UNITED STATES OF AMERICA

NATIONAL TRANSPORTATION SAFETY BOARD

Investigation of:	
LOSS OF THE SUBMARINE *TITAN* IN THE NORTH ATLANTIC OCEAN ON JUNE 18, 2023	Accident No.: DCA23FM036

Interview of: [redacted]
Director of Marine Operations
OceanGate, Inc.

OceanGate
Everett, Washington

Wednesday,
January 19, 2018

APPEARANCES:

STOCKTON RUSH
OceanGate Inc.

[redacted]
OceanGate Inc.

[redacted]
OceanGate Inc.

[redacted]
OceanGate Inc.

I N D E X

I N T E R V I E W

(1:00 p.m.)

MR. RUSH: There you go. So what's today? 18th?

[redacted] 19th.

[redacted] 19th.

MR. RUSH: 19th, 1 o'clock. I've got [redacted] and [redacted] recording this.

INTERVIEW OF [redacted]

BY MR. RUSH:

Q. Okay. So first question. Give me some background. What brought this on? How long have you had some of these concerns?

A. Well, the concerns, basically the second the dome came in and we got those dome cut offs, okay.

Q. Um-hum.

A. So the end segments. As soon as they came in, and I'm not (indiscernible), and basically as soon as they came in, and I wasn't the only one that was like, oh, my God. Okay. At that point, having no experience or problem before, so I thought I'm going to do a bit of research on this.

Q. Um-hum.

A. Okay. Hence, when I find out, they do cut them off on most of the segments on, you know, planes and boats and God knows what else. And so on that, I did approach you and say --

Q. Right.

A. -- are we still getting it scanned? Okay.

Q. And it turns out you can't. We had looked at that. So keep going.

A. Okay. Do you want me to quote you?

Q. Yeah, okay.

A. I'm not going to waste the money getting Boeing to inspect that piece of shit. I know it's rubbish and -- what else was it? By the end of the say I've got to dive that. So wow. I was quite taken aback.

Q. I will say, I would not have said that without saying we have acoustic monitoring which will tell me way before it fails. God, I would never say that without pointing out that we have acoustic monitoring and, yeah, and I don't think I said piece of shit but Boeing can't scan. So it does really matter. I've already -- we've already looked into it. There is no NDT doing 5 inch thick carbon fiber of that size.

A. Because absolutely nobody on this plant -- I mean I thought that --

Q. Nothing will find the micro buckling spots and small delaminations. Gross delaminations, yeah, you can put it in a CAT scan and you can get data on it. We've looked at a lot of the stuff, but keep going.

A. Okay. So is the intention to best efforts, get it scanned or are we just not doing it? What is the reason for not trying to get it scanned?

Q. Because the data we would get from a scan would not be

meaningful.
A. Really.
Q. Yeah. I mean unless it was a gross delamination. So it has a gross delamination and it is a piece of shit. We might see that in a scan. We will also see that with the acoustic monitoring. We've don't enough testing with acoustic monitoring that we know we will see that. You want to see a bad hole? That sample we have. That one-third scale clearly had a delamination a quarter of the way through. It went to 6500 PSI before it failed. And we knew at 4500 PSI that it was going to fail. So there -- an no one from Boeing, any of the experts I've talked to has questioned that acoustic monitoring will not detect problems with your hull way before they happen. Okay.
A. Does it not alarm you seeing what we see? Arnold -- I mean (indiscernible) was --
Q. Right, those are scraps, yeah, right.
A. We've got them at the (indiscernible), and they're from the 5 inch hull.
Q. Right.
A. Those are segments from that hull and --
Q. The only part of that segment that matters is the segment that is the part that was cut. The rest of it is crap, and it's meant to be crap. That's why you cut it off. It's like judging a GM plant by what's in the dumpster.
A. Right, but all that porosity, the delams, everything, the

glue runs, it doesn't concern you?
Q. Not at all, because carbon fiber is better compression then tension. And that's what nobody understands. It's completely opposite of what everyone else says. Everyone's, oh, carbon fiber can't handle compression. They're full of shit, and I've proven they're full of shit. If you want to see that, you take a look at the third scale model that we tested.
A. Yeah.
Q. It is -- that was poorly done. It was -- it has a massive delamination. It had porosity. It had buoyancy.
A. Yep.
Q. And it still worked. Okay. [redacted] will join us. So that unit was heated -- not heated sufficiently. It was undersized. It was designed for -- if you scale up that third scale model --
A. Yep.
Q. -- it scales up to a 4.2 inch, not a 5 inch hull.
A. Okay.
Q. It was -- he didn't have thermal couples in it like we did with this one so he could get the temperature.
A. Okay.
Q. And as you scale up, the scale factor is in your favor because the fibers are smaller in relationship to the diameter. So all three of those say that this will be better.
A. It's also --
Q. And that one -- also that one was good enough, and it -- but

what's amazing is how poor it was. So, you know, it's a good news, bad news. You know, the bad news is what the hell is [redacted] doing creating such a product, and the good news is [redacted] knows. That's why [redacted] (ph.) went to him and why he's the only person whose made these hulls is carbon fiber in massive uniform compression is highly tolerant of Boeing's mistakes in manufacturing defects which is the opposite. I've talked to expert at Darpa (ph.). I've talked to experts at Boeing. I've talked to [redacted] I've talked to ETK (ph.). I've talked to General Dynamics. You know, it's been a 8 year project. I know what the hell I'm talking about.

A. Okay.

Q. So keep going.

A. What do you want me to do? Do you want me to go through the list?

Q. No, but I mean so, so you had that concern, and you're -- whatever I said your interpretation was I said it was piece of shit, and we're not going to test it.

A. Correct.

Q. Okay. You've had -- I'd like to go down all these things but, you know, part of it I also want to know what was your -- what led up to this and what's your goal with this document?

A. The goal for this document from me is the safety of anything that goes on there including you.

Q. I understand.

A. Okay. That's it. I am just trying to do my job. I have approached [redacted] you, and to Scoot, okay, on the matters beforehand, okay. The hull issues.
Q. Correct.
A. Okay.
Q. Yep.
A. I approached it, and I've just been dismissed --
Q. Yeah. I told --
A. -- many times.
Q. I told you the O-ring doesn't matter because it's a metal to metal seal under high pressure. You don't believe that.
A. Do you know why? Because I have firsthand experience of that.
Q. Right.
A. I've had firsthand experience of a design that was the same as that with a double dove tail, okay. It failed twice. And it was back to the drawing board. The amount of the pressure. That was a project to the MOD which I cannot discuss, okay.
Q. Okay. What was the shape of the --
A. The O-ring was exactly the same --
Q. No, no, not the O-ring. What was the shape of the --
A. Flat plate (ph.).
Q. Flat plate. Was it a dome on one end?
A. I can't tell you.
Q. Okay. So --

A. It was a, you know, a project for the MOD.
Q. And when it failed, what was the failure mode?
A. What was the failure mode? The O-ring.
Q. Well, did it leak? Did it flood? What did it do? Did it leak a lot, a little? Did it start to leak?
A. It started to leak.
Q. At what pressure?
A. It was 4 -- 40 bar.
Q. So quite shallow.
A. 40 bar.
Q. And so it started to leak.
A. Yep.
Q. And then it came up and then had to redesign it?
A. Right.
Q. Okay.
A. We did it twice to verify the system.
[redacted] What was the design intent?
[redacted] Pardon?
[redacted] What was the design intent?
[redacted] A pressure vessel.
BY MR. RUSH:
Q. How did deep, how deep do they want to go?
A. I can't talk about it.
Q. Okay.
A. Okay.

(Crosstalk)

[redacted] -- so I can't about it. Pardon.

[redacted] The percentage was what?

[redacted] Okay. I think the -- the thing of this meeting is I just want to verify everything on here, the reason being is I ask question. I'm dismissed. That's it. Okay.

MR. RUSH: No, I gave you my answer.

[redacted] So instead of me being here --

MR. RUSH: And you didn't like my answer.

[redacted] -- with the kind of report, okay.

[redacted] I don't dismiss you when I answer.

[redacted]

[redacted] No, I take issue with that.

[redacted] Okay.

[redacted] No, no, let's go back to the O-ring. I do take issue with that. We had a great conversation about the O-ring in the plunge hole.

[redacted] Yeah.

[redacted] I answered all your questions.

[redacted] Okay.

[redacted] And what did I say?

[redacted] At first --

[redacted] Enlighten all of us.

[redacted] Do you think so? Do you think it would fail? That's what you said to me. That's what you said on the shop

floor. Do you --

[redacted] But what did I say about the plunge hole?

[redacted] I said, yes. The chances of not failing are high.

[redacted] Okay. So keep going.

[redacted] Okay.

[redacted] What did we talk about?

[redacted] Go for it.

[redacted] No. Enlighten us. I didn't dismiss you. What did I tell you that I did to verify that? I walked you through the design process to know that that was okay.

[redacted] No, you didn't.

[redacted] Yes, I did.

[redacted] When did you do that?

[redacted] Absolutely did.

[redacted] When?

[redacted] What I told you was --

MR. RUSH: Was that months ago or --

[redacted] No, when we were mounting the aft dome. What I told you was this. I said, look, I know as well as you do, I've never seen a plunge hole like that on a sealing surface like that. Do you remember this?

[redacted] I do remember you saying that.

[redacted] There you go.

[redacted] That was --

[redacted] Who did I tell I communicated with?

[redacted] You didn't say you communicated.

[redacted] Both Tifan (ph.) and Parker agrees that that plunge hole is appropriate.

[redacted] Really?

[redacted] Yes. And who did I call to know this? Their R&D engineers.

[redacted] Okay.

[redacted] So the design was done in concert --

[redacted] Okay.

[redacted] -- with their R&D department.

[redacted] Okay.

[redacted] Now, you can Google this on Google, and go look for plunge holes on ceiling surfaces and, in fact, they're all over the place.

[redacted] Okay.

[redacted] But we did talk about this, and I said, look, I've never seen them either, and then I commented that if it's going to leak, we're going to know. It's not a catastrophic failure but I said we're going to know that I've got fix it which is why I put the O-ring groove on the forward dome, and I didn't put it on the segment one. I can ship that out and get it reworked. That is what we talked about, and I did not dismiss you.

MR. RUSH: Okay. So let's --

[redacted] Can I ask -- do you have that documentation from the people that you talked to saying that that was an appropriate application?

[redacted] No, it was over the phone.

MR. RUSH: Yeah, it's via phone most of our --

[redacted] I don't -- they're not certifying that design. So whatever we talked about over the phone.

MR. RUSH: And this will come up. We'll go through this line by line. It'll come up on a lot of items which are, yeah, we know they're experimental. The question is if it fails, will we know before it happens? Will somebody get hurt? You know, if it's something -- if it was a glass front and you couldn't tell and the first failure mode is thing that's full of water, that's a lot different than acrylic which will craze (ph.) before it fails, and will creak before it fails. And it's a lot different than an O-ring that will leak before it explodes. And so you sort of go down the list, and that's the philosophy we're using on an experimental first of a kind prototype vessel, but let's go down -- let's just go down the first piece.

So the viewport. So what you're saying is you need the -- we need a pressure test of viewport with associated documentation from Hydrospace. Have you talked to [redacted] about this?

[redacted] No. Just [redacted]

MR. RUSH: Okay. Okay.

[redacted] I mean I'm keeping it in house.

MR. RUSH: Right.

[redacted] I'm not, I'm not -- all that happens is anytime I've worked a system before, I worked on seven different systems before I came here, okay, all over the world.

MR. RUSH: Um-hum.

[redacted] Right. It's an open book policy that you can check before you go for a dive with people in there, okay, because at the end of the day the pilot is responsible for their lives. That's it. End of story from the start of the dive until the hatch is opened at the end.

So in terms of the viewport, all I was doing was asking for basic information on that viewport. That's it. That's all I'm asking for. That's it.

[redacted] An inspection was performed on the viewport by [redacted] and I, and it was delivered with cert paperwork.

[redacted] Okay. So is the viewport -- does it tie in with the PBHO guidelines?

[redacted] No.

MR. RUSH: No.

[redacted] It doesn't?

MR. RUSH: It's 8 percent off of the --

[redacted] Well, actually it does.

MR. RUSH: There are no PBHO guideline. Let's just start, let's just start with that. There are no PBHO guidelines. PBHO admits themselves. I've talked to [redacted] and other members

of the PBHO committee that the acrylic specs for PBHO were developed by Statute (ph.), and Statute admitted prior to his death how conservative he was and everyone knows that they are hyper over conservative and everyone I've talked to says an acrylic viewport will craze one-third it's failure depth period.

[redacted] It meets the requirements --

MR. RUSH: And no one -- and if you'd show someone. So in that discussion with [redacted] --

[redacted] Yeah.

MR. RUSH: -- we said this is the shape we want. It's a non-standard shape.

[redacted] Okay.

MR. RUSH: Normally it's a hyper hemisphere, and we're doing a flat bottom on the front of it, okay. So that's a non-standard shape.

[redacted] Yeah.

MR. RUSH: And I don't think -- and to find the pressure, you have to extrapolate Statute's curves which you can tell are wrong because they're straight lines. Nothing in this world is a straight line particularly when exposed to a squared function perform pressure. But you have to extend off the chart to get to where we are. [redacted] said if you do that, you are some percentage off, 8 percent is what they say. When you're looking at a safety factor in excess of 4. So we have determined that, in fact, this isn't a safety issues. This is a functionality issue. We may go

down and it may craze, and we have a mitigation plan which is to put a steel plate in there and we will then machine a glass compressed fitting from a pressure -- from the guys at Rayotec who do the glass for the -- much of NASA and the like, and I've met with them, and that will be our mitigation if it crazes over.

[redacted] Okay.

MR. RUSH: But it isn't just going to -- one of the great things about acrylic, it doesn't just fail. And so we have determination -- this is part of the test program. We're going to test it. I am confident that [redacted] doesn't know what he's talking about. And even [redacted] says that data is wrong, and then he goes back and says, but the data says you can't do this. So it's self-serving.

[redacted] What is the data? When you said it goes off the chart, what does the data say about viewport --

MR. RUSH: It goes to a PBHO guide. If you go to PBHO --

[redacted] Yeah.

MR. RUSH: -- it's right in there, and you look at the type of -- they have a chart --

[redacted] Okay.

MR. RUSH: -- and it goes out -- and what they come up with is you come up a critical pressure --

[redacted] Yes.

MR. RUSH: -- which is the failure and then you multiply it by what they call a conversion factor because they didn't want to

call it a safety factor --

[redacted] Right.

MR. RUSH: -- because they knew every engineer would laugh at them because it's 4 to 10. There's not a safety factor of less than 4.

[redacted] Okay.

MR. RUSH: And if you run the chart out it would say we don't hit it by 8 percent.

[redacted] It meets the requirements (indiscernible).

[redacted] Okay.

MR. RUSH: So, you know, we've had lengthy discussions --

[redacted] And do you have documentation from [redacted]?

[redacted] Oh, yeah, yeah. And he said --

[redacted] Can I see it?

[redacted] No.

[redacted] We're back to yesterday.

[redacted] No, I'm not.

MR. RUSH: No, so one of the issues is there has to be some confidence in senior management who's spent their time doing this and engineering that is doing this. It's not everybody's job. Everybody at Boeing doesn't get to sign off on the aerodynamics. Even the chief pilot doesn't get to sign off to say the wing's designed right. He doesn't even get to sign off to say the control system's right. He gets to find out how is this done? How do I operate it? What are my limits? And, what do you want

me to do?

[redacted] Okay. I disagree with that comment, Stockton, and I disagree that you're not going to present that documentation for me to look at.

MR. RUSH: Okay.

[redacted] I would like to see it.

MR. RUSH: Okay.

[redacted] And I requested it in an email. You rejected it. I requested it in person yesterday. You rejected it. You flat out said no. You're not getting it? You're just a pilot, okay. That's it. You don't need to know which I find a bit bizarre.

MR. RUSH: No, it's not bizarre.

[redacted] Well, in fact, I think it was.

MR. RUSH: No, it's not bizarre and the reason why it's not bizarre is what you've done well documenting here --

[redacted] Yes.

MR. RUSH: -- is you can take -- you can pick and choose some part of data that you want and extrapolate --

[redacted] Yes.

MR. RUSH: -- misinformation, right. And that's what happens, right.

[redacted] Okay.

MR. RUSH: So that's why engineers don't share that really with the world. You get a report and some people will know or

certification, you don't see anything behind certification whatsoever. Nobody sees data behind certification and the reason is for some of the items you wrote in there, is you would package it differently and represent in error. And I think --

[redacted] Can you package it so that the people who aren't as intelligent as engineers can understand it?

[redacted] Yeah, that's what like a cert paperwork or a report is for. That's what --

[redacted] And do you have that?

[redacted] No, I haven't had time to write that yet.

MR. RUSH: Yeah, so let's --

[redacted] That's where we're getting all the questions.

MR. RUSH: The fundamental question on the viewport is, and this is what I've been asking for over 8 years, will the fail without warning? That's the one -- we're in testing and this is what I look at all these things. Will it fail without warning? And (indiscernible) everybody says no. It will craze before it fails.

[redacted] You're going to have to dumb this down for me. That's that word --

MR. RUSH: So that when it starts to stress, it starts to crack open, you know, like a bad windshield on a motor cycle.

[redacted] Um-hum.

[redacted] It will look like scratching.

MR. RUSH: Yes.

[redacted] Okay.

MR. RUSH: And so that may happen. We are testing a non-standard geometry at pressures way beyond what [redacted] did in sizes way beyond he ever tested for, and he's the only person who really ever did it. And everything in PBHO is based on Statute's work. And they pray to the God of Statute, and they all know, he even said himself, he didn't do all these different geometries. He tested the most of them, and he has great data, and there's lots of supporting stuff, but everybody admits that it was very limited, and that's why PBHO is not a standards committee. It is a volunteer group. It is not like a DOT standard. It is a bunch of volunteers who have their head up their asses in certain ways. And I'm going to go prove that, but that is for me to prove. That's why I'm going to do the dive. And what we may end up with is finding out that, hey, the viewport did craze. It crazed at 3,000 meters. The dive's over. Got to go back. We have a mitigation plan. We're going to put a steel plug in there, and we'll come up with a solution for it. We may find out it doesn't craze on the first dive. It crazes on the second dive. That's why I do more cycles, and same thing. We have a mitigation plan.

So we're testing. This is a test project. You know, we're doing stuff. No one has ever done a carbon fiber haul for human pressure like this, and there is a number of things that we're doing that, you know, no one's alarms like we've done it. No

one's done, you know, any of these operations. We're doing stuff that's way out there, and the only way I'm going to be comfortable with it is lots of cycles, lots of testing.

And, you know, at that point, the proper thing is to say, look, we've done 20 cycles to this depth. Here, you can go look at the viewport. It's for us to show you and say, hey, you know, Will says it's only good to 3,000 meters, and we're going 4,000 is not really relevant. What's relevant is, is this a proven design? And before we put people in there, particularly clients, it's going to be a proven design, and if I have to do 20 dives by myself before I can convince people in the company that it's safe, I'll do 20 dives. I'll do 50 dives.

But at some point you get to that, and this is how it used to be done before we came up with computers and committees and risk assessments, you know. You used to out and fly planes. Planes aren't that fun.

[redacted] In terms of you going in the submersible, I am so against it.

MR. RUSH: Okay.

[redacted] We spoke about it. Everybody else in the company has spoken to you about it.

MR. RUSH: Um-hum.

[redacted] Nobody's said anything against it. I'm against you doing that.

MR. RUSH: I understand.

[redacted] We should being putting that sub on a wire --

MR. RUSH: I understand.

[redacted] -- with this experimental --

MR. RUSH: And that's your issue, and a wire without safety issues, for one. And secondly, this is how we're doing it. It's just period. I have looked at it. You know, they don't test nuclear subs on a wire. They don't test airplanes on a wire. They could. What you do is you set a testing program where you do it incremental. It's not going to just go to 3100 and be perfect and at 3200, it all goes away. That ain't going to happen, and I will put my life on the line to say that ain't going to happen, okay.

[redacted] I wouldn't let it happen. And he hasn't heard (indiscernible) from me on that whatsoever.

MR. RUSH: So, you know, that can be your assessment. I've test flown planes I've built myself. I've test flown subs that I've built myself, and as long as I am comfortable with what the safety parameters are. When you first fly a plane, you take off and you land. And the next time you take off and you got to 200 knots and you land. And then next time you go to 210, and then you do -- you gradually build the envelope because they don't just, don't fail. They tend to, you know, you see the stresses are beyond the limits.

We have this thing more instrumented than anything. I had this conversation with [redacted] yesterday. I said every other

sub out there is unsafe. They should have strain gauges at every location on a steel sub. How do you know it's still round if we get hit by a forklift? It costs almost nothing. No one has a strain gauge doing real time monitoring. That's what they should be doing.

So I take, you know, great umbrage at people saying this is unsafe. It's a different approach, and I will do incrementally and I will do it safely, and we'll analyze the data from every depth and if no one else is comfortable, that's fine with by me as well.

[redacted] And so what's going to happen in the timeline that we've got between doing -- eventually when it does get done here to bring you in and say that 8 weeks later, it's on a truck, it takes what, 2, 3 weeks to get there.

MR. RUSH: Yeah.

[redacted] And within how many dives do you want to be at 4,000 meters?

MR. RUSH: We'll do 3 to start with. We'll do 1, 2 and 3, and then we'll do -- we'll see what the set rate is and how long it takes and we'll do it by 100 meter increments from there on that day.

[redacted] I disagree with that because --

MR. RUSH: And I'm going to stop on the way, you know, along the way. Well, we have real time monitors. So we'll see, you know, the same thing. Every time we get go 1,000 meters, it

should be quieter than the last time. If it isn't, then we have serious concerns. We have a lot of mitigation plans in this that are already in place, that have been tested and that are -- nobody can deny. It's just nobody's done it that way before.

[redacted] Computers fail. We know this from *Cyclops I*.

MR. RUSH: So you call the dive off.

[redacted] So to get that data --

MR. RUSH: Right.

[redacted] Computers don't fail.

[redacted] Anyway --

(Crosstalk)

MR. RUSH: So the answer is yes, a computer fails. So we call the dive off.

[redacted] And how do you know you're getting accurate data?

MR. RUSH: Because we have -- the strain gauges. We test it with -- the same way Boeing does. Snap it. Snap a 3 millimeter pencil lead on the outside, and see what that wave form looks like. We've had a Ph.D., at the naval post graduate school look at this data. This is -- one of the concerns I have with a lot of this is the tone here is we don't know what we're talking about, and I've spent 8 years working on this thing. I know --

[redacted] That is not the case. Honestly, Stockton, that is not the case. What I'm doing is I'm just trying to get answers and put forward my recommendations with my experience

within the submersible industry --

MR. RUSH: I understand.

[redacted] -- which outweighs the experience that you have in the submersible industry. I know this is your company.

MR. RUSH: I understand.

[redacted] But at the end of the day, I've been doing it a very long time. This is [redacted] first project. I know you worked on hyperbarics and stuff like that. You were a diver in the Navy. It's your first submersible project, okay. In terms of getting everything right the first time, this is critical especially --

MR. RUSH: I understand.

[redacted] -- wanting to be in the submersible.

MR. RUSH: I understand.

[redacted] In terms of your viewport paperwork, let me see it. What is the objection to letting me see it? It's not a bad thing having a second set of eyes who has experience three times --

MR. RUSH: Because it doesn't -- we'll tell you it doesn't meet.

[redacted] Why keep it from me?

MR. RUSH: Well, because it doesn't meet. It doesn't meet the parameters period. We will admit to that.

[redacted] Okay.

MR. RUSH: Okay. So let's just clear a few things up. One,

how many subs have you designed and built yourself?

[redacted] I am not a designer.

MR. RUSH: Okay. How many airplanes have you designed and built yourself?

[redacted] None.

MR. RUSH: I will tell you that airplanes, cars and other vehicles, make -- these things are a joke. They have some nuances to them but this is nothing next to airplane.

[redacted] The physics doesn't change and neither does the --

MR. RUSH: So anyway. Let's move on. So forward ceiling surface, we covered that on the Parker O-ring component. And it doesn't sound like anything. You're going to take your experience and Parker's page from their catalog as trumping whatever [redacted] has said with Parker or with Tifan.

[redacted] On board.

MR. RUSH: Right. It doesn't have any paperwork to back that up.

[redacted] I don't need it, correct?

MR. RUSH: Okay. So the question -- yeah. This does get down to the basic question of trust of confidence and that's -- we'll get to that later, but let's keep going here.

[redacted] Okay.

MR. RUSH: So the ceiling face.

[redacted] Yeah.

MR. RUSH: So there's a [redacted]

[redacted] Yeah.

MR. RUSH: We'll polish it out.

(Crosstalk)

MR. RUSH: Okay. This one's interesting. So the glue -- the segment that was glued. Did you ask to inspect the attachment face?

[redacted] Negative. No.

MR. RUSH: Okay. If you had inspected the attachment face, do you have certain experience in examining large carbon fiber --

[redacted] I have experience of ceiling faces. This is not on the carbon. This is on segment one.

[redacted] Okay.

MR. RUSH: So the metal.

[redacted] Yes, metal, correct.

MR. RUSH: So we had no less than four engineers there. It is videotaped. It's on our archive.

[redacted] Yep.

MR. RUSH: You can see that.

[redacted] Yeah.

MR. RUSH: We've glued it on there. So I'm wondering what your -- you believe that you should have been --

[redacted] No, I just -- all -- for me, before I put people in the water --

MR. RUSH: Right.

[redacted] -- some verification.

[redacted] Of what?

[redacted] (Indiscernible) actually happening, okay.

MR. RUSH: Well, he saw it. I saw it.

[redacted] He saw before --

MR. RUSH: [redacted] saw it.

[redacted] -- you glued it on. That's it. That's all I'm asking. It's not -- this is a simple -- did you see it, [redacted] That's -- you inspected that ceiling face. You inspected that ceiling face.

MR. RUSH: Right.

[redacted] So we can move on now.

MR. RUSH: So non-destructive testing. We've already addressed.

[redacted] Have you? This is on the bond line. So are we doing anything on it? I know initially the company when [redacted] spoke to everybody initially, we were talking about using a machine to applying the adhesive. It had to be so many thousandths of an inch thick, okay. We all saw on the video, and there's four guys on the top of ladders with spatulas --

[redacted] Yeah, exactly.

[redacted] -- streaking it on.

[redacted] Yep, yep.

[redacted] Okay.

MR. RUSH: And we had feeler gauges to make sure we had the

gaps on it, and I'll give you an example. The deep seaglider, and I've mentioned this, they have a carbon fiber hull. They talked to Boeing about it. They said it scales up much like ours. They have an aluminum end cap that was supposed to be anodized and was painted. It did 3 dives at 6,000 meters. They brought it back to analyze it, and they found that, oh, shit, it was painted and it literally just came off. The bottom line, and what is unusual is the glue and the nature of the carbon fiber is tolerant of compressive loads, much like cement. Cement can get fractured and in compression it's fine. In tension, it falls apart. Carbon fiber is very much the same.

[redacted] And are you, as an open sound because we've got three dissimilar materials --

MR. RUSH: Yeah, that's why they need to be separated by the titanium --

(Crosstalk)

[redacted] -- carbon. Everything is going to react differently --

MR. RUSH: Right, exactly. Yeah.

[redacted] It's engineering.

MR. RUSH: Yeah. No, it's been --

[redacted] So you have the data on that?

MR. RUSH: Yeah, we've analyzed the hell out of it so the modules are the same, the deflection is the same.

[redacted] What data would you be talking about? Like

what? What's the question?

[redacted] When we spoke -- everybody spoke initially the carbon. The carbon eventually, you know, there was a potential for it shrinking half an inch. Then there was talk of it doing a quarter of an inch, and then it was back up to an inch.

[redacted] Okay.

[redacted] You know, if you got all that sort of data in terms of the hull --

[redacted] Yeah, that's what --

[redacted] So how much is it going to shrink by? What's the common --

(Crosstalk)

[redacted] -- 50 inches in the center of the case, it would be between .06 and .075 inches.

[redacted] Okay.

[redacted] Can we go back to the carbon fiber just because --

MR. RUSH: Yeah. Let me give this from the layman's perspective. What we're doing with carbon fiber, titanium, titanium domes, cyclic fatigue, water penetration, dissimilar metals, you know, the whole number of things that can happen, all of which will manifest themselves in acoustic information and strain gauge deflection.

[redacted] Um-hum.

MR. RUSH: That's why we have the real time monitoring. You could never do this. I would never recommend anybody doing this

if you couldn't tell the health of the hull from day 1 to day 2. That is the crux of what we're doing. That's what we spent so long doing. That's why we have Ph.D.s analyzing the data, and that why we did the tests at the University of Washington. Because if you don't do that, all of the concerns that [redacted] points out are legit. With acoustic monitoring, you get away from that.

Now, if it fails, then you have to stop, and it's -- again, this is not something that just happens all of a sudden. It doesn't just implode. It screams like a mother before it implodes.

[redacted] The MVAs (ph.), our analysis, all structural analysis and everything were good. It's all been validated.

[redacted] Um-hum. My question, you were talking about that carbon fiber is better --

MR. RUSH: In compression.

[redacted] -- in compression as opposed to tension.

MR. RUSH: Yeah.

[redacted] And all's I'm hearing is the opposite of that.

MR. RUSH: Exactly. Exactly.

[redacted] And you do have --

MR. RUSH: Yeah, exactly.

[redacted] -- that document? I mean I'm -- I'd like to read it.

MR. RUSH: Talk to Boeing. That's why Boeing is doing it.

That's why I've talked to people from not just Boeing, Lockheed Martin. People have realized that this is the case, and what is the -- and it's uniform compression.

[redacted] Right.

MR. RUSH: The challenge is when you have non-uniform compression or twisting of tensile (ph.) like you have in a wind, and what's being said in the, in the ocean world is exactly what was said in the aviation world, and they -- and the FAA took 20 years to approve carbon fiber primary structures. I had been flying my plane for 10 years before the FAA every thought you could do that. The entire thing's fiberglass. And it is -- the issue is controlling manufacturing as having enough overbuild and having higher safety factors with it. And when you look at uniform compression of carbon fiber, it's the perfect material.

And I've talked to what -- I've been the Navy conferences. I've talked to guys from Lockheed Martin who are trying to pitch this because years ago, they did composite hulls and people said, how do you know it's any good? You could have voids. You could have porosity. You could have cyclic failures. And they took us and chopped it to pieces because they thought we'd have problems and it was perfect.

And so the Navy has been against it, and the orthodoxy of the submersible world have been against it, and they talk about capricious failure modes, and they talk about porosity and they talk about all these little things. And the world is coming

around to understand that, in fact, carbon fiber is perfect for pressure vessels. It's the only material for pressure vessels.

[redacted] Can I ask a --

MR. RUSH: Because it doesn't require, it doesn't require extra buoyancy. You can actually get a light structure.

[redacted] Sure. Again, I guess here's just me as a diver thinking out loud --

MR. RUSH: Yeah.

[redacted] -- you know. If there's a void say in the middle of the hull --

MR. RUSH: Right.

[redacted] -- and you go down -- I mean the pressure is going to --

MR. RUSH: Yeah.

[redacted] -- squeeze that void.

MR. RUSH: And it's going to pop.

[redacted] Well -- but then we're going to come back up.

MR. RUSH: Exactly. This is --

[redacted] I mean isn't that going to -- that void going to get bigger and bigger and bigger?

MR. RUSH: Exactly, and you'll hear that one -- you'll hear it in the carbon fiber and you'll also see it in the strain loading because the thing will get soft. You see this with sail planes sometimes. They sit in the sun and they start to get soft. That all gets detected. That's why we do real time monitoring.

From the beginning of time, I started this project, the only idea that made sense was that you would have real time monitoring of the hull because you can't do these non-standard things and highly complicated and complex structures unless you're confident you can sense the heartbeat of the patient.

[redacted] Does that -- I mean doesn't that mean though that the hull would get weaker --

MR. RUSH: Exactly. Yeah.

[redacted] -- over --

MR. RUSH: There is a non-zero probability that we'll find out this hull is only good for cycles at 4,000 meters --

[redacted] Let me address that.

MR. RUSH: -- or 50.

[redacted] Let me address though. So there's an awful lot of rumor in what you're saying.

[redacted] Um-hum.

[redacted] And to start with, we'll go with our carbon fiber is stronger in tension versus compression. That statement is, in fact, true. A carbon fiber fiber is stronger in an engineering lab in tension than it in compression. What no one talks about is in its worst failure mode, compression, is it adequate? That value is orders of magnitude different and better than other materials --

MR. RUSH: Like titanium.

[redacted] -- that these structures are made out of. Just

the minimum. If we took -- if we got build everything in tension, it's why we make a lot of pressure vessels like out of carbon fiber. If you take that internal and you made a long cut of it, like this, right, and then let's suppose that it's perfect with zero voids in it, all right. And you sat something on it that's extremely heavy, and maybe even a point load. And you have this same shape out of different materials. It doesn't matter if it's steel, titanium, copper, bronze, and the list goes on, plastic. It doesn't matter. That carbon fiber plate will out perform most of the materials.

Now, we can heat treat and do some material science to a lot of these other metals a little bit differently to make them stronger and it has to do with more complicated grain structures and what not, but what you're doing in there is you're changing the shape of it to model more of what a carbon fiber structure would do.

MR. RUSH: Then if you have void --

[redacted] Give me a second, Stockton. When you have a void inside, okay, which there's a high probability you get some voids we'll say inside the structure itself. Everybody talks about voids inside carbon fiber structures as if it's the death needle. And, it can be that carbon fiber structures are extremely process dependent, right, which is why I went down to Sacramento to watch some new videos on the whole thing because they are. And what we were concerned about is if you get somebody that does this

kind of move, we wanted to capture it on video, but watching it is like watching paint dry but valuable, right, watching their process.

But let's supposed that that void in there crushes, the bubble crushes, right.

[redacted] Um-hum.

[redacted] And so all your material around it goes -- it collapses, right.

[redacted] Um-hum.

[redacted] And so two surfaces that weren't touching each other are now touching each other --

[redacted] Right.

[redacted] -- right. And --

[redacted] At pressure.

[redacted] At pressure, right. Okay. That bubble or that capability or that defect, what we call a material sign, doesn't move.

[redacted] So you're saying when you come back --

[redacted] When you come back up, it goes back to the same place. It does not move. Okay. Can it move? That answer is yes. What you need is in the surrounding material of that defect, you've got to have some sort of energy imparted on it in order for it to move within a plane. Carbon fiber structures are very planar, right. So they're like layers and wraps --

[redacted] Right.

[redacted] -- and whatnot, right. So in these, not just the fibers next to each other in the plane because you have the same question in between two this way. We'll say two lay ups, it doesn't matter what they are, right. You can have a void inside there.

[redacted] Um-hum.

[redacted] When that collapses, when you relieve the stress, it comes back up. The problem comes when it collapses and you're loads are vibrant and non-uniform, which is not the case that we have. And I'll get to why this is so important for us to understand.

So if that bubble comes up, we may never hear it. So we can have bubbles in there doing this forever and never cause a problem.

[redacted] Um-hum.

[redacted] And it doesn't matter really if 50 percent of that has voids in it. It's like 50 percent of the volume has voids in it. Now, would we be concerned with those items traveling? Yes. And is 50 percent the right number? I'm going to say no. I really don't know what acceptable void content's going to be. But, what you are concerned with is those structures when they come together in those interstitial planes, right. But glue is what holds it together. What nobody talks about with carbon fiber structures is sure the fibers are strong in tension, and they're not as strong in compression but they are strong.

Okay. What really holds these things together is the glue.

[redacted] Right.

[redacted] Nobody, nobody says did you put the right glue in there?

[redacted] I'm asking. Did you put the right glue in there?

[redacted] We put the right glue in there because it's a misunderstood things, and these are rumors and this is a problem, this is a problem with taking misunderstood data and then publishing it, you know, maybe in an incorrect way, right. It's really the glue. It boils down to the glue in between interstitial places, and this is why. If I took a think piece of glue here and collapse this on top and wanted to peel it off I'd say that it's not going to come off, right. But what if I put a nice thick glob of glue on here and put it on there and then peel is off, right. Sometimes those don't hold and when you do this with superglue, right, you see this a lot, the instructions tell you a really, really small drop, right. More is never better.

[redacted] Right.

[redacted] And the reason why more is never better is it changes your stress strain profile from plane strain to plane stress. And so it matters really how thin that glued interface is more than, more than anything. So like I said, in the entire structure -- give me a second here. In the entire structure, what's important for the entire design is the entire structure moves the same way and we want it to move. Skyscrapers move.

They all have to move, right.

Now, to move, we have a principle called modulus, and not to go into that, our design matches that modulus all the way through, right. And the reason to take that to why carbon fiber structures especially in these solid pieces in uniform compression are so good is metals have the same issue. They have what are called defects inside, right. And there's different types of defects. We call them dislocations. You have like plane dislocations, screw dislocations, and in these dislocations what no one talks about in the metal is if I -- like if you go up in an airplane, you see the airplane wings going like this, the reason why metals are flexible and carbon fiber is really, really stiff, is these dislocations, voids move. And they keep moving in the latta (ph.) structure until they reach a free surface, and then it just kind of pops out.

When you run out of dislocations, right, it's not flexible any more. Then it becomes brittle.

[redacted] Right.

[redacted] And you can see this test in copper pipes. Copper pipes, if you ever take a piece of copper and you bend it, you can bend it in one direction, but you go to try to unbend it, it's cohort (ph.). You can't unbend it any more. And the reason is all those dislocations inside or voids went straight to the surface. There isn't anything in there to allow it to move.

MR. RUSH: So, let me bring it back to the submersible. So

if you look at the autonomous vehicles, they're all carbon fiber. The deep diving, the deep seaglider, the LDUV, they're using carbon fiber because it's three times better on the strength to buoyancy basis than titanium. And so the world is going that way. The manned sub world is dragging its feet, kicking and screaming, but they're making very expensive AUVs and all kinds of expensive equipment that is all carbon fiber.

And, you know, as I've seen, I've been to conferences on this stuff. I've talked to, you know, Boeing's top people. We had our contract with Boeing. You know, I've spent countless hours down there talking to all of their composites people, and they're, you know. They had (indiscernible) with [redacted] (ph.) 2 weeks ago, and he was all concerned. And he said, hey, I'm really concerned about you. You're going to go in this sub, and I said, [redacted] tell me I'm wrong. Will I hear it on my acoustic monitoring system way before it fails? He said, yes. I said, then I'm not concerned. I'm not concerned that I may end up with a sub that doesn't work or a sub that can only do 50 cycles, and we've got make a whole new -- if we could get 50 out of each hull, it would still pay. We just go make up a bunch of hulls. We will know before. I will know before it fails, well before it fails, and we will also know that it's starting to get weak, that we didn't -- and one of the concerns, you get -- you get porosity, that rhino liner doesn't work and some water gets in there and then it freezes and then it starts to create, you know, voids. You'll

hear that, too. We will hear everything. So -- and that's -- I'm betting my life on it, and I have asked everybody I possibly can, and nobody with any knowledge in the space have told me I'm wrong.

[redacted] And we're dealt with --

MR. RUSH: And Boeing has a reason to tell me I'm wrong.

[redacted] So why? Was it the safety factor that Boeing want to -- you know, they've been willing to make it for 10 or 9 inches rather than 5? Is that the safety factor?

MR. RUSH: Well, they want it for 6,000 meters and a 2 1/4 safety factor and they wouldn't do a 90/10 lay up. They'll only do 40/40/20 because they don't have data because in the real world nothing gets uniform loads. Everything has a tensile, yeah, component to it. And so they don't have models do it. Even though they admit all your loads are orthogonal, they wouldn't do it that way. He -- [redacted] told me that he'd look at the deep seaglider which is a 6,000 meter hull and he scaled it out, and it turns out to be a 5 inch thick hull, and that would be for 6,000 meters. So he's looking at it. He says, well, maybe we'd do 7, maybe 5, but it's Boeing, and they're adding on, you know, safety factor after safety factor.

[redacted] And what is our safety factor?

MR. RUSH: Well, it's supposed to be 2 1/4 but I know it isn't because it's supposed to be 2 1/4 on the 2/3 scale model. There's no way that should have failed at 6500.

So, you know, we -- what we told [redacted] was we wanted 2 1/4

safety factor at 6,000 meters depth. I will guarantee you that it's not there. That's what he designed for but there's all the anomalies and, you know, he's doing a wet layout for me and that's not the same as a Boeing process where they put each fiber down, where they -- and Boeing is very concerned to get it exactly right because weight is costly to them. Weight isn't costly to us. Weight's what we want. And so originally the hull was supposed to be 4 1/2 inches. I said, oh, let's make it 5 just for extra shits and grins to have more. So I think -- I have very little concern we're going to have a problem with the carbon fiber. The weakest link in the entire sub is the titanium dome.

[redacted] So what do you think the safety factor is with the size and the way that we laid it out?

MR. RUSH: With the thing? Less than, less than what we asked for.

[redacted] The case?

MR. RUSH: Yeah.

[redacted] Yeah.

[redacted] The manufacturer's reporting over 2 1/4 at 6,000.

MR. RUSH: 6,000. So 4,000 --

[redacted] When you're saying not, when you're saying --

MR. RUSH: That's what he's saying.

[redacted] That's us.

MR. RUSH: That's the best data we've got --

[redacted] That's the vest --

MR. RUSH: And that's the same thing with anything. You'll get engineer data and then you go out and test it. So, you know, you can have an engineer who says the landing gear is good for "X" and you do out and test it and it breaks. That happens all the time.

[redacted] So you're saying -- sorry -- 2 1/4 --

MR. RUSH: At 6,000 meters.

[redacted] -- at 6,000 meters. It should conceivably go to 10,000.

MR. RUSH: Correct.

[redacted] Is that what you're saying?

MR. RUSH: It should not fail. I'm telling you that our experience with [redacted], everything [redacted] has told us has been wrong, which is the depressing part. Every part that he's told us is wrong has been in our favor. So on one level, you go, holy, shit. He is the -- he is one of the living experts in carbon fiber. He's got 22 patens. He makes all kinds of stuff for General Dynamics and Fawcett and everybody else, and he's done a bunch of testing. But he's an old dude. He's weird, and he does it with older software and he has understood the secret of this whole thing which is it's highly tolerant of wet lay ups and manufacturing defects in compression. And so when you're Boeing, you do -- you have to be as light as possible. And so they know it down to a rat's ass.

[redacted] Who makes the vehicles like the deep sea --

MR. RUSH: The deep seaglider. Boeing.

[redacted] That's Boeing.

MR. RUSH: Yes, that's why I went to Boeing because I saw them making the deep seagliders. That's our thing.

[redacted] Sometimes --

MR. RUSH: ATK does it. General Dynamics does it. They make housings for inner continental ballistic missiles out of it. They make all kinds of stuff. You look at what [redacted]s doing with his giant stratolauncher and, you know, carbon fiber's the way to go.

[redacted] Boeing does not have internally in the entire company, does not have the allowance provision and capability to analyze a structure like ours. They can't do 0-90. It's what forces them to a totally different design. You can't compare the two.

MR. RUSH: Yeah. And that's because, that's because under their -- their software, they have to validate and get allowables for a certain layout (ph.) which requires a bunch of work. So that they can have rats on -- we know how this is going to respond to different load structures, and unless they have it, they can't put it in the software.

[redacted] How do you document that?

MR. RUSH: So anything, let's move on.

[redacted] Can I ask one more question about the glue?

MR. RUSH: Yeah.

[redacted] You said it has to be the right glue. What kind of glue is that?

MR. RUSH: I have it in the report.

[redacted] I mean it's not Elmer's.

MR. RUSH: It's in the report. No.

[redacted] On, no, no, it's Elmer's big brother.

MR. RUSH: Yeah. No, it's -- yeah, we've got --

[redacted] Is it specifically for like high pressure environments or is it --

MR. RUSH: Yeah, it's -- this is

[redacted] -- just like a regular --

MR. RUSH: Yeah, Dr. [redacted] (ph.), I can't remember where he got the carbon fiber from.

[redacted] Yeah. So actually the glue has to be so specific because the wet lay up which is circular, when we do it on the mandrel (ph.), we combine that with what we call pre print (ph.) axials. That has glue already in it.

[redacted] In it, yeah.

MR. RUSH: And it's real hard.

[redacted] Okay. And that --

[redacted] So that glue has to react with each other.

[redacted] Right.

[redacted] It's extremely specific.

MR. RUSH: Yeah, the chemistry there is non-trivial and in the one -- in our third scale where you can look at and see that

it basically failed the quarter in, likely that was the prepay (ph.) which has to get to a certain temperature before the glue will now merge with the wet stuff. So you basically have the -- you have fibers go in. They get dipped in the resin and then they get wound like a baseball and then a person hand lays up --

[redacted] Right.

MR. RUSH: So again, manufacturing defects with a squeegee. You know, you can get bubbles and everything else, and then it has to go in the oven. And if that inner piece doesn't get hot enough, then it's not going to -- the glue won't flow and you'll get what we had where you could see it at quarter in, it just totally sheered. So we went down and said put thermal couples in this thing, you know. Original -- his -- [redacted] original estimate of how long it was going to take was something like a couple of days in the oven.

[redacted] Ten. Oh, 3 days.

MR. RUSH: Three days, and it took how many?

[redacted] A week.

MR. RUSH: A week.

[redacted] But his total manufacture --

MR. RUSH: If you think back when he did the last one, he probably went with his thumb, you know, on the scale. He is a very empirical designer. He has his problems but he understands this more than anyone else, but he's got his flaws. So we go back and say, this is built way better than the last one. It's larger

which is better because the fibers are smaller in relation to the distance. It's thicker than it should be, and he's taking greater care, and we've watched it closer, that I'm confident that this is closer to a 2 1/4 safety factor. But I have -- we have -- we both have serious concerns. We've had serious concerns with him. I mean we've had our vendor issues. It's not like we're just going into this thing blind. I mean there's a reason why he and I flew down to Venecia (ph.) so much and flew down to see [redacted] and were holding his hand and pushing and making sure we had the documentation and did all that stuff.

UNIDENTIFIED SPEAKER: How's that relationship now?

MR. RUSH: He's not going to talk to us because we cut his bill because we had to spend all this money to go to Unico where he said he could machine it and he couldn't. His machine couldn't take it by an inch.

[redacted] So who's going to make *Cyclops III* then?

MR. RUSH: We'll probably find -- there are a number of vendors who can do it. So even North Sails, they do -- people who do carbon fiber around mats. One of the reasons I went down this path was talking to [redacted] about his ship, and he had a fiber optic sensor inside the mats that were all carbon fiber.

[redacted] So [redacted] doesn't have or not [redacted] Mr. [redacted] doesn't have the --

MR. RUSH: Intellectual property owner.

[redacted] Yeah.

MR. RUSH: Well, he gave it to us. We have -- what you really need to know is the material and the resin that's used and the process side, and we'll get -- the next time, we'll get either BMW, a number of better carbon fiber shops than [redacted] [redacted] is this niche, and I went to him because he had all the data from testing [redacted] hull.

[redacted] Right.

MR. RUSH: And so that was the primary vira (ph.) of going with him. He's getting old. You think he may be getting senile. He's got heart trouble. You know, he can't stand up for long. I don't know what was causing him to be a little unusual to say the least but there are no shortage of people who can do this now that we have the tool and you have the basics to.

[redacted] Was [redacted] hull pressure tested?

MR. RUSH: Yeah, they pressure tested scale models of it. They pressure tested -- they did -- they were pressure testing the main one and the glass failed on the front, but they had put, like we did, giant aluminum plates and they had pressure tested stuff. They took it to destruction. They put known voids in it. He spent about $7 million, which is what we've got to ride on, and the same thing, you know. [redacted] worked with Virgin Galactic and that didn't end well because he's -- they're all odd dudes.

[redacted] A weird bug.

MR. RUSH: Yeah. They're all odd dudes.

[redacted] They (indiscernible) on that.

MR. RUSH: Yeah.

[redacted] On that carbon fiber hull (indiscernible) that.

[redacted] How thick was that?

MR. RUSH: It's 7 inches but it's small (indiscernible). It's like 28 --

[redacted] Yeah, it's small.

MR. RUSH: So it's a small tube. So let's keep going here. Hatch change. We're still working on hatch change. I mean this thing is, you know, we know that's the number one thing. That dome swings out. It's going to fall, smash somebody. That's a death trap. And so there's a lot of work going into the hinge and the dolly and the restraining mechanism. You know, I was telling [redacted] we might even put an airbag on there, get on the surface, blow an airbag up so nobody gets hurt. That is an identified problem, yeah.

Forward horizontal support. Yeah, I can put the nuts in it. I don't know if that's -- it's not -- we weren't ready to -- it's not being delivered. We delayed this to --

[redacted] No, he didn't come ask me about that. So we have it on a list that's being closed out before we actually go.

MR. RUSH: Okay.

[redacted] Yeah, that's fine.

MR. RUSH: Carbon fiber (indiscernible), you know, we covered that, you know. It's there. It's been covered.

Ballast bag, hey, that's mine. Yeah, maybe it's got some

glue. Maybe it's got some leaks. Maybe the activator doesn't work. We're not leaving this -- we're not leaving the harbor. No matter what we do, if I went and paid $10,000 to go get a rotary actuator from somebody, we'd still have to test it. We went and bought the vent valves from Hydro-Lek, pieces of shit. You know, we had a vent valve wide open. They were, you know, they don't have good drawings. They didn't have, you know -- I mean you can go buy expensive equipment that's proven. We've got to prove it on our hull, and that's all about being incremental. We don't leave this harbor here until I've got a drop weight because, yeah, I don't -- fuck, I made that in my basement. It could fail, yeah. It shouldn't. I mean logically it's an oil filled motor that should be able to handle it, but I don't know. So I need multiple backups.

Segment 2, yeah, you guys looked at it before you put the O-ring in there, right.

[redacted] I know [redacted] and I did.

MR. RUSH: Yeah. So there were two eyeballs on it. They torqued it. They put it on. They checked the O-ring.

[redacted] There was three eyeballs on the torque.

MR. RUSH: Non-distressing. So you've got segment 2, okay, because they were glued onto the -- why's that different than the first one?

[redacted] Segment 1 and segment 2.

MR. RUSH: Segment 2 is -- it's titanium/titanium and just an

O-ring. So it's not glued anything. We've called the segment 1s are the ones that --

[redacted] One gets glued onto the carbon. One just gets glued onto the carbon.

MR. RUSH: So those are called segment 1s. So we have two segment 1s.

[redacted] They're both called segment 1s.

MR. RUSH: Yeah.

UNIDENTIFIED SPEAKER: There's an action 4 with a pivot.

MR. RUSH: The ceiling face was the one they both inspected. Same with the aft dome. Aft dome ceiling face, same thing. They inspected it.

Exo -- okay. So dissimilar metals. Yeah, we're going to put some anodes on it, but the principal metals are -- the dissimilar metal issue. You've got aluminum, steel and titanium. In that, the valance of aluminum is the one that loses. It is not -- in the safety issue, it may be a durability issue but we can put, you know, magnesium anodes on it. That is the plan. It's not done, you know, it's not going to matter dunking, you know, here. It's not going to matter. There area a lot of boats with aluminum and steel.

[redacted] But still, that's a design question. The intent is the way that it is. There's no dissimilar metal issue right now. Or is there? What is the issue that you're brining up? The fact that there isn't any or the fact --

[redacted] There isn't any anodes.

[redacted] What's that?

[redacted] The fact there isn't any anodes on it.

[redacted] What if we don't need any?

[redacted] Okay.

MR. RUSH: What if the aluminum is anodes?

[redacted] (Indiscernible) isolated? Well, what if we don't? So my question to you is how do you know that we do need it?

[redacted] Experience with subsea vehicles.

[redacted] Because everything in the water has one. That's a good question.

[redacted] Anodes are so cheap I mean.

MR. RUSH: Yeah, we'll put them on.

[redacted] In the scheme of things, they're so cheap. Why not I guess?

MR. RUSH: Yeah, we can put them on.

[redacted] I mean --

MR. RUSH: We can throw them on. We can replace them. We have them on the motor thrusters. It's not, it's not a huge issue. One of the things that's unique about what we do is as opposed to having a metal hull where you have a huge problem with ground faults, we're, you know, hugely isolated from all of it because of the insert and the way everything's dated and not current. So, it's different than you would see in a metal hull

but, yeah, we can throw anodes on it and magnesium would better than zinc.

[redacted] But keep in mind from a design perspective, all right, if we constantly went down the path say, well, why not? It just doesn't -- they're just small and they don't cost a lot, put it on there. Eventually you're strap and bolt them to the side of these things, right.

[redacted] I get that.

MR. RUSH: And more importantly, it's a safety issue. This is a question of is it maintainable? If we had a problem, you'll see it. You'll see all kinds of -- where these things are joined, it'll corrode and start to go. It's not the kind of thing that happens instantaneously. You end up with a non-maintainable vehicle because both start to fail and things start to rust out. That's a maintenance, not a safety issue. But --

[redacted] But just a question.

MR. RUSH: Yeah.

[redacted] Would having anodes on there potentially prevent that from happening as opposed to just waiting and seeing if it happens?

MR. RUSH: Correct, yeah.

[redacted] (Indiscernible) two metals that are put together because the metals on an electrode negativity scale, you can't just pick any anode and stick it on there.

MR. RUSH: But generally, yeah. And so we -- it's not -- you

know, it's a -- to me it's sort of a -- it's not a major point.

[redacted] But, no, I get that it's not a major point. It's just that to me it's a -- I'd rather -- I mean I'd rather go and do this with preventative measures as opposed to --

MR. RUSH: Right, yeah.

[redacted] -- trying to fix it after the fact.

MR. RUSH: Correct, yeah.

[redacted] And be like, oh, shit, I guess we should have put some anodes on there.

MR. RUSH: So take it from this perspective. If you want to do anodes properly, you need to do a proper analysis of the structure, where to place them, how much to place them.

[redacted] Right.

MR. RUSH: We have so many other things on the engineering to do list that this doesn't percolate to the top.

[redacted] No, I understand that.

MR. RUSH: And so, yeah, we can just stick them on and put them all over the place which is how most people do, but properly you should analyze the actual structure and know how big they should be, where they should be. That has to do with are you going to be in a marina or not? Are we sitting in the water or sit on a lot? There are a whole bunch of issues. It didn't hit the top of the engineering let's go analyze this to hell list.

[redacted] Yeah, not only that, but there's specialty engineers that focus on this. We were -- was one --

MR. RUSH: Yeah.

[redacted] -- [redacted] (ph.) and they came down just to check out subs and, you know, looked at *Antipodes* and gave us some recommendations on, you know, that's why we have magnesium sitting on the thrusters?

MR. RUSH: Yeah. Same thing on the ElectroPods and the anodes.

[redacted] But to me, you know, this issue is, you know, there are difficulties and challenges that I think, you know, we have as OceanGate is, you know, we have basically two different branches of, you know, we've got this R&D side in development side, and then we've got the operational side, you know. And so some of our challenges on this communication on this team perspective is like we got switching hats between those roles, right. We have this where we're in this development --

MR. RUSH: So part of us is trying normally, engineering makes the vehicle and operations operate it. In the past, operations made and operated it which is --

[redacted] Yeah, and it's just, you know, switching hats and understanding those different variables is not an easy transition for people to make.

MR. RUSH: (Indiscernible) battery. That's not the final securing mechanism. We may clamp it. We may band clamp it, but we're still waiting for the second battery which hopefully it's here next week.

Vertical thrusters, this is just for getting it wet. We're going to have a flaring (ph.) over them. They'll get tied down. Same with the horizontal thrusters. We're going to put a right angle connector on those eventually so they can come in, and we'll be strapping them down and then we know it's a little gangly.

But the real question we have to answer is, you know, what's our battery life? What's our maneuverability? Can we turn this thing? Can we, you know, does it function? Does the control system have the robustness that we need? Or, is it like the problems we had with *Cyclops I* where the computers are failing every 5 seconds? That's the answer I want to get as soon as possible. And having cables dangling around, I could give a shit. I'm not going to be, you know, before we go up against a wreck, yeah, we're going to have those things covered. I'm not an idiot.

Same thing --

[redacted] Stockton, I wasn't trying to make you look like an idiot. On Friday, we agreed that I was going to do a quality inspection report this week.

MR. RUSH: Right, and we talked about --

[redacted] That's what this is here.

MR. RUSH: No, we were going to go through and we were going to show you everything in the sub, and that's been pushed back.

[redacted] That was for training.

MR. RUSH: No, that was, that was so you could ask questions. We wanted -- I wanted you to be aware of what was going on the sub

so you could ask intelligent questions to say, hey, what is the fusing? Where is the fuse? Is this fused? Why is this wire there?

[redacted] Okay.

MR. RUSH: And that's been getting pushed off and the update meetings have been going. So this is -- part of the reason this is sort of premature.

[redacted] This is nothing but the intent.

[redacted] None of it.

[redacted] No, of your -- what we're calling this, a quality whatever.

[redacted] Yes.

[redacted] None of this was part of that.

[redacted] Okay.

[redacted] What was the intent then?

[redacted] Part of the handoff.

[redacted] Part of the handoff? To go through and understand, how do you turn it on? Like this is where the breakers are. This --

[redacted] That's not quality to me. I guess --

(Crosstalk)

[redacted] Last Friday it was agreed at the meeting that I was going to a quality inspection. That's right. End of story.

MR. RUSH: This is true. I did sit down, but we said that the purpose of the go through was to -- before you could do -- the

issue is a quality from an operational perspective. What you did is a quality from an engineering perspective. I didn't hire you to be an engineer. I hired you because you understand operations.

[redacted] Right.

MR. RUSH: And so in order to determine the quality from an operational perspective, you need to know where are the 24 volt lines? Where are the breakers? Hey, that's not right. That thing needs a cover. There are a bunch of things operationally.

[redacted] Well, that wasn't --

MR. RUSH: Questioning the carbon fiber was never -- would have never been in there.

[redacted] Yeah.

MR. RUSH: I didn't you has a carbon fiber expert.

[redacted] No, you did not.

[redacted] But shouldn't he as the head pilot and me as a potential pilot be at least allowed to ask questions --

MR. RUSH: Yeah.

[redacted] -- to have peace of mind --

MR. RUSH: You're welcome to ask questions.

[redacted] Absolutely.

MR. RUSH: But, you know, if you ask a question about an O-ring and we give you our engineering answer to the O-ring and you say I don't believe it, I don't know what else I can do there. So, yeah, everybody's welcome to ask all the questions and they're welcome to see. We've got the acoustic monitoring system, and you

can see it, and we've shown it. You can sit there and scrub it and hit it and see that it works.

[redacted] We've never hidden any of it.

[redacted] I'm coming at this from my accounting background as an auditor.

MR. RUSH: Right.

[redacted] And I can have a client tell me his books are perfect.

MR. RUSH: I know.

[redacted] I don't trust him.

MR. RUSH: Correct.

[redacted] I mean I may trust him as a person.

MR. RUSH: Trust is verifying.

[redacted] Trust is verifying,

MR. RUSH: Correct.

[redacted] And I feel a little bit like we're getting some pushback the verification pieces.

MR. RUSH: The verification --

[redacted] Trust me, trust me, trust me.

MR. RUSH: The verification is --

[redacted] And that's difficult.

MR. RUSH: The verification is the testing. So the question is I'm not asking any of the pilots to make an engineering assessment of the sub. What I'm asking them to do is make an operational assessment of the sub which is how much testing do you

really think you need? And [redacted] might say, hey, given our problem with the previous thrusters, we don't have 100 hours on the computers. I don't think we're safe. Or, you know, there are a number of those things we can say, this is the amount of testing and operational experience I believe we need in this situation. On something like a 24 volt charging system, it may be, hey, I don't think we need a lot because I've seen it and it'll work and maybe we need some other elements for safety. But it's the testing regimen that we're looking for and that's how we validate it. So you validate it by testing.

Having everybody go over the engineering and having everybody, you know, look at the certs and the docs and the rest of that, is irrelevant. What they should be looking at is how many cycles are there? What should I look at? Can I tell when this thing has failed. Can I see when there's a component? You know, can I do a proper pre-dive of this unit? If somebody comes and says I don't believe this acoustic monitoring. I just don't believe it. I don't like electronics. I don't want to hear it, then they shouldn't they dive with us period. If you don't have confidence in the acoustic monitoring as a method of detecting failure of carbon fiber, you shouldn't go in the sub.

[redacted] Ultimately your life is always in the hands and trusting an engineer. You do that in your car.

[redacted] Which I get.

[redacted] You don't verify any of that.

[redacted] But they provide me with the manuals so I can read it and --

MR. RUSH: Okay.

(Crosstalk)

[redacted] But this goes back to what I was saying earlier is that, you know, we are on *Cyclops II*, *Titan*, we're in this research and development phase. We need to as a team realize that we're in this development phase, and we're not going to get performance reports from engineering during the development of the vehicle. It's just -- I get what [redacted] saying. We're collecting data. We're going to get real time data back from this testing and then come up with a submarine and then determine based upon that testing what our limitations are for operations. We're going to have -- we'll have that feedback and then we can make the determine like what are our operational procedures based upon that testing and what are out boundaries? Can we operate, you know, and this will be the large platform as well? What sea safe boundaries are we going to -- we have to develop that as a collective team and, you know, based upon the existence of vehicles.

MR. RUSH: In the past, before we had computers, we were able to analyze everything down to a rat's ass. Build, test, build, test, you know, and that's intermittent. When you get computers to be able to do everything, now it's design, design, design, and they keep going. And what the ocean environment allows us, it is

mighty unfriendly on the surface, but once you go under water, your loads are all known, they're repeatable, and they're linear in their onset which allows you to do things in the old world method which is the efficient way to do it. We could spend forever analyzing what's our descent rate? And we could do a higher dynamic study and we can do this stuff or we can go out and test it and tell us what it actually is. And so we're taking -- it completely falls in the face of any -- an Alvin (ph.) design or anything else, and the reason Alvin costs so much is because they spent way too long on stuff that was more about meetings and making sure they had massive consensus as opposed to somebody saying this is the way it's going to be.

All the background developments, whether it was the Saturn 5 program with [redacted] or whether it was the early nuclear stuff, there's always one person who stick their foot down. Otherwise, you've got a committee that takes forever and costs a lot.

So understanding how, I think from a pilot's perspective, number one thing, you need to get some confidence about acoustic monitoring. And, if you can get there and some people can't. Some people say, look, I'm not going to trust my life to a computer telling me that the patient's heart is okay. Then this isn't the right place to be.

[redacted] Yeah, I have no experience with acoustic monitoring. So I mean my --

MR. RUSH: Once you see them, you'll see how it's made, and you'll sit there and go, wow, I can hear crackling of shrimp. I can hear all this stuff. You'll know those things.

[redacted] Everyone's going to have go through this process of this transition from R&D to operations and be comfortable with it.

MR. RUSH: Right, before you even get in the sub.

[redacted] Every one of us have to go through that process. And --

[redacted] And, [redacted] -- go ahead. Sorry.

[redacted] Yeah. It's just -- we're all going to have to go through that process because we're doing new stuff. It's just part of that path.

[redacted] Take this out. If I take this lead right here, .5 millimeter lead, and I will show you, I have 9 times the instruments installed in that sub right now, that Stockton asked me to put in. And if I take this lead and I break it on the outside surface of segment 1, we will see the breaking impulse on the forward instruments. And I will see also a time delay from the instruments from the first ones to the last ones.

[redacted] So how do you know the difference between pencil lead breaking and something popping inside the vessel?

[redacted] That's a good question.

MR. RUSH: Yeah. And that's why we hired a Ph.D. in statistics.

(Crosstalk)

[redacted] Or biological sounds, right?

[redacted] Yeah.

MR. RUSH: Yeah, yeah. So we're going to probably have an external transducer so we can -- things like shrimp crackling and --

[redacted] Yeah.

MR. RUSH: -- harbor porpoise, we may have a lot of false positives.

[redacted] Right.

MR. RUSH: And that's the question.

[redacted] I can answer that. Let's not do it now but I'd be happy to answer that. If you're really interested in --

[redacted] Yeah, I -- I mean it is my life on the line --

MR. RUSH: Right.

[redacted] -- so, yeah, I do --

[redacted] I'll explain it.

MR. RUSH: Anyway, let's keep going.

[redacted] I think what would be beneficial, you know, outside this meeting is, you know, this is -- like I said, this is a journey for everyone at OceanGate, and everyone that's going to be involved in our operations in, you know, having and we have this moving thing that's going to be developing. We're going to be, you know, the performance reports based upon testing, you know, we're all running fast and circling around and making sure

that we have this really effective communication. It's going to be very challenging given our timeline and allowing each, you know, person to do that process and get an understanding of complex things that they're not an expert in is going to take great effort by this team to communicate. I just want to, you know, we need to think about that holistically at OceanGate and how to manage that.

[redacted] Agreed.

MR. RUSH: Okay. So the last two items have to do with the flooring and the vinyl. One of the questions is what is the appropriate flame test? So there's a flame test for fireproof stuff for your house because you have an open flame and there's a rational flame test for a submarine which you don't have an open flame. You do have wires that short. And the real test --

[redacted] You have oxygen, right? I mean --

MR. RUSH: Well, you've got oxygen but it shouldn't be a high oxygen -- it's not a high oxygen environment unless somebody decide to crank it up. So the question is can you take a 24 volt battery and a wire and cause this thing flame on.

[redacted] Which flame standard did you use?

[redacted]

[redacted] No, you wrote it on here. It's like some sort of hit list. You asked me about PBHO. What flame standard did you use?

[redacted] Flame standard, you take it outside and set

it alight for 3 seconds. All I did was it was a test that [redacted] (ph.) asked me to do which I did --

MR. RUSH: On the, on the acrylic.

[redacted] -- on the tape.

MR. RUSH: You did it on the flooring.

[redacted] No, on the acrylic. That was on flooring. I did the tape. I let you know on the tape. You told me right at the 5 o'clock meeting and you said to me, take a sample of that, HTPE, and set it alight. I did it under instruction from you --

MR. RUSH: Okay.

[redacted] -- which is where it came from.

[redacted] Sounds good.

MR. RUSH: I didn't even look at it.

[redacted] I just asked you about the standard. I've already done the test -- did the test long before, and I let you know that. I also let you know when I saw your little flame test that it was fine, but you still wrote it. Why? The engineer already told you it's fine, and I already told you about my previous tests.

[redacted] What test did you do?

[redacted] Why were you testing it if we already tested it?

[redacted] Exactly.

MR. RUSH: He did ask me. So that's the reason for it.

[redacted] Okay. But it's going to be tested again. We've

already had this conversation.

MR. RUSH: So, one of the -- obviously a concern here is to me it's clear that there is not a lot of confidence on your part in the engineering that went into this vessel, and that your experience in other vessels gives you serious concerns about the safety of *Cyclops II* from the very fundamental level. From the carbon fiber and then you have serious concerns with the safety of the test procedure and me going in it and not being (indiscernible). And you have serious -- you have a lot of serious -- you have some very serious concerns.

[redacted] Correct.

MR. RUSH: And I don't believe we have alleviated those concerns in this meeting at this point.

[redacted] Right.

MR. RUSH: And I don't believe we're going to alleviate your concerns.

[redacted] Correct.

MR. RUSH: That's a problem. You're a great pilot. There's no question about that.

[redacted] Sure.

MR. RUSH: And, you've done a great job on *Cyclops I* and *Antipodes*. Clearly *Cyclops II* is not something you are eager to jump into because it is -- you -- from what you're saying, you have these serious safety concerns that you're not going to get comfortable with.

[redacted] I do, and this is the first day we've ever had a proper sit down, all of us, to discuss all of this, okay. I now there's a lot in terms of PBHO guidelines, the viewport. We know the viewport may not make it --

MR. RUSH: Um-hum.

[redacted] -- okay. We know about the carbon fiber, okay. We've all seen the samples. The samples, they're a mess.

MR. RUSH: They're not samples.

[redacted] They're not samples.

MR. RUSH: They're scrap.

[redacted] They're cut off (indiscernible). They're scrap off the ends.

[redacted] They're scrap.

[redacted] But, my thing is, a genuine question. Is there anywhere that can do non-destructive testing on that hull to verify the integrity. And I know in a lot of produce that have been built out of carbon fiber, they do have voids which is acceptable in the space industry and stuff like that and the boating industry. It's acceptable.

What are we saying the baseline against right now to between you and the water under cover, dropping yourself down to 4,000 meters? What is the justification there in doing that without having any proper baseline data --

MR. RUSH: Right, and I --

(Crosstalk)

MR. RUSH: -- talked to Boeing about the same issue. I said how do we inspect this? We have a 5 foot diameter CAT scan, but it will not detect micro voids. It'll only gross delaminations.

[redacted] So why don't we do it?

MR. RUSH: Because it's got steel on it now. I can't be done now. And my question is, the actual test, we get a perfect test environment on every goddamn dive, something you can't get in flight. Every dive. We go through 10 feet, 20 feet, all the way down. We get the exact same pressure and once we get down a couple thousand meters, the exact same temperature. Every dive. And that gives you the ability to test. Every dive is collecting data. We're going to get heuristic (ph.) data that will say, shit, I'm at 2,000 meters and it's noisier than it was yesterday. You better call it off. That's what we've been focusing on. That is the value. That allows us to do this. And so going and getting something that comes up and says there are voids or there's not voids, I don't even care if they tell me there's a 1,000 voids. I'd still go do it because I want to see the data as it goes down. I am confident that even if there was massive voids, it's (indiscernible) fault. It might only be good to 2,000 meters.

[redacted] It may only be good for 20 meters.

MR. RUSH: No.

[redacted] You don't know.

MR. RUSH: I don't know, but I mean that's not rational.

[redacted] You can't -- nobody here can say --

MR. RUSH: Exactly.

[redacted] -- what the hull is good for.

MR. RUSH: Right. Exactly, exactly. I can tell you this --

[redacted] You can bring your results back from the dives.

[redacted] Right.

[redacted] You get your (indiscernible) in your crack lines.

[redacted] That's right.

[redacted] Okay. What's to guarantee that those voids were there before you even did the first dive in the marina --

MR. RUSH: Correct.

[redacted] -- or after that last dive where Stockton stated we're scrapping the hull.

MR. RUSH: I'll ask you this question.

[redacted] What?

MR. RUSH: I -- do you think that hull can do 20 feet from the marina?

[redacted] Stockton, I don't know.

MR. RUSH: Okay.

[redacted] That's my answer. I am no carbon fiber expert.

MR. RUSH: Okay.

[redacted] All I'm asking for is information here.

MR. RUSH: Okay.

[redacted] And information, I've got it now. You don't have information.

[redacted] No, we do.

[redacted] Hold on.

[redacted] We have all the information we need.

[redacted] Right. Okay.

[redacted] No, no, no. You can't dismiss that.

[redacted] I haven't dismissed it because I asked to see it.

[redacted] You don't have to see it.

[redacted]

MR. RUSH: Okay. Let's back up. Let's get to what I was getting to at the outset --

[redacted] Yes, sir.

MR. RUSH: -- which is you're not comfortable with this hull nor are you comfortable with our test plan. Is that right?

[redacted] Listen, the main thing here is I am highlighting issues that you, you and you have seen on the shop floor. Even your wife pointed out that O-ring, you know, the hole. She's like --

MR. RUSH: You're not an engineer.

[redacted] I know. But --

MR. RUSH: You didn't have the hat on, too.

[redacted] What's that?

MR. RUSH: You didn't have a helmet.

[redacted] Oh, yeah.

MR. RUSH: She's constantly pointing that out.

[redacted] Yeah, I know that, but honestly, we don't know what's going to happen to that carbon, okay. Any sort of testing we do, we should be doing unmanned to start.

MR. RUSH: That's your opinion.

[redacted] Absolutely, that we're all entitled to.

MR. RUSH: I understand.

[redacted] We're all entitled to.

MR. RUSH: And where I'm getting to this thing is this is the future of the company. This is the path I've determined to take. This is the test program I've determined to take, and I've been working on the engineering, and I'm comfortable with it. And that's what -- I'm the only SOB who's going in this thing. And I'm not going to force anybody to go into it, and they can all look at it later. You're not comfortable with that.

[redacted] So why the change of mind for getting it scanned --

MR. RUSH: Right.

[redacted] -- when it was agreed it was going to get scanned --

MR. RUSH: Because I've asked --

[redacted] -- even in all the documentation.

MR. RUSH: I asked -- after I talked to Boeing and they said

basically you're not going to get any useful data out of it.

[redacted] Because the loss with the --

[redacted] It would show big voids but it wouldn't show little voids. It will give you details.

[redacted] No, no, no.

[redacted] That's what Stockton said. It may show big voids. So why not do it?

MR. RUSH: Because we chose not to because, one, we couldn't a machine that would do it. You know, maybe if we had looked in the lumber industry. We weren't doing it with Boeing.

[redacted] Yeah.

MR. RUSH: So then the question of could we get to Boeing? I chose a lot of things not to do. Yeah, I could go down in Alvin pack (ph.). Give me $42 million. I'll go down in Alvin pack. I'm willing to not go down in Alvin. We're doing things differently, and that's, that's the problem. We're doing things significantly differently than any program you've ever been on.

[redacted] Exactly.

MR. RUSH: And that is making you very nervous.

[redacted] These issues are --

MR. RUSH: And I'm not going to get over that.

[redacted] I know it. These issues are making me nervous --

MR. RUSH: I understand.

[redacted] -- for putting people in --

MR. RUSH: I understand.

[redacted] This is visible. It's visible.

MR. RUSH: I understand.

[redacted] Okay. Now, the viewport, it's visible.

MR. RUSH: Right. Okay.

[redacted] Okay. So deviation is from the original plan.

MR. RUSH: I understand.

[redacted] The original plan was June or July that vehicle was going unmanned --

MR. RUSH: Correct.

[redacted] -- to Penn State (ph.).

MR. RUSH: Yeah, it was.

[redacted] Yeah.

[redacted] It was delayed.

MR. RUSH: Yep.

[redacted] Why?

MR. RUSH: Do you know why?

[redacted] Because it was delayed.

[redacted] No, no, not at all.

MR. RUSH: There were multiple reasons.

[redacted] Not our fault.

MR. RUSH: One was they wouldn't let us put in there.

[redacted] It was the displaced volume. They wanted us to fill the inside no less than 94 percent (indiscernible).

[redacted] Well, this is news.

MR. RUSH: Okay. So we made the determination, no, and we'll do it this way.

[redacted] Okay.

MR. RUSH: And that will happen, and that's the reason we're able to get farther than anybody else. We're being more nimble, and we're doing things that are non-standard and that is, that that is not something that you are going to get comfortable with.

[redacted] It's not a case of get comfortable with. Stockton, I came aboard this project. I moved my family from the UK.

MR. RUSH: I understand.

[redacted] This project, okay, had a plan. We deviated from that plan so much over the last 2 years even before [redacted] started, okay. It's just went a different angle completely. You've got to agree with me.

MR. RUSH: I don't know if I'd say a different angle. It has changed, and I'm -- and it will change a lot. The business has changed. You haven't seen nothing. You want to talk to original investors what we're going to do here. That's a small nimble business.

[redacted] So for you to turn around and say I am weary of this. Yes, I am because there are areas in here --

MR. RUSH: I understand.

[redacted] -- that with my experience I can see there

being issues, and I'm allowed that opinion.

MR. RUSH: You are.

[redacted] I am allowed that opinion.

[redacted] But that doesn't call for an inspection report. That's a --

[redacted] [redacted] I will do what I want in terms of the inspection report. This was an inspection report. We spoke about it last Friday that Stockton turned around and said, you do it.

MR. RUSH: I didn't say do a report. I said we were going to go through the sub.

[redacted] No.

MR. RUSH: I did not say I was going to do a report.

[redacted] It wasn't made clear. I said to you upstairs in the afternoon on the Friday afternoon, we were talking about the whole life support thing, okay. I said, I'm going to go through this with a fine tooth comb. You never questioned that.

MR. RUSH: Right, and I didn't say write a report on it.

[redacted] Well, what's the objection with writing a report?

MR. RUSH: You first figure out what's going on and ask the questions and get an answer so you can have an intelligent answer to it.

[redacted] That is -- that's a misstatement because I have asked him, I have asked you and I have asked you --

MR. RUSH: You don't believe the Parker O-ring. Even today

you don't.

[redacted] What's the ceiling surface?

[redacted] [redacted] --

[redacted] No, no.

[redacted] [redacted] --

MR. RUSH: Let's stop. Let's keep emotions out of this. All I'm saying is we've reached an impasse.

[redacted] Um-hum.

MR. RUSH: Okay.

[redacted] Yeah.

MR. RUSH: I think the proper resolution here, if you're up for being a contract pilot, is for you to be a contract pilot and to not be in --

[redacted] Is this a conversation we have with [redacted] --

MR. RUSH: What?

[redacted] -- sitting in here? You want me to be a contract pilot. Is this not a conversation we should be having on our own, not the engineer and director sitting beside us?

MR. RUSH: If he'd like to leave.

[redacted] I think this is going a different tangent here. So I think --

MR. RUSH: Sure.

[redacted] -- we should sit down and discuss this.

MR. RUSH: Well, he's your direct superior. So he will sit in.

[redacted] Okay.

MR. RUSH: So my point is given that we -- you stated you're not going to get comfortable certainly the test part of the project, with me being in the sub, that's not something you will ever get comfortable with.

[redacted] These issues need to be closed out.

MR. RUSH: I understand.

[redacted] I -- these are serious issues.

MR. RUSH: I understand, and I believe --

[redacted] The risk is high here --

MR. RUSH: I understand.

[redacted] -- especially with this.

MR. RUSH: I understand.

[redacted] It's not been made clear why I'm not being given the information from [redacted]

MR. RUSH: Correct. Yeah. I've seen the information. I --

[redacted] Because it ain't good.

MR. RUSH: Yeah, because [redacted] doesn't know what the facts are period. And it's fine. You can, you can -- it's fine to poke holes and ask questions. The challenge is that you -- I can give you an answer and you disagree and you stick with your approach, and that -- and you have an opinion, and you will not -- I'm not going to get you off it. If it's not PBHO certified, you know, the PBHO certification means absolutely nothing, you're not going to be comfortable with it. You're not going to be

comfortable, what you've said with the carbon fiber hull and a human being going in on the first dive.

[redacted] The main thing I'm concerned with, Stockton, is you're throwing yourself down 4,000.

MR. RUSH: I'm not throwing myself to 4,000 meters. I'm incrementally testing it until I get down there.

[redacted] This is the thing. [redacted] and I have discussed this. I've sent [redacted] a test proceed that should be done properly, okay, in terms of that system going down on a wire. You judge it using your strain gauges, your test gauges, you get the data, analyze it. It's staircasing.

MR. RUSH: I understand.

[redacted] Yes, it's the industry. I've been in it long enough --

MR. RUSH: I understand.

[redacted] -- to know how the industry works. Nobody has had an accident for such a long time --

MR. RUSH: I understand.

[redacted] -- for that reason.

MR. RUSH: I understand.

[redacted] Stringent testing.

MR. RUSH: I understand.

[redacted] Okay.

MR. RUSH: Okay.

[redacted] *Cyclops*, it's not classed. The hull may be

classed, okay, fair enough, but in terms of best system --

MR. RUSH: Right.

[redacted] -- it's all new to everybody.

MR. RUSH: I understand.

[redacted] So why are we not even trying to follow the guidelines from the industry in terms of doing the pressure testing.

MR. RUSH: There's an industry hanging on a rope guideline? First of all, hanging it on a rope is not, is not a zero probability solution. It is not without risk. It is not without difficulty. And, I am confident that with an incremental stair step approach down, having a person is just as safe as having a (indiscernible). You try to -- you take a 10,000 pound load off the back of a ship on a 3 mile cable, that is not a small endeavor. This is not like taking, you know, *Suds* out dropping it down 400 feet. That has it's own engineering challenges. I've decided this is how I am going to do it. You are not going to ever be comfortable with that.

[redacted] I -- my main concern here, Stockton, I get the gung-ho thing, wanting to go and do that. Again --

MR. RUSH: It's not a gung-ho thing.

[redacted] Stockton, I think you have to listen to me here. The main thing which you are sweeping under the carpet here is if something goes wrong with you being in that submersible, okay, you're topside support, those are the ones that are left

with the outcome of. Those are the ones that are left to answer to the accident investigation team. OceanGate is done.

MR. RUSH: I understand.

[redacted] Everybody says, it'll just be Stockton's wife. That's the only person you can be liable for. Nonsense. The accident investigation team will come down.

MR. RUSH: I understand.

[redacted] It would shut the industry down.

MR. RUSH: I understand, and that's bullshit, but that's fine.

[redacted] Okay.

MR. RUSH: You know, the industry likes to say that all the time. What's [redacted] do?

[redacted] That man is different. That man does not have -- yeah, he is different. Very different.

MR. RUSH: If [redacted] has an accident, will it shut the industry down?

[redacted] I'll agree with him on -- I am uncomfortable with you doing the manned test as well, and I've told this to [redacted] (ph.) that the thought of going down to the Bahamas and bring back a dead body would mentally fuck everyone who is down there, and that's scares the shit out of me.

MR. RUSH: Okay. And if you worked for Virgin Galactic, you've got three dead bodies. I mean that's the nature of casting things in the extremes.

[redacted] Understood. I'm just saying it's not just you.

MR. RUSH: By the way, you don't be bringing my body back.

[redacted] Me, I know.

MR. RUSH: I understand the concept and so this isn't for everyone, and that's where I'm getting to, which is this project is not for everyone. Okay. And the question is -- what I'm getting to, it's clearly not an approach that you're comfortable with. You don't want to be associated with it. You don't want me to die and --

[redacted] I never said I don't want to be associated with that. I am voicing my safety concerns which as an employee of the company.

MR. RUSH: I understand.

[redacted] I've been here for nearly 3 years now, Stockton. I've seen the way it was. I am addressing what I view as safety concerns, concerns I have mentioned verbally --

MR. RUSH: Correct.

[redacted] -- which have been dismissed by everybody.

MR. RUSH: I have -- no, I've listened to them and I have given you my response to them and you think my response is inadequate.

[redacted] Right.

MR. RUSH: Okay. So that's the impasse we're in.

[redacted] You know, I'm going to keep on coming back to this because where we're at right now is we are -- we're at the

infancy of this -- of operating this sub. And we are -- we're jumping ahead and jumping to conclusions based upon little operational facts and little -- we're just making a lot of assumptions, and that's why it's so critical through this development process that we collect accurate data. We have performance reports from engineering. We, you know, and we can take that quantitative data and move forward. And we've done that with the development of the Mars Program, you know. In transferring that over, we've developed a new vehicle based upon, you know, our performance of that, you know, in carrying that over into the *Cyclops* Program, and that's --

MR. RUSH: Yeah, everybody said that wouldn't work. Even [redacted] said it wouldn't work, you know, but --

[redacted] But the fact of the matter is that --

MR. RUSH: Everything I've done on this project is people telling me it won't work. You can't do that. It will not happen. You can't -- starting with you can't dive here in zero visibility with an inexperienced crew on wrecks. You know, people didn't understand what sonar could do for you. I've been fighting this ting since I started this business, and I don't want to fight it with you. And I don't want to put you in a position that you are feeling like you've been badgered into signing off of me going and killing myself. I have no desire to die. I've got a nice granddaughter. I am going to be around. I understand this kind of risk, and I'm going into with eyes open and I think this is one

of the safest things I will ever do, you know, a lot safer than flying the first plane I ever built made of carbon fiber with a 300 horsepower engine on it.

So I have no desire to die, and I'm not going to die. What may easily happen is we will fail. We will get down there and we will find that the acoustic monitoring has, you know, fails after 10 hours or gives false -- too many false positives or that the thing is noisy or the dome is creaking because we're going to be measuring that or it starts to craze. I can come up with 50 reasons why we have to call it off and we fail as a company. I'm not dying. No one dying under my watch period. You don't agree with that, and I don't want to put you in that position. And that's why I'm saying contract pilot may make the most sense because I know you're comfortable with the *Antipodes* and I know you're comfortable with *Cyclops I*.

But, I can't have you here -- one, I can't force you to work on a project that you think has the potential to kill me and destroy an industry and participate in that activity. And I'm not going to do what you want. That's the impasse.

[redacted] I don't want to speak for [redacted] here, but for myself, and this -- my frustration partially comes from obviously my background is accounting. So this is all brand new to me, and what I know, I know from diving and pressures and that sort of stuff. The frustration is trying to get additional knowledge from [redacted] he's not here to defend himself. He puts up walls. He

stops you. I want to know this stuff and granted he's, you know, willing to teach about strain gauges and that's great. But, I feel like everything else is trust me, I'm an engineer, and you don't need to see that.

[redacted] So do I.

[redacted] And that's frustrating. This group should be the most open group. We should be talking with each other constantly, pilots, engineers, operations. We should all be on the same page, and it's an us against them, and that --

MR. RUSH: That's very --

[redacted] -- that's going to kill this company.

MR. RUSH: Oh, yeah, yeah, I know, and it's been there for a number of years and it's what I brought up, you know, months ago, that is what will kill the project, yeah.

[redacted] And I mean I hate to throw [redacted] under the bus, but he --

MR. RUSH: He will talk your ear off if he wants, but he won't talk your ear off if he thinks you're going to criticize and he needs to get something done and he just comes to the table but, you know, he wants to be --

[redacted] But sometimes if you just ask a question, it's like, hey, can I see that? I mean I don't fully understand why he's so unwilling to let us --

MR. RUSH: They don't like each other. I mean that's --

[redacted] I get that, but for him to just say, no, you can't

see it.

MR. RUSH: Yeah.

[redacted] Because -- and I mean for -- he's not saying it in so many words, but he's saying you're too dumb to review this stuff.

MR. RUSH: Right. No, what you'll see, what his report said, if -- what [redacted] has said, if the shape is like this, it would be good to 3,000 meters. Because we have material here, he says he'll only certify it to like 1,000 meters. I'm like really. That's interesting. And I talked to him at length about that. He doesn't have any real data for this. He says, well, it's like a cathedral. A cathedral's having gravity. And I keep going back to [redacted], because it's long. You can't have a short conversation with [redacted]. I said, tell me this. Will it craze? Will it creek? Will I have warning that it's going to fail? And he said, yes. And then he said, so what's your back up plan? If you're in the Bahamas and it gets to 2,000 meters and this thing is creeping and crazing, you're screwed. I said we have a back up plan. He wants to know, what is it? I'm not going to tell you because you're a pain in the ass. You've lied to us about thrusters. I didn't say that but, you know, we'll have a steel plate that we can put in there and finish our testing.

It's going to be a bit of a problem because we're not going to have a viewport until the machine went in, but we do have a back up plan.

[redacted] So is it basically like a steel O-ring that you're going to --

MR. RUSH: No, it's literally a steel plate like thing.

[redacted] A steel plate. You're just going to cover it.

MR. RUSH: Yeah, we'll cut out the inside and Rayotec can do an insert glass fitting for a pressure house --

[redacted] And steel and titanium.

MR. RUSH: Yeah, so that's what the housing's for, you know, is okay. What's the shape? Should it be steel? Should it be aluminum? How much of a plug and all that. So where does it sit it transfers the load properly, but those are things you don't have confidence in.

[redacted] Well, we don't have confidence in them because we're not being told about them.

[redacted] Yeah, we're not being told. Well, that's it, Stockton. We're not getting answers. We're not getting correct answers. It's just -- it's been a problem and there has been a problem since day one, and we have been trying to make it work, that relationship thing, and --

MR. RUSH: That goes both ways. He says he's been trying. I get he said, she said from all of this. So the fact is I know. I'm getting all the answers and I'm the guy who's listening to everything that's [redacted] saying, everything that [redacted] saying, everything that Boeing's saying, everything that [redacted] [redacted] saying, ATK, TV. I'm the guy who's collecting all that

data, okay. It sits here. And if you don't have confidence in the CEO, then that's the wrong place to be, and that's what it comes down to. I'm not -- and anybody can come ask me. Have I ever, you know, told you -- come and ask me. What is this acoustic monitoring system? I know all this stuff. I talk to him all the time. And I haven't rejected somebody and said I'm not going to tell you. I'll tell you. I just told you what the acrylic is. According to [redacted], he's like, it won't work at all. And why did he say that? Because he wants to sell us another one. He had more acrylic. He said, why don't you buy one like this? Because that will make it support 1,000 meters. And I said really. But it's going to distort just like the *Antipodes*. I want the one that's flat. If it doesn't work, I could go to that or I'm going to actually go to the plate.

And so, you know, I have all that data and I'm happy to share it. I give a damn what he says, but I'm the guy who's been talking to him. And that's what, you know, offends me is, you know, I've been in this thing. I've been getting this data. I have been collating from experts all over the planet, and I'm still never going to be able to convince you. You've got a history. I know. You've got a history of testing --

[redacted] A lot.

MR. RUSH: -- stuff under and seeing things.

[redacted] A lot.

MR. RUSH: I understand. And I'm never going to convince you

that's what -- that's the problem.

[redacted] To me, these --

MR. RUSH: I know.

[redacted] -- these are serious issues, Stockton.

MR. RUSH: I understand that. You've said that. I understand that. I mean it's health and safety.

[redacted] I'm not talking about something that's in a car and it's going to fall apart, or whatever.

MR. RUSH: I understand.

[redacted] This is pressure bearing.

MR. RUSH: I understand.

[redacted] This is intense pressure.

MR. RUSH: I understand that. I understand.

[redacted] I want this project to work. I came over here before this project started.

MR. RUSH: I understand you do. I understand you want this project to work but I am telling you, I understand that. And just told me what the failure was.

[redacted] Stockton, it's going to leak.

MR. RUSH: Okay. Am I going to die because it leaks?

[redacted] It's going to leak.

MR. RUSH: An I going to die?

[redacted] But --

MR. RUSH: Am I going to die?

[redacted] Get -- I mean honestly, we've not obviously

exhausted the amount of companies that could be doing scounding (ph.) of the hull to show what it's like. There's two samples sitting in the shop floor up at --

MR. RUSH: Those are not samples.

[redacted] They are --

MR. RUSH: They are scrap material.

[redacted] -- segments from carbon hull.

MR. RUSH: They are scrap. That's called scrap.

[redacted] Okay.

MR. RUSH: A sample is something that is representative of the primary. If you look at those pieces of scrap, they're shit, not so shitty, sort of shitty, looking better. The only part that matters is the part that's cut off. You look at that surface. You start looking at the rest of it, yeah, it was all back and forth. That was always supposed to be a cut off. It is scrap. So you can draw a picture.

Let's get back to the fact. The fact is we're not going to get there. You're not going to get comfortable with my approach.

[redacted] I disagree with your decisions.

MR. RUSH: I understand. Yeah. I mean that's insurmountable.

[redacted] That's, you know, that's my question. You always -- you know, we have this test plan here or you some test profile, right. We have 40, close to 40 days of testing here in Everett before we go to the Bahamas. Is that, you know, we talked

about maybe delaying the Bahamas. If we can -- if we don't fit those profiles or we run into test points within, you know, this development --

MR. RUSH: Yeah, right.

[redacted] -- you know, and we're way off.

MR. RUSH: Then we could start at 50 meters.

[redacted] Yeah, whatever. We have these anomalies, and how --

MR. RUSH: That's what [redacted] even talking about.

[redacted] And that's, you know, part of this development of this program is we have to collect these data points and there's real world testing to take place and, you know, we all have to do this journey and be comfortable with that. You know --

MR. RUSH: And I don't want to force anybody down the journey.

[redacted] Yeah, and -- but with that said, you know, we're going to have, you know, I've talked to [redacted] about, you know, the request for information, the disclosure of things. We're going to have all sorts of questions, you know, from different departments on how to behave and how to maintain and, you know, so this upcoming meeting that's for now Monday, is going to answer some of those, but we're still in this transitional period, and we're going to ride this transitional period all the way through the Bahamas, and then come up with operational procedures based upon that success or those anomalies that we run

into.

[redacted] What's this meeting on Monday?

MR. RUSH: It's to review the systems.

[redacted] It's a systems review, and that's what [redacted] walk talking about, you know, talking about, okay, will this break or does this? This is how you turn on *Cyclops II*. This is how you fire up the computers. This is, you know, the basic going through the systems that engineering's been working on and developing and starting that transition to operations but at the same time, we are still in development mode, and things are going to be changing, right. We have -- we know that some things have been slapped together, you know, like for example, the thruster, you know, has got all sorts of different types of hardware on there. That's not going to the Bahamas and certainly not going out to, you know, *Titanic* with three different types of fasteners on a thruster mount.

MR. RUSH: There won't be anything like that.

[redacted] But, you know, that was available, what was in the shop, and -- but to me, I'm not going to sign off from operations for that to go out in a case like that. Is that fine for testing in the marina? If we have a rusty fastener, is that the end of the world? Or if we have a missing anode, you know, I don't think it's ideal but it's -- I'm not going to say, no, we can't go do a dunk a here and, you know, just because we are going to have a little bit of rust and, you know, but there's certain

things that we are going to make the determination if we don't have the right information in from this upcoming brief, we're going to say, we're not going to put a person in it until this.

MR. RUSH: And the brief is not a release to put a person in it yet.

[redacted] Correct. Yeah, yeah.

MR. RUSH: We're getting at the process.

[redacted] It starts that --

MR. RUSH: Right.

[redacted] -- dialogue. The dialogue to me has not been well established and it has not been as good as we would all like, but to me that's just an open book that we're all going to write together and get down this path so we have an operational sub and we have a successful program. That's the key to me. That's -- how do we, all at OceanGate, make this a successful program because this is our goal. We've got a very tight timeline to do it.

MR. RUSH: So let's go back to square one.

[redacted] Well, here's -- I'm putting my HR hat on here.

MR. RUSH: Yeah.

[redacted] You know, what -- I guess what do you need? I mean what would make you comfortable with continuing to be the director of marine operations here? Is it -- are you in an all or nothing like all of this needs to be -- I have to have the hull --

MR. RUSH: Scanned.

[redacted] -- scanned. I have to --

[redacted] I would like the hull scanned, yes, absolutely.

[redacted] Is that -- I guess the question is, is that a -- the hull has to be scanned or I can --

[redacted] Cannot sign off on it?

[redacted] Yeah. I mean are you there or --

[redacted] I don't care. Are you saying it? It does not matter what I say. That's my point, right?

MR. RUSH: That's why I think we're at an impasse because you have made it clear. These things have to be addressed to your satisfaction, not to my satisfaction, to your satisfaction. And on top of that, there's no way you're going to be comfortable with me going in the sub.

[redacted] Is that --

MR. RUSH: Those are the points that are pretty clear. You've stated that pretty clearly.

[redacted] I don't if there's any option. What they are, I don't know. I mean there's ultrasonic. There's x-ray. There's --

MR. RUSH: I've talked to a bunch of folks. Good luck. I mean really because we had the same thing with the -- we talked to [redacted] about doing this so we could qualify in case we had a problem in the future and, you know, he's looked at a bunch of stuff, but again, I've given you my opinion of [redacted] I've

talked to the Boeing guys. It's not easy. Nobody's made a hull like this, 5 inches thick of carbon fiber and particularly now it's got two titanium ends, you just took a whole bunch -- the area that you're most concerned about is the very first part. It's a concern that Boeing has. It's Boeing has. It's going to broom (ph.) out, and that's where you're going to end up having the biggest problems. Guess what? That's not encapsulated titanium. You ain't going to be able to handle that.

[redacted] How much is the width on the -- I mean if this is the carbon fiber, how much is --

MR. RUSH: It ain't much.

[redacted] Probably like your finger size.

[redacted] Oh, okay.

[redacted] You've answered my questions. So.

MR. RUSH: Well, I have, not to your satisfaction but I have answered them.

[redacted] Correct.

MR. RUSH: Yeah. Okay. And having you have such a deep seated opinion that the approach that we are taking, I am pushing, is the wrong one, is not something we can deal with as a company. We can't have the director of marine ops not have confidence in the test plan or the construction of the vessel that he's in charge of. Now, you can see it from my perspective. That just won't work. I'm not going to bend. You're not going to bend.

[redacted] Okay.

MR. RUSH: Have I stated it clearly?

[redacted] Yeah.

MR. RUSH: I like you. I think you're a great pilot. I understand your position, but you have to understand my position and the approach that I'm taking.

[redacted] Which I don't agree with.

MR. RUSH: I understand. No, and I appreciate your honestly.

[redacted] I'm the same. I like you. Although I respect you, we do have disagreements --

MR. RUSH: I understand.

[redacted] -- a lot. What I'm saying is I don't want to see any harm to you. What the heck for the sake of paying some money and doing some research and get this thing checked over.

MR. RUSH: We're not going to rehash this thing.

[redacted] Seriously.

MR. RUSH: It is not just paying somebody and doing some research. I have looked into this ad nauseam, and I am confident with the acoustic monitoring system which is what I brought back this whole thing to. You're not.

[redacted] No, it --

MR. RUSH: And I understand. But we can rehash this. There's two sides to this thing. We ain't getting any closer.

[redacted] No. I mean you just don't have any baseline of what's going on inside that carbon.

MR. RUSH: Yeah, yeah.

[redacted] We're on the process for creating a baseline though.

MR. RUSH: Yeah.

[redacted] That's what, that's what I've been saying this whole time. We're in research and development. We have to go down this path to establish a baseline.

[redacted] But you don't know what's going on in there, [redacted]

[redacted] Exactly. We have record the data and get performance reports to get --

[redacted] Right.

[redacted] -- to collect that. We cannot -- without going down a test path, you cannot collect the data. It's --

[redacted] You need to have --

[redacted] The argument is about what the test path is.

MR. RUSH: That's the challenge, and that's what carbon fiber -- that's the only way to get a known (indiscernible), cut the thing up, and now you have a -- non-destructive testing of carbon fiber is a real problem and you want to go talk to Boeing, go talk to them because I have spent a lot of time down there. This is a non-trivial problem. We took the other one down there, and even getting through one inch of carbon fiber is a problem. Nobody makes 5 inch thick carbon fiber pieces of this size for compressive loads.

[redacted] Are we getting that baseline via, you know, sea

level, 10 feet, 100 feet? I mean are we --

MR. RUSH: Yes.

[redacted] -- going to be taking those different --

MR. RUSH: Every dive, every dive we're going to have the data. We get -- we're going to generate almost a terabyte of data on a dive, and that's what we're having the statistical analysis done. How much can we pair that back? And then we're going to be able to compare it. We cam say, hey, something happened. What was that? And if we have an external transducer which we're going to have on it, we'll say, hey, that's a shrimp again, that's a ferry boat going over. That is a pop. It has a certain, you know, frequency. Let's mark it. Did we ever have a pop at 1,000 meters? No, we've never had one. Okay. We've got a problem. Call it off. You know, cut the hull up, you know. I've got no problem to wasting money. I'm not going to die on this thing. But, you know, we're going to have this issue. We've got to, we've got to, you know, figure out false positives. We'll figure that out here, you know. It'll be, it'll be interesting. We'll hear -- I don't know if we're going to hear shrimp crackling. I don't know if we're going to hear whales farting. I don't know what we're going to hear through that, but it hears a lot.

[redacted] Right. I guess --

MR. RUSH: And if you look at, if you look at the pops we had in our testing --

[redacted] Yes.

MR. RUSH: -- which was using the exact same system and doing it in parallel with Boeing system as a validator of it, you can see those pops and they are -- they have a particular shape as opposed to just the background noise of the, you know, both electrical noise as well as the resin settling in but even the Boeing people don't know what's going on. I mean I've asked the experts at Boeing, what is that pop? And they said, you can read five books, and it'll give you five different reasons. It could be the matrix popping. It could be a fiber popping. It could be multiple fibers popping. It could be imploding. It could be exploding. It could bending. It could be, you know -- they don't know. This is cutting edge stuff.

[redacted] Well, I mean I --

MR. RUSH: No question about that.

[redacted] It's kind of makes it scary.

MR. RUSH: Yeah. I'm much more scared about people getting hit by the dome, smashing their head, breaking their arm, crushing their shoulder, you know, that -- getting their hand cut off or their hand cut up in a prop because they got distracted and, you know, that scares me a hell of a lot more than me dying in the sub because I know it ain't happening. But I'm guaranteeing you, we're going to have some major injuries. We're going to have somebody who's going to slip and fall. We're going to have, you know, they had it when they did the *Titanic*. We're going to have people with collar bone injuries, with broken arms. We're going

to have stuff. I want to make sure it's not because the dome ran away and smashed into them. I want to make sure it's not because we did something stupid, but it will happen.

[redacted] Are we setting up safety procedures for like topside? I'm assuming we are.

MR. RUSH: Yeah, and that's why we have -- there's two doctors --

[redacted] and I have been (indiscernible) all sorts of --

MR. RUSH: -- two full-time doctors and hospital on staff. So there will be stuff. That's where our risk is. Our risk is not in this, but --

[redacted] I'm going to come back to me being a CPA, and I've brought up items with you that are accounting related --

MR. RUSH: Right.

[redacted] -- that I feel uncomfortable with --

MR. RUSH: Correct.

[redacted] -- that you are taking the risk on --

MR. RUSH: And when you had the questions about the international transfer of funds between our subsidiary and us.

[redacted] Yeah.

MR. RUSH: I knew you were completely wrong, but you need to hear it from somebody else. And so I said, you're completely wrong but, yes --

[redacted] I wasn't completely wrong.

MR. RUSH: No, but he said, you know, they don't care about, you know, as long as it's a tax issue. I wasn't trying to avoid taxes.

[redacted] Correct.

MR. RUSH: So I am open to this.

[redacted] No, and I get that, and -- but you did allow me to come back and do my own research.

MR. RUSH: Correct.

[redacted] And realize that I was wrong, but I think that's where [redacted] is coming from that -- I mean he's got a duty of care where he is sitting, saying that here's my knowledge and here are the things that I see. I have to bring them up.

MR. RUSH: I understand.

[redacted] Or else I --

MR. RUSH: And that's why I'm saying we're at this impasse because I'm not going to get there because we're coming from different sides of the problem. And I don't want to force him into being out there like badgering the shit out of him and he just knuckles under to say, yeah, I'll let him do it. And that is not the place -- one, I don't think I can do it. I don't think I can badger him sufficiently. And two, I don't want anybody -- I don't want anybody in this company who is uncomfortable with what we're doing. There are a lot of people out there who are excited about doing it. But I don't want to force people. We're doing weird shit here. And I'm -- and I am definitely out of them all.

There's no question. I'm doing things that are completely non-standard, and I'm sure the industry thinks I'm a fucking idiot. And I know [redacted] (ph.), he's telling everybody we're stupid fools. That's fine. They've been doing that for 8 years. And, I'm going to continue on the way I'm doing, but I'm not going to force people to join my religion if they don't want to.

[redacted] I don't know. I mean we are sort of at an impasse, I agree. However, I think, I think we need to separate for a while. I don't think we need to make any decisions right this second. I think we need to -- it's a Friday. Let's sleep on it for a couple of days and think about things. That's my opinion.

MR. RUSH: And it may be your opinion. What I don't want is I don't, I don't want [redacted] to knuckle under.

[redacted] I don't want him to either.

MR. RUSH: Because I -- yeah, and I don't think in 3 days you're going to suddenly say, you know, Stockton's right.

[redacted] No, I agree. I don't think that's going to happen. It may be that there's -- I mean where I sit right now, I'm not comfortable with acoustic monitoring because I don't understand it.

MR. RUSH: Right.

[redacted] But, I'm willing to under [redacted] tutelage to learn more. Perhaps that's --

MR. RUSH: Learning's not going to be nearly as good as

watching it on the sub but yes.

MR. RUSH: Correct, yeah. I mean and that's something that's going to have to be done as well. I mean I don't know if that's something that [redacted] is comfortable with saying, okay --

MR. RUSH: But he's not going to be comfortable with a live test. So I keep going down this list. If we have these fundamental disagreements and if you knuckled under, I know it wouldn't be authenticate and I don't think you'd do it.

[redacted] Well, instead of --

MR. RUSH: And I'm not knuckling under.

[redacted] -- you talking for him, I mean --

MR. RUSH: Okay.

[redacted] -- I guess my -- and I don't want to talk for him either, but I'm going to play [redacted] advocate here and just say, you know, as opposed to let's -- because I feel like you're heading the let's make this a hard separation right now, let's just do it, I mean I feel like he should be given the opportunity to think through this and say could I -- is there any situation where I could be comfortable? Let me think through it instead of, you know, making that decision right this second. I feel like, you know, could you ever become okay with acoustic monitoring? Is that something that you, you know, is that something that you can --

[redacted] Absolutely. But, we don't have a baseline. We don't have a baseline.

MR. RUSH: We do. We run it 10 foot.

[redacted] I'm just concerned. That said, I am allowed to be conservative. You employed me for that reason, okay. I'm doing my job. That for me is health and safety. That's that. I'm allowed to disagree with you as we said.

MR. RUSH: Correct.

[redacted] So I disagree with you.

MR. RUSH: All right.

[redacted] With Stockton.

MR. RUSH: Right, and then that's what I'm saying. He's -- [redacted] is clear. We've known each other long enough, he doesn't knuckle under.

[redacted] Well, I understand that, but there --

[redacted] Is there, is there --

[redacted] But you and I disagree about it as well that you said, no, this isn't happening. I still disagree with you.

MR. RUSH: Right.

[redacted] But I continue to work for you.

MR. RUSH: Yeah.

[redacted] But I mean are we --

MR. RUSH: That's, that's --

[redacted] Or are we at a --

MR. RUSH: This is different. I mean that's a --

[redacted] Yeah, it's a payroll issue or --

MR. RUSH: Well, yeah. Yeah.

[redacted] Yeah, I get it. We're at completely different --

[redacted] The real question is, are you letting me go? Do you now want to let me go? That's the question.

MR. RUSH: I don't see that we have a choice. From what --

[redacted] I feel like we're being hasty.

MR. RUSH: Well, it -- I think we've been very clear on what [redacted] wants to do to be comfortable, and what he thinks we have to do to do this safely and where I say we're going. And I don't see that there's going to be any bending on that because they're fundamental issues. I mean it really is. This is, you know, it's a Buddhist and a Christian thing or something. I don't know what it is but if these are -- this is who he is. That's why we hired him, you know. It is for that level of detail and safety and approach to it, was the primary attraction to bringing [redacted] on board. And now we've gotten to a point where his experience and his estimation of the correct way to do is fundamentally opposite of the approach that I want to take.

[redacted] What were you saying, [redacted]

[redacted] Yeah. To me, this is, you know, I keep on saying the same thing. You know, we're going -- we're on this path and we -- to me like in my path at OceanGate, you know, we're, you know, we're on this trail collecting these performance points and then making rational decisions along those points.

MR. RUSH: That's not an approach that [redacted] has been involved with. It's not an approach that is an industry standard

approach. It's not an accepted approach with the way the industry works.

[redacted] I'm wondering if that is acceptable as a cure.

MR. RUSH: What do you mean?

[redacted] You know, it is -- is there ever a path or that that's something that's [redacted] willing to do and go down that path and collect that because I feel like we've done that path on the LARS, you know.

MR. RUSH: People are in the LARS.

[redacted] With [redacted] -- you know, that's just my comment.

[redacted] Are you like a, for lack of a better word, like a make it up as you go along?

[redacted] Well, that's what -- that's really --

[redacted] I know that's what this is.

[redacted] This is a research and development program and eventually it will transfer into an operational procedure and an ops deal, but we're going to collect data points that are going to set limitations on the eventual operational procedures. That's the reality of this program.

[redacted] Right.

[redacted] And so there's a lot of undetermined facts right now that we don't know, that we can't say, we know that, you know, the hull is good to whatever or --

MR. RUSH: Yeah.

[redacted] We don't, we don't know all the information and that's to me one of the attractions about being here at OceanGate, doing innovative stuff, not knowing what's going to happen and, you know, having that intellectual stimulation and --

MR. RUSH: And regrouping and, you know.

[redacted] And tackling, you know, sophisticated problem solving. You know, I think that we've gone down that path with the LARS program. I'm looking forward to that path on the *Cyclops II* program, and to me that's an attraction. And I just -- I feel that, you know, that's just for me, but everyone's got to digest their own way and be comfortable with it like we've said.

MR. RUSH: You're not comfortable with it or you are.

[redacted] I'm comfortable with it.

[redacted] I guess the question is, is there anything -- I mean going down the same -- what you're saying, like the LARS path, doing it, you know, the *Titan* path --

[redacted] Yeah.

[redacted] -- is that something that you could ever be comfortable with? I mean that's --

[redacted] I just feel a tad let down right now with your comments. I'm (indiscernible) to be honest with you. This is the first time on paper I've ever put any health and safety concerns and by God, Stockton, you know on every expedition we've had issues, and I've been there for you. Every single expedition.

MR. RUSH: I'm not denying that.

[redacted] Every one.

MR. RUSH: I'm not denying it.

[redacted] Yeah.

MR. RUSH: But show -- what, what is the path forward given where your -- what your opinion is and your experience is telling you --

[redacted] Yeah.

MR. RUSH: -- and given what I've told you where I am, what -- I don't see how that path moves forward. That's the issue.

[redacted] We disagree on that path. That's what it is. It's a disagreement on the path on how that should be done.

[redacted] And a disagreement in my opinion isn't something that necessarily means that we need to part ways. I mean it may come to that at some point, if we get to that point, but I don't think that right now the answer is to part ways. I'm not sure that's the right answer.

MR. RUSH: Well, do you see a scenario where you will be comfortable with me being in the sub for a live test at the (indiscernible)?

[redacted] Right now, no.

MR. RUSH: Under what scenario would you be comfortable with that?

[redacted] Get the hull scanned.

MR. RUSH: So unless the hull's scanned, you wouldn't -- you will not -- there's no way you'll be comfortable with me doing a

live dive regardless of what acoustic monitoring does at a 1,000 meters, 2,000 and 3,000?

[redacted] The acoustic monitoring will tell you what is happening.

MR. RUSH: Correct.

[redacted] Not what is there.

MR. RUSH: I understand.

[redacted] That's --

MR. RUSH: And I care what's happening.

[redacted] -- my concern. You don't know what is there.

MR. RUSH: Unless the hull is scanned, you will not be comfortable with me being in the sub for the depth trials.

[redacted] Correct.

MR. RUSH: That's correct. And there's nothing that's going to -- no matter about the acoustic data, no amount of going out and towing it and driving it around here or taking it down is going to make you comfortable?

[redacted] It's very different from you putting yourself in the seat and taking it down there. We don't know -- there's no baseline. That's where I'm going with this. There's no baseline on --

MR. RUSH: Yes, there is.

[redacted] -- on that hull?

MR. RUSH: There's a baseline right now. I've got acoustic data right now as it's sitting there. I'm going to have acoustic

data at 10 feet. I'm going to have acoustic data at 20 feet. That is a baseline.

[redacted] Yeah. Can we create that baseline?

MR. RUSH: You don't know what's in the matrix. Yeah, that's right. You don't know.

[redacted] You don't know --

MR. RUSH: That's exactly. You don't know what's in the matrix. You don't know if somebody from [redacted] Composites took a ham sandwich and threw it in there in the middle of the night.

[redacted] Correct.

MR. RUSH: You don't know. You don't if 50 mosquitoes came through and they had a locust swarm and it's all in the resin and you've got tons of voids.

[redacted] Correct.

MR. RUSH: You don't know.

[redacted] The alarms go off.

MR. RUSH: That's correct. And that's why we have acoustic monitoring, but you're not going to ever be comfortable with that alone unless the hull is scanned and you know what it looks like. You've said you're not going to be comfortable.

[redacted] The company is deviating from the original plan of --

MR. RUSH: I understand. Yeah, yeah.

[redacted] We have.

MR. RUSH: Yeah. We've deviated from a lot of plans. We've

deviated from a whole ton of plans. Yeah, I was going to have Boeing build this. I was going to have ATK build this. I was going to have General Dynamics build this. [redacted] was not my first choice. TiFab wasn't my first choice. You know, there were -- we've had to bob and weave and catch up and do a whole bunch of shit.

[redacted] I still don't want, I still don't want to make a hard decision today. I --

[redacted] I think Stockton's made a decision.

MR. RUSH: I don't see how I can make any other decision unless, you know, and I don't want, I don't want you to cave to placate me. I don't think you'd do that. And I think we're going to have a meeting of the minds. And you're -- this is a critical things. If you're going to be director of marine ops and you're not confidence with the approach I'm taking, that, you know, that can't hold.

[redacted] All management disagrees on something at one time or another, you know that.

MR. RUSH: Yeah, but this is more than a disagreement. You're not going to stand by, be sitting on the deck while I go down there --

[redacted] Unless --

MR. RUSH: -- unless it's done to the way you want it. We can wait until Monday, but I don't see -- we keep bouncing back to the same spot.

[redacted] And I'm not going to change my mind.

MR. RUSH: I know that.

[redacted] You know that.

MR. RUSH: Yeah, I know that.

[redacted] You're not going to change your mind.

MR. RUSH: Exactly. I know that, too.

[redacted] All right then.

MR. RUSH: And I don't, you know, I appreciate this huge sacrifice you've made to move out here. I appreciate it. You've been a hell of a great employee. And I think you're a great pilot, you know, I'd love to be able to have you do stuff with us. But this is the future of the company. You know, we're going to something for *Antipodes*. We're going to find stuff for *Cyclops I*. But this is the future.

[redacted] If we go down this path, to get this performance data, we do execute on our plan, [redacted] would you ever be comfortable given that we have this impasse on this baseline with the *Cyclops II* program?

[redacted] The *Cyclops II* program excited, and I'm going to swear, and I know we shouldn't, the shit out of me, okay. From day (indiscernible), I've been involved with that, okay. The whole APL thing, moving on, when [redacted] came in, fantastic, excites me, okay. I am just bringing up safety concerns. That's it. That's it, that we disagree on. So the main thing here is Stockton and I are not going to agree on this.

[redacted] I understand that.

[redacted] That said, what happens in the future, when you're doing your testing and stuff like that, and that's different. That's different from what we're just saying now.

[redacted] Yeah. I'm asking, I'm asking you if we, if we prove that what we have given right now down this path of performance review, if we prove this program, is that something that you will ever be at some point comfortable with given the future data that we're going to collect? I mean we are going to collect this data? We are going to get these performance reports, but --

MR. RUSH: But if you don't -- but [redacted] point would be if you don't know what's in the matrix, how do you know on the 6th dive, the 60th dive, the 100th dive, the 101st dive, it's going to fail, and unless you have confidence in the acoustic monitoring, that's -- that is a legitimate -- that is a -- his concern is legitimate. It's the orthodoxy. It's what people would say. You did 100 dives to the *Titanic* and 101st it's going to implode. I don't believe it. And you do, and that's the impasse. So he's never going to get comfortable.

[redacted] But a lot of people thought that [redacted] was going to kill him, and now people are like awarding him things like, oh, wow. He's one of the most experienced pilots in the world, you know.

MR. RUSH: He's still dangerous. He's dangerous for a

different reason. He's not dangerous because of his engineering. It's because of his ops.

[redacted] Yeah. But he's got more respect is what I'm saying.

[redacted] What I think [redacted] is trying to say, I think, is we're at an impasse but --

[redacted] Is there a cure?

[redacted] -- we need [redacted] on this crew. In my opinion, we need him here.

MR. RUSH: He has to be comfortable with us. Well, we don't need any -- quite frankly, everyone is replaceable. It will be a huge loss to lose him. We'll have to recover through it because I can't have him freshening everything that -- the process. You're going to be highly uncomfortable if we continue down this path to the level of it's not appropriate for me to put you in that position, for me to go do stuff that you think is insane, that I'm going to kill myself with a vehicle that hasn't been checked out to the way you want. And I'm going to somehow have him be associated with that and overlook it which he won't do. You know, that -- yeah, we need, we need somebody. It's -- this is, this is a huge loss. He's the backbone of this company. He's worked his ass off on it. You've been on every expedition. You know the shit hook, line and sinker, you know. This is not like idiot face, you know, Coast Guard schmuck, you know. This is -- he's core. But this is also a core problem.

[redacted] Yeah, I agree with you.

MR. RUSH: Yeah.

[redacted] I agree with you, and --

MR. RUSH: I'm not trying to be an asshole. I'm not trying to be an asshole.

[redacted] Please understand, I'm not saying you're going to die. That is a risk that it could happen. There's a risk any time you put *Antipodes* in the water, any vehicle I'm aware of, more than anybody here, okay, with flight experience and stuff like that. I've done a lot of dives, a lot of dives that went wrong, okay.

MR. RUSH: Um-hum.

[redacted] So I understand and I still do it, okay. But the feel good fighter is in there and the feel good fighter is not going to be fulfilled by you to make me comfortable to supervise you topside while you go down to 4,000 meters. That's not going to change. If we knew the hull integrity was intact, absolutely, absolutely. Not a problem.

MR. RUSH: Well, I do know that you don't believe what I believe.

[redacted] Yeah.

MR. RUSH: That's the issue.

[redacted] That's the issue.

[redacted] There's a (indiscernible) all of this. A gentleman sent me (indiscernible). He doesn't bring confidence to

the table, not often, not for us. [redacted] I'm not (indiscernible) just not -- never has, okay. You knew that with the *Cyclops II*.

MR. RUSH: Um-hum.

[redacted] Fortunately he stated it (indiscernible) *Antipodes*, and she's performed every time. Yes, I'm running a (indiscernible).

MR. RUSH: Okay. Yeah, and that's also a huge problem. I mean the fact is I take, you know, I take what he says. I take all the other information sources that I have, and I distill them and I have confidence.

[redacted] But I mean [redacted] and I have both seen so many (indiscernible) with fundamental components that's going onto that new vehicle.

MR. RUSH: Okay.

[redacted] I've been taken aback. You really would (indiscernible) and it's a lack of experience. He may be a materials engineer but he has not got the experience for submersibles. And this is his first (indiscernible). This is going to be one of the most trying projects and it really is.

MR. RUSH: Um-hum.

[redacted] It's innovative. I don't doubt any of that. At the end of the day, he brings no experience to the table.

MR. RUSH: Okay.

[redacted] He is learning as he's going. That's it. So.

MR. RUSH: Nothing left.

[redacted] At will state.

MR. RUSH: What?

[redacted] At will state. (Indiscernible) say my goodbyes to ya.

MR. RUSH: Okay. It's never easy.

[redacted] Some are easier than others.

(Whereupon, the interview was concluded.)

CERTIFICATE

This is to certify that the attached proceeding before the

NATIONAL TRANSPORTATION SAFETY BOARD

IN THE MATTER OF:	LOSS OF THE SUBMARINE *TITAN* IN THE NORTH ATLANTIC OCEAN ON JUNE 18, 2023 Interview of [redacted]
ACCIDENT NO.:	DCA23FM036
PLACE:	Everett, Washington
DATE:	January 19, 2018

was held according to the record, and that this is the original, complete, true and accurate transcript which has been transcribed to the best of my skill and ability.

[redacted]

Transcriber