of 2012?
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1	A When you say operating engineer.		constraints within the HRSG to make sure that we don't
2	Q The guy on the ground. The Mr. Wayne Tom's	2	go above certain pressures in each section; safety
3	equivalent?	3	valves, for instance; sky valves; vent valves that are
4	A Okay. Well, there was a lot of discussion	4	operated as part of startups and shutdowns that are
5	between Mitsubishi and Duke Energy during that outage	5	safeguards against over-pressurizing those lines. So I
6	between Periods 1 and 2. And the plant manager and the	6	just want you to understand, there are other safeguards
7	operating staff at Bartow were part of those	7	involved with that.
8	conversations when the 118-pound limit on the IP exhaust	8	Q In 2009, did Mitsubishi provide any
9	was recommended by Mitsubishi and we agreed to install	9	operational instructions for blending the steam produced
10	that as an operating limit at that point, and we did.	10	by the four CTs prior to introduction into the steam
11	So yes, there was discussion around that point.	11	turbine?
12	Q When we discussed where the gauges were	12	A I don't know if Mitsubishi provided blending
13	located before, does your one gauge that you had reflect	13	instructions, or if they were provided. They were more
14	any additional pressure that comes from the HRSGs?	14	likely provided by the EPC contractor of the project,
15	A The one gauge that we had being the IP exhaust	15	because the HRSGs were manufactured by a different
16	that we talked about?	16	equipment manufacturer, so the EPC more than likely gave
17	Q Yes.	17	those operating procedures.
18	A I don't know specifically. I suspect it did	18	Q Okay. In other words, the manufacturer of the
19	not. As we talked about, I think the gauge was likely	19	HRSGs themselves?
20	located between the IP turbine and the point where the	20	A Gave them to the consortium of Bibb and TIC
21	admission flow, the LP admission flow enters that line.	21	that I talked about and became Kiewit, and so it
22	Q And so that could have caused additional	22	probably would have come from Kiewit.
23	pressure that wouldn't have been reflected?	23	Q Okay. In 2009, did Mitsubishi provide any
24	A It could have. Now, there are and I don't	24	operating instructions for blending the steam produced
25	know the operating pressures, but there are mechanical	25	by each HRSG with the steam removed from each of the
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1	steam turbine sections?
2	A When you say steam removed from each of the
3	steam turbine sections?
4	Q Recycled to each of the because you had
5	exhaust steam from the high pressure that goes into the
6	intermediate pressure, that then goes into were there
7	any type of blending instructions for that?
8	A Well, again, any instructions like that likely
9	would have come from the Kiewit the EPC.
10	Could I approach the chart again?
11	THE COURT: Sure.
12	THE WITNESS: This is a point that I think you
13	need to understand.
14	The exhaust of the high pressure turbine
15	let me get the exact line here. So here is the
16	inlet steam to the high pressure turbine. It goes
17	through the high pressure turbine in this
18	direction, exits here, and now it's called cold
19	reheat steam. We need to reheat it, get the
20	temperature back up and increase the energy in that
21	steam.
22	So it's sent back to the HRSG and it's
23	reheated. It's made into intermediate pressure
24	steam, which is then comes down in that
25	admission line we talked about before.
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1 So again, you are -- we are mixing up the HRSG 2 with the steam turbine operation, so any procedures 3 having to do with blending steam in and out of 4 different sections would be --BY MS. BROWNLESS: 5 6 Q Between those sections would have to he come from the HRSG? 7 8 A Right. So the EPC, the Kiewit entity would be 9 taking input from the HRSG manufacturer and the steam 10 turbine manufacturer to provide those type of 11 procedures. 12 Okay. In 2009, was there an exhaust system in Q 13 place with pressure if the low pressure area rose above 14 a certain level? 15 A Yes. 16 Q And can you show me where that is? 17 Would you ask that again? If pressure -- I am А 18 sorrv. 19 0 Was there an exhaust system in place if 20 pressure in the low pressure area rose above a certain 21 level? 22 A Well, there is multiple points where there is 23 protection. There is protection -- you can't really see 24 it on here, but there are rupture diaphragms. They are 25 just a thin piece of material much like a porthole on a 114 W. 5th Avenue, Tallahassee, FL 32303 Premier Reporting (850) 894-0828

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1	ship or a submarine, but manufactured so that when	1	to 420 megawatts. We certainly were far away from the	
2	they they will burst and relieve pressure or relieve	2	generator's capability of 468 megawatts, and so we	
3	vacuum. You might really want to relieve vacuum and let	3	started discussions with Mitsubishi on what, if	
4	air come in. But there are rupture discs around the	4	anything, could be done to rectify that.	
5	casing of the low pressure turbine. There are safety	5	Q Okay. And who made that request? Y'all made	
6	values on the low pressure turbine on the admission $% \left( {{{\left( {{{{\left( {{{c}} \right)}}} \right)}}} \right)$	6	it to them? Who made it?	
7	steam line. And there are	7	A Yes. I don't know specifically who, but Duke	
8	Q On the HRSG?	8	Energy made that request to Mitsubishi.	
9	A Yes. And there are things called sky valves	9	Q And why did you decide that you wanted to ramp	
0	which are automatically operated valves that the	10	it up to 450 at that time?	
.1	operator controls to raise or lower pressure as needed	11	A We felt that there was capability in that	
.2	to make sure that the pressures are suitable for	12	4-on-1 power block at Bartow that we weren't able to use	
13	admission into the system.	13	that we should be able to use specifically with the	
14	Q Okay. If I look at what's Exhibit 80, which	14	generator. We knew we could generate steam flow.	
15	is the chart, the Table A, do you have that?	15	Think about this for a minute, in case 48,	
L 6	A Exhibit 80?	16	heat balance 48 is three HRSGs three combustion	
7	Q It's Table A.	17	turbines, three HRSGs, duct firing in the HRSG on the	
8	A Oh, Table A. I am sorry. Yes, I have that	18	steam turbine and we achieved a corrected value of 420	
9	right in front of me.	19	point something megawatts in order for the contractual	
0	Q Okay. When was the request made of Mitsubishi	20	minimum to be met.	
21	to figure out a way to increase the megawatt output of	21	At that time, everybody involved with the	
2	the Bartow steam turbine to 450 megawatts?	22	project knew there is more steam flow available. We	
23	A That request was made during Period 2, when it	23	weren't even using one of the combustion turbines and	
	became apparent with the 118-pound limit we had placed	24	HRSGs. So we have this expensive power block that we	
4	became apparente with the fits pound fimite we had placed		incost of we have entry enpendice power stock ende we	
5	on the IP turbine exhaust would not allow us to even get . Sth Avenue, Tallahassee, FL 32303 er Reporting (850) 894-0828 Reported by: Debbie		know that there is more capability. 5th Avenue, Tallahassee, FL 32303 r Reporting (850) 894-0828 Reported by: Debbie K	
25 4 W	/. 5th Avenue, Tallahassee, FL 32303 premier-reporting	114 W	. 5th Avenue, Tallahassee, FL 32303 premier-reporting.	
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5 W mie	7. 5th Avenue, Tallahassee, FL 32303 (850) 894-0828 premier-reporting er Reporting 279 I know it's expensive replacing rows of	114 W Premie	5th Avenue, Tallahassee, FL 32303 r Reporting (850) 894-0828 reported by: Debbie K 280 was nothing different between when you started out in	
W	7. Sth Avenue, Tallahassee, FL 32303 er Reporting       (850) 894-0828     premier-reporting Reported by: Debbie       279       I know it's expensive replacing rows of blades, but when you think about a several-hundred-	114 W Premie	5th Avenue, Tallahassee, FL 32303 r Reporting (850) 894-0828 reported by: Debbie K 280 reported	
5 wmie 1 2 3 4	1. 5th Avenue, Tallahassee, FL 32303 er Reporting (850) 894-0828 Reported by: Debbie 279 I know it's expensive replacing rows of blades, but when you think about a several-hundred- million-dollar project or power block being held up by	114 W Premie 1 2 3	5th Avenue, Tallahassee, FL 32303 r Reporting (850) 894-0828 reported by: Debbie K 280 was nothing different between when you started out in Period 1 and you made this request to increase the nameplate capacity by another 30 megawatts?	
5 mie 1 2 3 4 5	7. 5th Avenue, Tallahassee, FL 32303 er Reporting (850) 894-0828 Reported by: Debbie 279 I know it's expensive replacing rows of blades, but when you think about a several-hundred- million-dollar project or power block being held up by perhaps the \$3 million row of blades, if there is a way	114 W Premie 1 2 3 4	.5th Avenue, Tallahassee, FL 32303       premier-reporting.         (850) 894-0828       Reported by: Debbie K         280         was nothing different between when you started out in         Period 1 and you made this request to increase the         nameplate capacity by another 30 megawatts?         A       That's correct. It was the same set of	
5 mie 1 2 3 4 5 6	279 I know it's expensive replacing rows of blades, but when you think about a several-hundred- million-dollar project or power block being held up by perhaps the \$3 million row of blades, if there is a way to get all of the output all the capability out of	114 W Premie 1 2 3 4 5	.5th Avenue, Tallahassee, FL 32303       premier-reporting.         (850) 894-0828       Reported by: Debbie K         280         was nothing different between when you started out in         Period 1 and you made this request to increase the         nameplate capacity by another 30 megawatts?         A         That's correct. It was the same set of         equipment with just a different operating parameter.	
5 1 Wemie 1 2 3 4 5 6 7	A Sth Avenue, Tallahassee, FL 32303 er Reporting (850) 894-0828 Reported by: Debbie 279 I know it's expensive replacing rows of blades, but when you think about a several-hundred- million-dollar project or power block being held up by perhaps the \$3 million row of blades, if there is a way to get all of the output all the capability out of the power block, then that's the prudent thing to do to	114 W Premie 1 2 3 4 5 6	.5th Avenue, Tallahassee, FL 32303 r Reporting       (850) 894-0828       premier-reporting. Reported by: Debbie K         280         was nothing different between when you started out in         Period 1 and you made this request to increase the         nameplate capacity by another 30 megawatts?         A       That's correct. It was the same set of         equipment with just a different operating parameter.         Q       Right. And the operating parameters had to do	
5 4 Wemie 1 2 3 4 5 6 7 8	279 I know it's expensive replacing rows of blades, but when you think about a several-hundred- million-dollar project or power block being held up by perhaps the \$3 million row of blades, if there is a way to get all of the output all the capability out of the power block, then that's the prudent thing to do to make sure we can operate as efficiently as possible and	114 W Premie 1 2 3 4 5 6 7	.5th Avenue, Tallahassee, FL 32303       premier-reporting.         (850) 894-0828       Reported by: Debble K         280         was nothing different between when you started out in         Period 1 and you made this request to increase the         nameplate capacity by another 30 megawatts?         A         That's correct. It was the same set of         equipment with just a different operating parameter.         Q       Right. And the operating parameters had to do         with the amount of steam that you were putting through	
5 <b>1</b> Wemie 1 2 3 4 5 6 7 8 9	279 I know it's expensive replacing rows of blades, but when you think about a several-hundred- million-dollar project or power block being held up by perhaps the \$3 million row of blades, if there is a way to get all of the output all the capability out of the power block, then that's the prudent thing to do to make sure we can operate as efficiently as possible and as much output as possible for our customers.	114 W Premie 1 2 3 4 5 6 7 8	.5th Avenue, Tallahassee, FL 32303       premier-reporting.         (850) 894-0828       Reported by: Debble K         200         was nothing different between when you started out in         Period 1 and you made this request to increase the         nameplate capacity by another 30 megawatts?         A         That's correct. It was the same set of         equipment with just a different operating parameters.         Q       Right. And the operating parameters had to do         with the amount of steam that you were putting through         the system?	
5 WW nie	A shi Avenue, Tallahassee, FL 32303 (850) 894-0828 Reporting Reported by: Debbie 279 I know it's expensive replacing rows of blades, but when you think about a several-hundred-million-dollar project or power block being held up by perhaps the \$3 million row of blades, if there is a way to get all of the output all the capability out of the power block, then that's the prudent thing to do to make sure we can operate as efficiently as possible and as much output as possible for our customers. Q Wasn't the excess capability available when	114 W Premie 1 2 3 4 5 6 7 8 9	.5th Avenue, Tallahassee, FL 32303 r Reporting       (850) 894-0828       premier-reporting. Reported by: Debbie K         280         was nothing different between when you started out in         Period 1 and you made this request to increase the         nameplate capacity by another 30 megawatts?         A         That's correct. It was the same set of         equipment with just a different operating parameter.         Q       Right. And the operating parameters had to do         with the amount of steam that you were putting through         the system?         A       Ultimately, yes.	
5 Wernie 1 2 3 3 4 4 5 5 6 7 8 8 9 9 0	<pre>/. 5th Avenue, Tallahassee, FL 32303</pre>	114 W Premie 1 2 3 4 5 6 7 8 9 10	.5th Avenue, Tallahassee, FL 32303 r Reporting       (850) 894-0828       premier-reporting. Reported by: Debbie K         200         was nothing different between when you started out in         Period 1 and you made this request to increase the         nameplate capacity by another 30 megawatts?         A         That's correct. It was the same set of         equipment with just a different operating parameter.         Q       Right. And the operating parameters had to do         with the amount of steam that you were putting through         the system?         A         Ultimately, yes.         Q       Okay. Because you would have expected that a	
5 Wernie 1 2 3 3 4 4 5 5 6 7 8 9 9 0 1 1 2	2. 5th Avenue, Tallahassee, FL 32303 er Reporting (850) 894-0828 279 I know it's expensive replacing rows of blades, but when you think about a several-hundred- million-dollar project or power block being held up by perhaps the \$3 million row of blades, if there is a way to get all of the output all the capability out of the power block, then that's the prudent thing to do to make sure we can operate as efficiently as possible and as much output as possible for our customers. Q Wasn't the excess capability available when you first accepted the unit? I guess what I am trying to understand is was there anything in the design	114 W Premie 1 2 3 4 5 6 7 8 9 10 11	Sth Avenue, Tallahassee, FL 32303       gremier-reporting.         (850) 894-0828       Reported by: Debble K         200         was nothing different between when you started out in         Period 1 and you made this request to increase the         nameplate capacity by another 30 megawatts?         A         That's correct. It was the same set of         equipment with just a different operating parameter.         Q       Right. And the operating parameters had to do         with the amount of steam that you were putting through         the system?         A       Ultimately, yes.         Q       Okay. Because you would have expected that a         4-on-1 configuration would give you a higher nameplate	
5 WWmie 1 2 3 4 5 6 7 8 8 9 9 0 1 1 2 3	A sh Avenue, Tallahassee, FL 32303 (850) 894-0828 Reporting Reporting 279 I know it's expensive replacing rows of blades, but when you think about a several-hundred-million-dollar project or power block being held up by perhaps the \$3 million row of blades, if there is a way to get all of the output all the capability out of the power block, then that's the prudent thing to do to make sure we can operate as efficiently as possible and as much output as possible for our customers. Q Wasn't the excess capability available when you first accepted the unit? I guess what I am trying to understand is was there anything in the design substantially different from the time you did the	114 W Premie 1 2 3 4 5 6 7 8 9 10 11 12	Sth Avenue, Tallahassee, FL 32303       premier-reporting.         (850) 894-0828       Reported by: Debble K         280         was nothing different between when you started out in         Period 1 and you made this request to increase the         nameplate capacity by another 30 megawatts?         A         That's correct. It was the same set of         equipment with just a different operating parameter.         Q       Right. And the operating parameters had to do         with the amount of steam that you were putting through         the system?         A       Ultimately, yes.         Q       Okay. Because you would have expected that a         4-on-1 configuration would give you a higher nameplate         capacity than a 3-on-1 configuration?	
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1		ONFIDENTIAL
1	A Yeah. So I don't know the specifics of why	1 pressures that we were given, and temperatures.
2	case heat balance case No. 28 and heat balance case	2 Q And this may be redundant, but again I just
3	No. 48 were selected between the consortium building the	3 want to make sure I understand.
4	project and Progress Energy. Probably it's because we	4 Do you agree that Mitsubishi concluded in its
5	wanted to test or make sure that where we would normally	5 September 22nd, 2017, analysis that excessive blade
6	operate the system runs efficiently at that normal	6 loading was the cause of the blade failure?
7	operation range.	7 A I don't agree with that. Could you show me
8	It wasn't a maximum operation. You typically	8 where that's the document that shows that?
9	don't run the Bartow combined cycle at maximum output.	9 MR. BREW: That's the rebuttal exhibit.
10	In fact, we can look at the data and there is many more	10 THE WITNESS: Actually, if we could look at
11	hours not at maximum output than there are at maximum	11 JS-4. It's attached to my testimony.
12	output.	12 MR. BERNIER: Judge, for what it's worth this
13	We are following the load of the system and	13 is getting into rebuttal.
14	making sure we have the most efficient economic low-cost	14 MS. BROWNLESS: Oh, I am sorry if it is.
15	units in service. Bartow is one of the more efficient	15 MR. BERNIER: That's okay.
16	units, but we have other units that are more efficient	16 MS. BROWNLESS: I will stop.
17	and lower cost than Bartow. So we typically don't	17 MR. BERNIER: We are pointing it out. I was
18	operate flat-out high highest load possible.	18 hearing it over here, and that's correct.
19	So I am speculating, but that's perhaps why it	19 MS. BROWNLESS: No problem. No problem.
20	was tested at those levels. But remember, the	20 And if you give me just a minute.
21	420 megawatts for heat balance case No. 48 was the	21 THE COURT: Just wait for the next question.
22	minimum that Mitsubishi had to achieve. It didn't mean	22 THE WITNESS: Okay.
23	that was a limit, or that was a maximum. We should be	23 MS. BROWNLESS: Can I have a minute, please?
24	and were pleased that we could get more than	24 THE COURT: Sure.
25	420 megawatts if we still adhered to the operating	25 MS. BROWNLESS: That's all I have, Your Honor.
114 W	5th Avenue, Tallahassee, FL 32303 premier-reporting.com	n 114 W. 5th Avenue, Tallahassee, FL 32303 premier-reporting.com
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1	Thank you.	1 five.
2	THE COURT: Okay. Mr. Swartz, to plug on, all	2 MR. BERNIER: We can take some time.
3	we have left is redirect.	3 THE COURT: Let's take a recess for about
4	MR. BERNIER: We do, and we need to consult	4 five.
5	real quick to see what we have for redirect, and it	5 (Brief recess.)
6	may be more than a half-hour set of questions, so	6 THE COURT: Okay, redirect.
7	maybe I don't know if we would want to do it in the	7 MR. BERNIER: Thank you, Judge. And I
8	morning.	8 appreciate that break. That was helpful. I think
9	THE COURT: I will leave that the will the	9 we were able to streamline this some.
10	group here. I mean, do we want to put off until	10 FURTHER EXAMINATION
11	tomorrow morning? I am just not sure I mean, I	11 BY MR. BERNIER:

tomorrow morning? I am just not sure I mean, I		11	BY MR. BERNIER:
want to make sure we finish this in two days. I		12	Q Mr. Swartz, you have been asked a good number
mean, is do we expect Mr. Polich to take as long		13	of questions today primarily by Mr. Rehwinkel, but by
as this did today?		14	others, about whether or not Mitsubishi in Period 1
MR. BERNIER: I can assure you I do not have		15	specifically ever provided any documentation to Duke
as much for Mr. Polich as we have had for		16	Energy stating it was okay to operate over
Mr. Swartz.		17	420 megawatts. Do you recall those questions?
THE COURT: Okay. I mean, I am happy to		18	A Yes.
recess if everybody wants to do that, but I was		19	Q Okay. Let me ask this in another way.
thinking if it's a half hour of questions, we may		20	Did Mitsubishi in Period 1 specifically ever
as well wrap it up and then start fresh in the		21	provide Duke Energy a document or any instructions
morning.		22	saying do not operate over 420 megawatts?
MR. REHWINKEL: Yeah, I think that would be a		23	A No.
good break.		24	MR. BERNIER: Okay. I think Mr. Hernandez has

THE COURT: We can take five. We can take

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1	MR. HERNANDEZ: I do.		1	A That's correct.
2	EXAMINATION		2	Q Okay. Did Mitsubishi participate in any of
3	BY MR. HERNANDEZ:		3	the inspections that you testified about that Duke
4	Q Mr. Swartz, let's stay with Period 1.		4	conducted as it was replacing blades?
5	During Period 1, did Duke operate the steam		5	A Yes, in fact, every one. Each iteration of
6	turbine at less than 420 megawatts?		6	installing different LO blades, Mitsubishi was the
7	A Yes, for considerable periods of time.		7	execution arm of that outage. We had Mitsubishi
8	Q Can you give us an approximate percentage of		8	personnel, engineers on site each time inspecting blades
9	the time that it operated under 420?		9	with us, inspecting the entire low pressure turbine.
10	A About half, I think. And how I achieve that		10	Q And I know that you testified that Duke found
11	is there is a part of Mr. Polich's testimony actually,		11	no irregularities, no abnormalities, no damage to the
12	Exhibit RAP-5, tabulates the number of hours that were		12	steam turbine components aside from the blades, but did
13	over 420 megawatts. So if you just look at that and		13	Mitsubishi find anything?
14	think about the number of operating hours in that		14	A Nothing was found. The rest of the low
15	period, which can be found on JS-1 on the Table A on		15	pressure turbine blading diaphragms was all good in each
16	page five and do the math, it's about half of the hours		16	one of those inspections.
17	were above and about half of the hours were below		17	Q During Period 1, was there any way for Duke to
18	420 megawatts.		18	know that it operated within the avoidance zone during
19	Q Okay. Thank you.		19	Period 1?
20	You spoke in your testimony about pounds per		20	A No. The avoidance zone wasn't actually
21	hour per square footage. Is that something that Duke		21	calculated until the beginning of Period 3, after we had
22	could have measured while operating the steam turbine?		22	done testing using the temporary blade vibration
23	A No. That's a calculated number.		23	monitoring system. And it was only at that time that
24	Q So that's not a operating parameter that Duke		24	Mitsubishi provided, or recommended avoidance zone.
25	could have followed while operating the steam turbine?		25	The only reason that Table A in the Exhibit
	Reporting (850) 894-0828 Reported by: Debbie Krick		Premier	r Reporting (850) 894-0828 Reported by: Debbie Krick
	287			288
1	267	]		288
1	JS-1 has hours in the avoidance zone and other periods	]	1	288 megawatts as designed. The long-term operation, 40
2	JS-1 has hours in the avoidance zone and other periods is because we back calculated that. If it had been in		1 2	288 megawatts as designed. The long-term operation, 40 years operation of any power plant, that's really the
2 3	287 JS-1 has hours in the avoidance zone and other periods is because we back calculated that. If it had been in existence, that's how many hours, but it didn't exist		1 2 3	288 megawatts as designed. The long-term operation, 40 years operation of any power plant, that's really the most important thing for the sake of the customer. So
2 3 4	JS-1 has hours in the avoidance zone and other periods is because we back calculated that. If it had been in existence, that's how many hours, but it didn't exist until the beginning of Period 3.		1 2 3 4	288 megawatts as designed. The long-term operation, 40 years operation of any power plant, that's really the most important thing for the sake of the customer. So that's why
2 3 4 5	287 JS-1 has hours in the avoidance zone and other periods is because we back calculated that. If it had been in existence, that's how many hours, but it didn't exist until the beginning of Period 3. Q Okay. I want to get some clarification on		1 2 3 4 5	288 megawatts as designed. The long-term operation, 40 years operation of any power plant, that's really the most important thing for the sake of the customer. So that's why Q I am sorry. I think you testified that there
2 3 4 5 6	<pre>287 JS-1 has hours in the avoidance zone and other periods is because we back calculated that. If it had been in existence, that's how many hours, but it didn't exist until the beginning of Period 3.</pre>		1 2 3 4	288 megawatts as designed. The long-term operation, 40 years operation of any power plant, that's really the most important thing for the sake of the customer. So that's why Q I am sorry. I think you testified that there were approximately 300 heat balance predictions. During
2 3 4 5 6 7	JS-1 has hours in the avoidance zone and other periods is because we back calculated that. If it had been in existence, that's how many hours, but it didn't exist until the beginning of Period 3. Q Okay. I want to get some clarification on heat balance testing. Is that something that is actually you use the term testing, but is that		1 2 3 4 5 6 7	288 megawatts as designed. The long-term operation, 40 years operation of any power plant, that's really the most important thing for the sake of the customer. So that's why Q I am sorry. I think you testified that there were approximately 300 heat balance predictions. During the course of actual testing of the steam turbine, not
2 3 4 5 6 7 8	<pre>287 JS-1 has hours in the avoidance zone and other periods is because we back calculated that. If it had been in existence, that's how many hours, but it didn't exist until the beginning of Period 3. Q Okay. I want to get some clarification on heat balance testing. Is that something that is actually you use the term testing, but is that testing actually performed when the steam turbine is a</pre>		1 2 3 4 5 6 7 8	288 megawatts as designed. The long-term operation, 40 years operation of any power plant, that's really the most important thing for the sake of the customer. So that's why Q I am sorry. I think you testified that there were approximately 300 heat balance predictions. During the course of actual testing of the steam turbine, not all of those prediction models were tested, correct?
2 3 4 5 6 7	JS-1 has hours in the avoidance zone and other periods is because we back calculated that. If it had been in existence, that's how many hours, but it didn't exist until the beginning of Period 3. Q Okay. I want to get some clarification on heat balance testing. Is that something that is actually you use the term testing, but is that		1 2 3 4 5 6 7	288 megawatts as designed. The long-term operation, 40 years operation of any power plant, that's really the most important thing for the sake of the customer. So that's why Q I am sorry. I think you testified that there were approximately 300 heat balance predictions. During the course of actual testing of the steam turbine, not
2 3 4 5 6 7 8 9 10	JS-1 has hours in the avoidance zone and other periods is because we back calculated that. If it had been in existence, that's how many hours, but it didn't exist until the beginning of Period 3. Q Okay. I want to get some clarification on heat balance testing. Is that something that is actually you use the term testing, but is that testing actually performed when the steam turbine is a attached to the generator? A No. The heat balance cases are actually		1 2 3 4 5 6 7 8 9	<pre>288 megawatts as designed. The long-term operation, 40 years operation of any power plant, that's really the most important thing for the sake of the customer. So that's why</pre>
2 3 4 5 6 7 8 9 10 11	JS-1 has hours in the avoidance zone and other periods is because we back calculated that. If it had been in existence, that's how many hours, but it didn't exist until the beginning of Period 3. Q Okay. I want to get some clarification on heat balance testing. Is that something that is actually you use the term testing, but is that testing actually performed when the steam turbine is a attached to the generator? A No. The heat balance cases are actually generated in this case, they were generated years		1 2 3 4 5 6 7 8 9 10 11	288 megawatts as designed. The long-term operation, 40 years operation of any power plant, that's really the most important thing for the sake of the customer. So that's why Q I am sorry. I think you testified that there were approximately 300 heat balance predictions. During the course of actual testing of the steam turbine, not all of those prediction models were tested, correct? A That's correct. There were over 300 heat balance cases that were generated years before construction, and then two were included in the contract
2 3 4 5 6 7 8 9 10 11 12	<pre>287 JS-1 has hours in the avoidance zone and other periods is because we back calculated that. If it had been in existence, that's how many hours, but it didn't exist until the beginning of Period 3. Q Okay. I want to get some clarification on heat balance testing. Is that something that is actually you use the term testing, but is that testing actually performed when the steam turbine is a attached to the generator? A No. The heat balance cases are actually generated in this case, they were generated years prior to construction of the power block. And they are</pre>		1 2 3 4 5 6 7 8 9 10 11 12	208 megawatts as designed. The long-term operation, 40 years operation of any power plant, that's really the most important thing for the sake of the customer. So that's why Q I am sorry. I think you testified that there were approximately 300 heat balance predictions. During the course of actual testing of the steam turbine, not all of those prediction models were tested, correct? A That's correct. There were over 300 heat balance cases that were generated years before construction, and then two were included in the contract for liquidated damages purposes.
2 3 4 5 6 7 8 9 10 11	<pre>287 JS-1 has hours in the avoidance zone and other periods is because we back calculated that. If it had been in existence, that's how many hours, but it didn't exist until the beginning of Period 3. Q Okay. I want to get some clarification on heat balance testing. Is that something that is actually you use the term testing, but is that testing actually performed when the steam turbine is a attached to the generator? A No. The heat balance cases are actually generated in this case, they were generated years prior to construction of the power block. And they are engineering predictions of output and other variables</pre>		1 2 3 4 5 6 7 8 9 10 11	288 megawatts as designed. The long-term operation, 40 years operation of any power plant, that's really the most important thing for the sake of the customer. So that's why Q I am sorry. I think you testified that there were approximately 300 heat balance predictions. During the course of actual testing of the steam turbine, not all of those prediction models were tested, correct? A That's correct. There were over 300 heat balance cases that were generated years before construction, and then two were included in the contract for liquidated damages purposes. Q And there were some questions regarding the
2 3 4 5 6 7 8 9 10 11 12 13	JS-1 has hours in the avoidance zone and other periods is because we back calculated that. If it had been in existence, that's how many hours, but it didn't exist until the beginning of Period 3. Q Okay. I want to get some clarification on heat balance testing. Is that something that is actually you use the term testing, but is that testing actually performed when the steam turbine is a attached to the generator? A No. The heat balance cases are actually generated in this case, they were generated years prior to construction of the power block. And they are engineering predictions of output and other variables based on different combinations of equipment and		1 2 3 4 5 6 7 8 9 10 11 12 13	<pre>288 megawatts as designed. The long-term operation, 40 years operation of any power plant, that's really the most important thing for the sake of the customer. So that's why Q I am sorry. I think you testified that there were approximately 300 heat balance predictions. During the course of actual testing of the steam turbine, not all of those prediction models were tested, correct? A That's correct. There were over 300 heat balance cases that were generated years before construction, and then two were included in the contract for liquidated damages purposes. Q And there were some questions regarding the settlement agreement, and the fact that within the</pre>
2 3 4 5 6 7 8 9 10 11 12 13 14	<pre>287 JS-1 has hours in the avoidance zone and other periods is because we back calculated that. If it had been in existence, that's how many hours, but it didn't exist until the beginning of Period 3. Q Okay. I want to get some clarification on heat balance testing. Is that something that is actually you use the term testing, but is that testing actually performed when the steam turbine is a attached to the generator? A No. The heat balance cases are actually generated in this case, they were generated years prior to construction of the power block. And they are engineering predictions of output and other variables based on different combinations of equipment and operating parameters that may be in place when you get</pre>		1 2 3 4 5 6 7 8 9 10 11 12 13 14	208 megawatts as designed. The long-term operation, 40 years operation of any power plant, that's really the most important thing for the sake of the customer. So that's why Q I am sorry. I think you testified that there were approximately 300 heat balance predictions. During the course of actual testing of the steam turbine, not all of those prediction models were tested, correct? A That's correct. There were over 300 heat balance cases that were generated years before construction, and then two were included in the contract for liquidated damages purposes. Q And there were some questions regarding the settlement agreement, and the fact that within the settlement agreement there was language indicating that
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	287 JS-1 has hours in the avoidance zone and other periods is because we back calculated that. If it had been in existence, that's how many hours, but it didn't exist until the beginning of Period 3. Q Okay. I want to get some clarification on heat balance testing. Is that something that is actually you use the term testing, but is that testing actually performed when the steam turbine is a attached to the generator? A No. The heat balance cases are actually generated in this case, they were generated years prior to construction of the power block. And they are engineering predictions of output and other variables based on different combinations of equipment and operating parameters that may be in place when you get to operation. So it's all theoretical.		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	288 megawatts as designed. The long-term operation, 40 years operation of any power plant, that's really the most important thing for the sake of the customer. So that's why Q I am sorry. I think you testified that there were approximately 300 heat balance predictions. During the course of actual testing of the steam turbine, not all of those prediction models were tested, correct? A That's correct. There were over 300 heat balance cases that were generated years before construction, and then two were included in the contract for liquidated damages purposes. Q And there were some questions regarding the settlement agreement, and the fact that within the settlement agreement there was language indicating that the parties negotiated an increase of megawattage from
2 3 4 5 6 7 8 9 10 11 12 13 14 15	<pre>287 JS-1 has hours in the avoidance zone and other periods is because we back calculated that. If it had been in existence, that's how many hours, but it didn't exist until the beginning of Period 3. Q Okay. I want to get some clarification on heat balance testing. Is that something that is actually you use the term testing, but is that testing actually performed when the steam turbine is a attached to the generator? A No. The heat balance cases are actually generated in this case, they were generated years prior to construction of the power block. And they are engineering predictions of output and other variables based on different combinations of equipment and operating parameters that may be in place when you get</pre>		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	208 megawatts as designed. The long-term operation, 40 years operation of any power plant, that's really the most important thing for the sake of the customer. So that's why Q I am sorry. I think you testified that there were approximately 300 heat balance predictions. During the course of actual testing of the steam turbine, not all of those prediction models were tested, correct? A That's correct. There were over 300 heat balance cases that were generated years before construction, and then two were included in the contract for liquidated damages purposes. Q And there were some questions regarding the settlement agreement, and the fact that within the settlement agreement there was language indicating that
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17	JS-1 has hours in the avoidance zone and other periods is because we back calculated that. If it had been in existence, that's how many hours, but it didn't exist until the beginning of Period 3. Q Okay. I want to get some clarification on heat balance testing. Is that something that is actually you use the term testing, but is that testing actually performed when the steam turbine is a attached to the generator? A No. The heat balance cases are actually generated in this case, they were generated years prior to construction of the power block. And they are engineering predictions of output and other variables based on different combinations of equipment and operating parameters that may be in place when you get to operation. So it's all theoretical. Q So when actual testing was performed after the steam turbine was actually installed, part of the		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	288 megawatts as designed. The long-term operation, 40 years operation of any power plant, that's really the most important thing for the sake of the customer. So that's why: Q I am sorry. I think you testified that there were approximately 300 heat balance predictions. During the course of actual testing of the steam turbine, not all of those prediction models were tested, correct? A That's correct. There were over 300 heat balance cases that were generated years before construction, and then two were included in the contract for liquidated damages purposes. Q And there were some questions regarding the settlement agreement, and the fact that within the settlement agreement there was language indicating that the parties negotiated an increase of megawattage from 420 to 450.
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	257 JS-1 has hours in the avoidance zone and other periods is because we back calculated that. If it had been in existence, that's how many hours, but it didn't exist until the beginning of Period 3. Q Okay. I want to get some clarification on heat balance testing. Is that something that is actually you use the term testing, but is that testing actually performed when the steam turbine is a attached to the generator? A No. The heat balance cases are actually generated in this case, they were generated years prior to construction of the power block. And they are engineering predictions of output and other variables based on different combinations of equipment and operating parameters that may be in place when you get to operation. So it's all theoretical.		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17	288 megawatts as designed. The long-term operation, 40 years operation of any power plant, that's really the most important thing for the sake of the customer. So that's why Q I am sorry. I think you testified that there were approximately 300 heat balance predictions. During the course of actual testing of the steam turbine, not all of those prediction models were tested, correct? A That's correct. There were over 300 heat balance cases that were generated years before construction, and then two were included in the contract for liquidated damages purposes. Q And there were some questions regarding the settlement agreement, and the fact that within the settlement agreement there was language indicating that the parties negotiated an increase of megawattage from 420 to 450.
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19	JS-1 has hours in the avoidance zone and other periods is because we back calculated that. If it had been in existence, that's how many hours, but it didn't exist until the beginning of Period 3. Q Okay. I want to get some clarification on heat balance testing. Is that something that is actually you use the term testing, but is that testing actually performed when the steam turbine is a attached to the generator? A No. The heat balance cases are actually generated in this case, they were generated years prior to construction of the power block. And they are engineering predictions of output and other variables based on different combinations of equipment and operating parameters that may be in place when you get to operation. So it's all theoretical. Q So when actual testing was performed after the steam turbine was actually installed, part of the purpose of that was to determine whether or not the		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19	208 megawatts as designed. The long-term operation, 40 years operation of any power plant, that's really the most important thing for the sake of the customer. So that's why Q I am sorry. I think you testified that there were approximately 300 heat balance predictions. During the course of actual testing of the steam turbine, not all of those prediction models were tested, correct? A That's correct. There were over 300 heat balance cases that were generated years before construction, and then two were included in the contract for liquidated damages purposes. Q And there were some questions regarding the settlement agreement, and the fact that within the settlement agreement there was language indicating that the parties negotiated an increase of megawattage from 420 to 450. Can you tell me the significance of those numbers, 420 and 450, in the context of the settlement
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	JS-1 has hours in the avoidance zone and other periods is because we back calculated that. If it had been in existence, that's how many hours, but it didn't exist until the beginning of Period 3. Q Okay. I want to get some clarification on heat balance testing. Is that something that is actually you use the term testing, but is that testing actually performed when the steam turbine is a attached to the generator? A No. The heat balance cases are actually generated in this case, they were generated years prior to construction of the power block. And they are engineering predictions of output and other variables based on different combinations of equipment and operating parameters that may be in place when you get to operation. So it's all theoretical. Q So when actual testing was performed after the steam turbine was actually installed, part of the purpose of that was to determine whether or not the steam turbine would perform in accordance with the heat		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	<pre>288 megawatts as designed. The long-term operation, 40 years operation of any power plant, that's really the most important thing for the sake of the customer. So that's why</pre>
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21	JS-1 has hours in the avoidance zone and other periods is because we back calculated that. If it had been in existence, that's how many hours, but it didn't exist until the beginning of Period 3. Q Okay. I want to get some clarification on heat balance testing. Is that something that is actually you use the term testing, but is that testing actually performed when the steam turbine is a attached to the generator? A No. The heat balance cases are actually generated in this case, they were generated years prior to construction of the power block. And they are engineering predictions of output and other variables based on different combinations of equipment and operating parameters that may be in place when you get to operation. So it's all theoretical. Q So when actual testing was performed after the steam turbine was actually installed, part of the purpose of that was to determine whether or not the steam turbine would perform in accordance with the heat balance prediction?		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21	288 megawatts as designed. The long-term operation, 40 years operation of any power plant, that's really the most important thing for the sake of the customer. So that's why: A fam sorry. I think you testified that there were approximately 300 heat balance predictions. During the course of actual testing of the steam turbine, not all of those prediction models were tested, correct? A That's correct. There were over 300 heat balance cases that were generated years before construction, and then two were included in the contract for liquidated damages purposes. Q And there were some questions regarding the settlement agreement, and the fact that within the settlement agreement there was language indicating that the parties negotiated an increase of megawattage from 420 to 450. Can you tell me the significance of those numbers, 420 and 450, in the context of the settlement agreement, why were they put in there?
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	JS-1 has hours in the avoidance zone and other periods is because we back calculated that. If it had been in existence, that's how many hours, but it didn't exist until the beginning of Period 3. O Okay. I want to get some clarification on heat balance testing. Is that something that is actually you use the term testing, but is that testing actually performed when the steam turbine is a attached to the generator? A No. The heat balance cases are actually generated in this case, they were generated years prior to construction of the power block. And they are engineering predictions of output and other variables based on different combinations of equipment and operation. So it's all theoretical. O So when actual testing was performed after the steam turbine was actually installed, part of the purpose of that was to determine whether or not the steam turbine would perform in accordance with the heat balance prediction? A That's correct. And that's really important		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	288 megawatts as designed. The long-term operation, 40 years operation of any power plant, that's really the most important thing for the sake of the customer. So that's why:

	289	IDENTIAL		290
1	Q So the 450 in the context of the settlement		1	CERTIFICATE OF REPORTER
2	agreement was similar to the 420 guaranteed amount set		2	STATE OF FLORIDA )
3	forth in the contract by Mitsubishi, is that correct?		3	COUNTY OF LEON )
4	A Yes, that's accurate.		4	
5	MR. HERNANDEZ: No further questions, Judge.		5	I, DEBRA KRICK, Court Reporter, do hereby
6	MR. MOYLE: I was going to say so much for the		6	certify that the foregoing proceeding was heard at the
7	relevancy of the settlement agreement, to tweak my		7	time and place herein stated.
8	friend Mr. Bernier.		8	IT IS FURTHER CERTIFIED that I
9	THE COURT: I am assuming there is no point		9	stenographically reported the said proceedings; that the
10	starting with another witness this evening. I take	1	0	same has been transcribed under my direct supervision;
11	it we are all in agreement we should stand in	1	1	and that this transcript constitutes a true
12	recess until nine o'clock in the morning?	1	2	transcription of my notes of said proceedings.
13	MR. MOYLE: Yes. Thank you, Your Honor.	1	3	I FURTHER CERTIFY that I am not a relative,
14	THE COURT: See you then.	1	4	employee, attorney or counsel of any of the parties, nor
15	(Whereupon, the proceedings adjourned for the	1	5	am I a relative or employee of any of the parties'
16	day at 4:50 p.m., and the transcript continues in	1	6	attorney or counsel connected with the action, nor am $\ensuremath{\mathbb{I}}$
17	sequence in Volume 3.)	1	7	financially interested in the action.
18		1	8	DATED this 18th day of February, 2020.
19		1	9	
20		2	0	A set a l
21		2	1	Debli R Kuci
22		2	2	
23		2	3	DEBRA R. KRICK NOTARY PUBLIC COMMISSION #GG015952
24		2	4	EXPIRES JULY 27, 2020
25		2	5	
	5th Avenue, Tallahassee, FL 32303         premier-reporting com           r Reporting         (850) 894-0828         Reported by: Debble Krick			5th Avenue, Tallahassee, FL 32303 premier-reporting.com Reporting (850) 894-0828 Reported by: Debbie Kric