

UNITED STATES OF AMERICA

NATIONAL TRANSPORTATION SAFETY BOARD

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In the matter of: *
*
MARINE BOARD OF INVESTIGATION *
INTO THE SINKING THE *EL FARO* *
ON OCTOBER 1, 2015 *
*
* * * * *

Prime F. Osborn III Convention Center
Jacksonville, Florida

Monday,
February 6, 2017

APPEARANCES:

Marine Board of Investigation

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KEITH FAWCETT, Member
CDR MATTHEW J. DENNING, Member
LCDR DAMIAN YEMMA, Recorder
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Technical Advisors

CDR MICHAEL ODOM
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MICHAEL J. KUCHARSKI, Marine Accident Investigator
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Parties in Interest

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JULES MASSEE, Esq.
TOTE Services

GERARD W. WHITE, Esq.
American Bureau of Shipping (ABS)

SPENCER A. SCHILLING, P.E.
Herbert Engineering Corporation

WILLIAM R. BENNETT, III, Esq.
On behalf of Mrs. Theresa Davidson
(Next of kin to Captain Michael Davidson)

Also Present

LT TRAVIS NOYES
(On behalf of Dr. Stettler)

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P R O C E E D I N G S

(9:05 a.m.)

CAPT NEUBAUER: The hearing is now in session.

Good morning, ladies and gentlemen. Today is February 6th, 2017, and the time is 9:05. I am Captain Jason Neubauer, United States Coast Guard, Chief of the Coast Guard Office of Investigations and Analysis, Washington, D.C. I am the Chairman of the Coast Guard Marine Board of Investigation, and presiding officer over these proceedings.

The Commandant of the Coast Guard has convened this Board under the authority of Title 46, United States Code, Section 6301, and Title 46, Code of Federal Regulations, Part 4, to investigate the circumstances surrounding the sinking of the S.S. *El Faro*, with the loss of 33 lives, on October 1st, 2015, while transiting east of the Bahamas.

I would like to take this opportunity to express my condolences to the family and friends of the 33 crew members who were lost at sea. I know that many of you are attending today's session, and more are watching on the live livestream. We appreciate you being here to join us for these proceedings.

Other than myself, the members of this Board include Commander Matt Denning and Mr. Keith Fawcett. The legal counsel for this Board is Mr. Jeff Bray. The recorder is Lieutenant Commander Damian Yemma. Coast Guard technical advisors to this Board are Commander Mike Odom, Commander Mike Venturella, Dr. Jeff

1 Stettler, Lieutenant Mike Comerford, and Mr. Paul Webb.

2 All Board Members have previously sworn to faithfully perform
3 their duties without partiality.

4 The Board's media liaison is Ms. Alana Ingram.

5 Upon completion of the investigation, this Marine Board will
6 submit its report of findings, conclusions and recommendations, to
7 the Commandant of the United States Coast Guard.

8 The National Transportation Safety Board (NTSB) is
9 participating in this hearing. Mr. Michael Kucharski, for the
10 NTSB's *El Faro* investigation, is seated to my left. The NTSB is
11 also charged with the responsibility of determining the cause or
12 probable cause of a major marine casualty under the provisions of
13 Section 304(a)(1)(E) of the Independent Safety Board Act of 1974.

14 For this reason, the NTSB's representatives will fully
15 participate in these hearings and make recommendations about the
16 scope of the hearings, they may call and examine witnesses, and
17 may submit and request additional evidence.

18 I would like to request the cooperation of all persons
19 present to minimize any disruptive influence on the proceedings in
20 general and on the witnesses, in particular. Witnesses are
21 appearing before the Board to provide valuable information that
22 will assist this investigation. We request that all members of
23 the public be courteous to the witnesses and respect their right
24 to privacy.

25 I ask that you silence all cell phones at this time, and that

1 you please exit the hearing room to make or receive any phone
2 calls. With the exception of one pool camera, photography,
3 including television cameras, will only be permitted during this
4 opening statement and during recess periods.

5 The members of the press are welcome, and an area has been
6 set aside for your use during the proceedings. The news media may
7 question witnesses concerning the testimony that they have given
8 after I release them from these proceedings. I ask that any such
9 interviews be conducted outside this room.

10 The investigation will determine, as closely as possible, the
11 factors that contributed to the incident so that proper
12 recommendations for the prevention of similar casualties may be
13 made; whether there is evidence that any act of misconduct,
14 inattention to duty, negligence, or willful violation of the law
15 on part of any licensed or certificated person contributed to the
16 casualty; and whether there is evidence that any Coast Guard
17 personnel, or any representative or employee of any other
18 government agency, or any other person, caused or contributed to
19 the casualty.

20 This is the third public hearing session for this
21 investigation, and it is scheduled to continue until February
22 17th. This session will focus on shipboard operations, and cargo
23 loading, lashing and storage operations for the accident voyage,
24 while also examining vessel stability, and weather conditions
25 forecasted and encountered. In addition, the Board will examine

1 regulatory oversight for the *El Faro*, including the Alternate
2 Compliance Program.

3 The Coast Guard has designated parties in interest to this
4 investigation. In Coast Guard marine casualty investigations, a
5 party in interest is an individual, organization, or other entity,
6 that under the existing evidence, or because of his or her
7 position, may have been responsible for or contributed to the
8 casualty. A party in interest may also be an individual,
9 organization, or other entity, having a direct interest in the
10 investigation, and demonstrating a potential for contributing
11 significantly to the completeness of the investigation, or
12 otherwise enhancing the safety of life and property at sea through
13 participation as a party in interest.

14 All parties in interest have a statutory right to employ
15 counsel to represent them, to cross-examine witnesses, and have
16 witnesses called on their behalf.

17 Witnesses who are not designated as parties in interest may
18 be assisted by counsel for the purpose of advising them concerning
19 their rights; however, such counsel are not permitted to examine
20 or cross-examine other witnesses or otherwise participate in the
21 investigation.

22 I will now read the list of those organizations and
23 individuals whom I have previously designated as parties in
24 interest. After I read the name of each organization or
25 individual, I ask that each party representative announce their

1 appearance.

2 TOTE, Incorporated.

3 MR. REID: Luke Reid, K&L Gates, LLP, on behalf of TOTE.

4 CAPT NEUBAUER: ABS.

5 MR. WHITE: Gerald White, Hill Rivkins, LLP.

6 CAPT NEUBAUER: Herbert Engineering Corporation.

7 MR. SCHILLING: Spencer Schilling for Herbert Engineering.

8 CAPT NEUBAUER: Mrs. Theresa Davidson, as next of kin for

9 Captain Michael Davidson, master of the S.S. *El Faro*.

10 MR. BENNETT: William Bennett from the firm of Blank Rome.

11 William Bennett from the firm Blank Rome.

12 CAPT NEUBAUER: The Marine Board will place all the witnesses
13 under oath. When testifying under oath, a witness is subject to
14 the federal laws and penalties for perjury for making false
15 statements, under 18 United States Code, Section 1001. Penalties
16 include a fine, up to \$250,000, or imprisonment up to 5 years, or
17 both.

18 The sources of information in which this investigation will
19 inquire are many and varied. Since the date of the casualty, the
20 NTSB and Coast Guard have conducted substantial evidence
21 collection activities, and some of that previously collected
22 evidence will be considered during these hearings.

23 Should any person have or believe he or she has information
24 not brought forward but which might be of direct significance,
25 that person is urged to bring that information to my attention by

1 emailing elfaro@uscg.mil.

2 Mr. Kucharski will now say a few words on behalf of the NTSB.

3 MR. KUCHARSKI: Good morning, Captain. Good morning, ladies
4 and gentlemen. I'm Mike Kucharski, Nautical Operations Group
5 Chairman for the National Transportation Safety Board's
6 investigation of this accident.

7 The NTSB has joined this hearing to avoid duplicating the
8 development of facts. Nevertheless, I do wish to point out that
9 this does not preclude the NTSB from developing additional
10 information separately from this proceeding, if that becomes
11 necessary.

12 At the conclusion of these hearings, the NTSB will analyze
13 the facts of this accident and determine the probable cause
14 independently of the Coast Guard. It will issue a separate report
15 of the NTSB findings, and if appropriate, issue recommendations to
16 correct safety problems discovered during this investigation.

17 Thank you, Captain.

18 CAPT NEUBAUER: Thank you. This concludes the opening
19 statement. At this time, I would like to ask that everyone
20 present stand for a moment of silence in respect of those persons
21 who were lost at sea as a result of this casualty.

22 (Pause.)

23 CAPT NEUBAUER: Thank you. You may be seated. We will now
24 take a 10-minute recess before calling in the first witness,
25 Captain Raymond Thompson. We'll reconvene at 9:25. The Board is

1 now in recess.

2 (Off the record at 9:14 a.m.)

3 (On the record at 9:26 a.m.)

4 CAPT NEUBAUER: The hearing is now back in session. The
5 Board will now call Captain Raymond Thompson, former chief mate on
6 the *El Faro*.

7 Good morning, Captain. Would you please raise your right
8 hand?

9 MR. THOMPSON: Good morning.

10 (Whereupon,

11 RAYMOND THOMPSON

12 was called as a witness and, after being first duly sworn, was
13 examined and testified as follows:)

14 CAPT NEUBAUER: Thank you. Be seated. Thank you for
15 returning today, Captain. Mr. Fawcett is going to be questioning
16 you today.

17 EXAMINATION OF RAYMOND THOMPSON

18 BY MR. FAWCETT:

19 Q. Good morning, Captain Thompson.

20 A. Good morning.

21 Q. We are, we're essentially resuming your testimony which was
22 abbreviated the last session. So just to recap, we now have the
23 benefit of the *El Faro* VDR transcript. And then, during the last
24 session, we talked about your general experiences aboard the *El*
25 *Faro*, some of the assessments that you made about the officers of

1 the vessel, and then we went into lengthy detail about cargo
2 securing operations and actions, stability and other subjects.

3 So right now, what we'd like to do is consider your testimony
4 also in light of the VDR transcript. And have you had the chance
5 to read the transcript and make an assessment of that transcript?

6 A. I have read the transcript, yes.

7 CAPT NEUBAUER: I just want to stop for a moment. The
8 microphone to your left is the court proceedings. The other
9 microphone is for the court reporter.

10 THE WITNESS: Yes, sir. I have read the transcript.

11 BY MR. FAWCETT:

12 Q. The questions I'm going to ask relate to the time frame
13 before the accident, which was October 1st, 2015, unless I specify
14 otherwise. And we're going to break your testimony into two very
15 broad time periods.

16 The first time period, we'll resume questioning about your
17 general experience in light of the amount of information and
18 evidence we've processed since we last saw you. We'll talk about
19 personnel issues. We'll talk about fatigue. We'll talk about
20 your selection process for the Marlins, and then finish up that
21 topic area with bridge resource management and ship operations.

22 Then we'll take a break, and we'll have our colleagues here,
23 along with the NTSB, and the party in interests provide follow-up
24 questions.

25 The next topic area will be your assessment of cargo

1 securing, voyage planning, safety, and we'll finish up with
2 weather. And then we'll have any other general questions that the
3 Board may have, that aren't covered in those topics. Once again,
4 I'll ask the parties -- the NTSB and the parties to comment and
5 ask questions.

6 We expect that your testimony will go over the lunch period
7 into the afternoon. And we thank you for appearing.

8 A. You're welcome.

9 Q. So just to reiterate for the public, you sailed as a master
10 for the *El Faro* for 1 week in 2015, approximately; is that
11 correct?

12 A. I believe I sailed there for 1 week, and then another time
13 for 3 weeks, sir.

14 Q. Okay. That 3-week period would have been -- I believe, in
15 the last testimony we have, there was some commentary about it
16 might have been in July of 2015. I didn't think that was correct
17 at the time. Do you recall the time frame you sailed as master?

18 A. I would have to look at my discharges. I don't recall the
19 exact dates.

20 Q. And then in your previous seagoing career, did you sail as
21 master on any other vessel, deep-sea vessel, in your career?

22 A. No, sir.

23 Q. So looking at TOTE, did they ever, prior to the accident time
24 frame, gather together senior officers to talk about the safety of
25 operations or the efficiency of operations, sort of get the guys

1 that are on watch together and have them talk about safety issues
2 and just operations in general?

3 A. Not that I recall.

4 Q. We have asked TOTE to share with you, your personnel file.
5 We did not make it an exhibit, but we just wanted you to be able
6 to refresh your memory as to the contents of the file. Have you
7 had an opportunity to do that?

8 A. I did look at it.

9 Q. Before I get to those areas, I was wondering, Captain Richie
10 resigned in August of 2015, and a chief mate was demoted. Did
11 that have any impact, from your point of view, on operations
12 aboard the *El Faro* or the *El Yunque*?

13 A. Not that I'm aware of.

14 Q. And during the 2013 to 2015 time frame, Captain Axelsson
15 departed, Captain Hearn departed, Captain Villacampa departed,
16 Captain Richie departed. Did that have any impact on the depth or
17 breadth of nautical experience, in terms of the captains of the
18 vessels?

19 A. I don't believe it did.

20 Q. In examining your personnel file, there were no evaluations
21 of you as chief mate or master. Does that match the recollections
22 once you looked through the personnel file?

23 A. I looked through the personnel file and I didn't see any in
24 there, but we did get evaluated, sir.

25 Q. And how did that happen?

1 A. As chief mate, the captains did evaluations on us. I believe
2 it was as we signed off every tour. They would give you an
3 evaluation. It had some check boxes on it, some comment sections.
4 And they would give you the evaluation. And then you would sign
5 it, and they would sign it. A lot of times, if you requested,
6 they would give you a copy.

7 Q. Was it part of the process, that you were to be provided a
8 copy?

9 A. I don't recall a hundred percent. I know you went through
10 the evaluation with a master. If you asked for a copy, they would
11 give you a copy.

12 Q. And do you recall being evaluated by Captain Axelsson?

13 A. To the best of my recollection, I was evaluated by Captain
14 Axelsson.

15 Q. Do you recall if you were evaluated by Captain Davidson?

16 A. To the best of my recollection, yes, sir. I was also
17 evaluated by Captain Davidson.

18 Q. Can you explain why those records might not be in your
19 personnel file?

20 A. I cannot.

21 Q. So how were you evaluated for your position as master of the
22 Marlins?

23 A. I specifically, I do not know.

24 Q. Were you interviewed?

25 A. I was not formally interviewed, but, you know, every week

1 people were coming down to the vessel. I had discussions, and
2 questions were asked by Phil Morrell when he came to visit the
3 vessel one time. And the way I understood it, he had asked
4 Captain Davidson and the chief engineer on board at the time about
5 me, as well.

6 Q. Just for the sake of clarity, who asked them?

7 A. Phil Morrell.

8 Q. So there's another form that TOTE requires to be filled out
9 at the completion of a tour, and that's an illness and injury
10 certification form, which provides evidence and proof that there
11 was no illness for you or injury during your course of your
12 service aboard the vessel. Were those routinely filled out for
13 you?

14 A. Yes, sir. Every tour and, I believe, every port mate trip as
15 well, or every time I did a port mate.

16 Q. Reviewing your file -- and what I'm looking for is
17 consistency of oversight on shoreside management. These aren't
18 personally directed at you, sir. These are directed at the system
19 itself where you worked. But the only form we found for the
20 illness and injury certification form is the one you filled out at
21 a port meet; is that correct?

22 A. Reviewing my file, that's what I saw, but that's not the only
23 one I filled out, sir. A lot of them are kept on board the
24 vessels, in your personnel file on board the vessel.

25 Q. Are those forms part of an audit process by internal audits

1 performed by TOTE?

2 A. I can't speak to that, but I'm sure it's part of the process.

3 Q. And as you served with TOTE prior to the accident, did they
4 provide -- I'm not sure if we asked this before. Did they provide
5 any additional training for you, other than the LNG safety-
6 specific training that was required? Did they provide like
7 courses at the SAR center, or anything like that?

8 A. As far as what training?

9 Q. ECDIS training, STCW training, anything else that's -- for
10 example, heavy weather training, shipboard simulator training. I
11 didn't see anything like that in your records. I'm just wondering
12 if you received training such as that?

13 A. Nothing specifically provided by TOTE on that, but as a union
14 member, we have to do ECDIS training and things of that nature.

15 Q. Have you had any training of that type since 2013?

16 A. I would have to look at my records, but I believe I have.
17 I've just gone through ECDIS and a few other courses as well.

18 Q. So turning to your service on the *El Faro* as chief mate and
19 master, on July 30th, if you'll draw your attention to Coast Guard
20 Exhibit 005, which you can find in the binder up there, page 36.
21 This was a July 30th email from Ms. Clark, crewing manager, sent
22 to Mr. Morrell and Mr. Kondracki, who is the director of labor
23 relations, and they were talking about the promotion of
24 Mr. Schultz.

25 One of the things the email had mentioned, a divide and

1 conquer plan with regard to crew cooperation. Has Mr. Schultz --
2 he relieved you, didn't he?

3 A. I believe so.

4 Q. Would you be aware of what that plan was and why that plan
5 was formulated on board *El Faro*, or shore side?

6 A. Can you repeat the question please, sir?

7 Q. Ms. Clark is talking to vice president of operations, and
8 Mr. Kondracki, the labor relations person, with TOTE. And she is
9 talking about informing the new chief mate, Mr. Schultz, who is
10 going to relieve you, the chief mate, about a divide and conquer
11 plan with regard to crew cooperation. Do you know what that plan
12 was, or do you know why that was instituted?

13 A. I do not know what that plan was, sir.

14 Q. What was your assessment of crew cooperation aboard the *El*
15 *Faro* in the time you served aboard?

16 A. Very good.

17 Q. Were there any issues that came to your attention as chief
18 mate or master in terms about issues involving the crew during the
19 time of your service?

20 A. Not that I'm aware of, sir.

21 Q. So looking at Exhibit 305, page 1, there's an email from
22 Ms. Clark to Mr. Kondracki. Ms. Clark is the crewing manager.
23 And it's about the sudden resignation of Captain Axelsson in mid-
24 tour.

25 A. Which page is this, sir?

1 Q. That's 305, not the same one you're looking at. It's another
2 exhibit. I apologize. And that was dated August 3rd, 8:33 p.m.
3 And a lot of that exhibit has been redacted. But it -- one of the
4 lines in it says -- the redacted portion talks about other reasons
5 Captain Axelsson resigned. But one of them, Ms. Clark says, "In
6 all the drama that was going on board the *El Faro*, he decided to
7 resign."

8 So you worked for Captain Axelsson at the time. Can you
9 perhaps speak to what he might have been referencing?

10 A. I can't speak to that, sir.

11 Q. As a little bit of a side question, but it's related, if a
12 crewperson on board the *El Faro* was at sea, and they had some
13 serious issues involving the ship's operation or safety, how would
14 they reach the DPA, the designated person ashore, to voice those
15 concerns? I know that if you're in a port, they can use cell
16 phones or shoreside phones to make a call. How do they do it at
17 sea?

18 A. At sea, they had access to email from the bridge, laptop, I
19 believe, and also the satellite phone.

20 Q. If I was a crewperson and I wanted to use the satellite phone
21 to make that call, how would I do that?

22 A. Well, usually if you wanted to use the satellite phone, you
23 would notify the master of the vessel. And then, you know, he
24 would tell you, go ahead, if it was something important. You
25 would go up, and there is step-by-step procedures of how to call

1 out, on the phone itself, to making an outgoing call.

2 Q. And could the person making that call do that in confidence
3 and privacy?

4 A. I believe, if they wanted to, they could. They could do it
5 on their watch.

6 Q. And the sat phone would be on the bridge?

7 A. Yes, sir. On the bridge.

8 Q. So it goes to say that ship's officers would be on the
9 bridge, and other personnel, when they were using the phone?

10 A. Ship's officer and usually your watch partner is up there.

11 Q. So speaking to the email system, the INMARSAT email system,
12 you mentioned they could use that. Just to clarify something we
13 don't know, the email that's generated from the crew computer or
14 the chief mate, the chief engineer, and the captain's computer,
15 goes to the server; is that correct?

16 A. That's the way I understand it.

17 Q. And can the captain, who -- where's the server?

18 A. I don't recall the location of the server on *El Faro*, sir.

19 Q. Did it have like a control panel, or a keyboard and a
20 monitor? In other words, what I'm trying to get at is, could the
21 master of the *El Faro* or another officer, could they look at the
22 email that was generated aboard the ship and see the contents of
23 the email?

24 A. Sir, if you wanted to, for the regular class of email, if you
25 opened it up to see what files were in there, I believe you could

1 read an outgoing email, the way I understand it. But I don't
2 believe you can read incoming emails.

3 Q. Could you delete an email, if you chose to, as master of the
4 *El Faro*, that was in the outgoing queue before it was sent?

5 A. Yes, you could, but the email that it was sent from would, I
6 believe, get a reply back saying your email was rejected, or
7 something to that effect. I don't recall the exact wording.

8 Q. Right. But they could be deleted, correct?

9 A. Not specifically deleted. No, you can recall the email so it
10 wouldn't be sent off the vessel. And then an email would go to
11 the inbox of the address it was sent from saying the email was
12 recalled. And then it would still be in the system someplace, the
13 way I understand it.

14 Q. Okay. So in plain language, if an email was deleted from the
15 queue, if I came down and sat at the crew's computer, there would
16 be some type of email that said this message was recalled or not
17 sent; is that correct?

18 A. That's the way I understand it, sir.

19 Q. There were two incidences that came to our attention that we
20 need clarification on. One was an incident that occurred sometime
21 in July, where a crewman -- I'm really not sure of the event, so
22 that's why your information is so important. There was a
23 violation of the zero-tolerance policy. A crewman, either aboard
24 the vessel, ashore, whatever, had a -- and please don't use names,
25 but the crewman was something related to alcohol.

1 The information that was provided to us was that you were
2 dispatched to take care of it. I don't know the date, times, so
3 your testimony is very relevant in helping us understand what that
4 incident was.

5 A. Okay. I don't recall the dates exactly, either, offhand.
6 We -- I received a call, saying there was a possibility of
7 somebody drunk out at the gate, from security, the way I recall.
8 I notified the captain of the vessel. He told me to go out to the
9 gate and see what was going on, and remind the crew member he
10 didn't need to be back until callback.

11 So I went out to the gate. There was no crew member there.
12 There was the mostly Spanish-speaking security guard, a Spanish-
13 speaking taxi driver on the other side of the gate. So I relayed
14 the message to the security guard to relay to the taxi driver.
15 And since there was no crew member that I saw there, I went back
16 to the vessel and I notified the captain.

17 Q. If something that occurs like that, is that logged?

18 A. I don't believe that incident was logged, sir.

19 Q. TOTE, do they have number of zero-tolerance policies?

20 A. Yes, sir.

21 Q. Could you talk about, as you understand it as a TOTE master
22 at the time of the accident, what are some of the zero-tolerance
23 policies that were in effect for TOTE?

24 A. I wasn't a master at the time of the accident, sir.

25 Q. Okay. As chief mate or as a member of a vessel crew, whether

1 you're a seaman, a steward, or an officer, what would be the zero-
2 tolerance policies that TOTE had in effect?

3 CAPT NEUBAUER: Mr. Fawcett, can you clarify, when you said
4 the time of the accident, do you mean the time of this incident at
5 the gate?

6 MR. FAWCETT: Well, I'm saying, sir, that TOTE might have
7 instituted new policies. And so what I'm doing is saying that,
8 during the time of your service, aboard the *El Faro* -- let me
9 clarify that.

10 BY MR. FAWCETT:

11 Q. What did you understand were the issues covered by TOTE's
12 zero-tolerance policy?

13 A. To the best of my recollection, it was drugs and alcohol,
14 sir.

15 Q. So did this incident, based on your understanding of the
16 policy, fall under the zero-tolerance policy for TOTE?

17 A. This incident specifically, sir, I believe it's a 0.4 blood
18 alcohol content to return to the ship. So -- and not having a
19 drink within a certain amount of hours. I don't recall the exact
20 numbers, but that's what I do recall the policy is.

21 Q. Okay. Was this at Jacksonville or was it San Juan?

22 A. This was San Juan.

23 Q. Okay. So the crewperson -- and the reason this, these
24 questions related to this incident are important -- we'll talk
25 more about this in other testimony, not your testimony, but how

1 would you establish whether the person was intoxicated or not, or
2 the person was not in compliance, complying with the zero-
3 tolerance policy?

4 A. I mean, that would be something if you see somebody stumbling
5 up the gangway or something like that, and you're on watch, I
6 guess you could -- you know, you have to make a determination at
7 that point if there was reasonable cause.

8 Q. Thank you for clarifying that. There was another incident,
9 and once again, please don't name names. And the reason I ask
10 this, I asked the question about Captain Axelsson's resignation,
11 the point of drama aboard the ship, the issue with the divide and
12 conquer plan about crew cooperation. There was an issue that
13 occurred at the end of July, where there was a physical -- not a
14 physical, but there was a verbal altercation between the second
15 mate and a crewman. Do you recall that incident?

16 And to help refresh your memory, it involved personal
17 protection, protective equipment, and the wearing of equipment in
18 port, I believe it was.

19 A. I do recall that, sir.

20 Q. Could you elaborate, without naming names, on what happened
21 on that incident?

22 A. I believe, if I recall, it was late at night. The crewman
23 was woken up for all hands. And on his way down to -- on main
24 deck to proceed to the stern for undocking, and I believe the
25 second officer reminded him of his PPE and not to show up on the

1 stern without it. And I -- the way I understood it was he didn't
2 like being told that. He technically didn't have to be there yet.
3 He had a few minutes to still get his stuff together and get down
4 there. And it was just a minor argument.

5 Q. To your knowledge, were statements required by the
6 participants in that, let's just call it an argument?

7 A. I believe there was, for that one, sir.

8 Q. What were the discussions between you and the captain about
9 the circumstances of that? And was there some type of agreement
10 that you and Captain Axelsson came up with to try to prevent that
11 kind of issue from occurring in the future?

12 A. I can't recall any exact conversation that we had, sir.

13 Q. I'd like to move on to a new topic, and that's fatigue.
14 Fatigue is, you know, one that relates to the human factors that
15 affect the decisions that individuals made.

16 Now Ms. Randolph stood the 00 to 04, and 12 to 16 watch; is
17 that correct?

18 A. That is correct.

19 Q. So in the course of 2015, seagoing officers are paid for 12-
20 hour days; is that correct?

21 A. I believe so.

22 Q. And they work overtime; is that correct?

23 A. Yes, sir.

24 Q. And we've been told that during the course of 2015, there was
25 kind of tightening up to ensure that the 12 hours were worked. It

1 sounded before like it was a little looser administered, in terms
2 of the mates stood their watches, we're talking at sea, and they
3 did daywork for their specialties, whether it was safety
4 inspections or taking care of chart navigation work and preparing
5 charts and correcting charts, and whatever their different duties
6 were. But in the later part of 2015, they were working more of
7 their 12-hour contract time. Would you agree with that, or not?

8 A. I don't know if it was any different, sir, before I got on
9 the ship to when I signed on the ship.

10 Q. So often I hear sailors say that fatigue is part of the life
11 of a sailor. Is that your experience?

12 A. No, sir.

13 Q. Ms. Randolph, the second mate, talked about, to her family
14 and friends, that she was always fatigued. Did she or any of the
15 other officers on the *El Faro* talk to you about being fatigued?

16 A. Not that I recall, sir.

17 Q. How about the pace of work? In other words, the line of
18 service, relatively fast turnaround in Jacksonville, did any of
19 the bridge officers, or any of the officers or crew come to you
20 and talk about the pace of operations, the workload, and any --
21 I've already asked you about the fatigue, but did any of the crew
22 talk to you about fatigue it might have created?

23 A. Not that I recall, sir.

24 Q. So in the passageways of the *El Yunque*, there are signs, or
25 were signs, about keep it quiet, your shipmates are trying to

1 sleep. What proactive steps did you take aboard the *El Faro* to
2 make sure that the noise and the accommodation spaces allowed the
3 crew to sleep and get good quality rest?

4 A. I believe, to the best of my recollection, there was signs on
5 that vessel, as well, on the crew decks.

6 Q. Was that part of the safety meeting discussion?

7 A. At times, it would be mentioned. If there's an early call-
8 out for all hands, if you're in the passageways, keep your radios
9 on low so that you're not waking up people that don't need to be
10 woken up, and things of that nature, sir.

11 Q. So did you get enough rest?

12 A. Me, personally? Yes, sir.

13 Q. During the course of the 2015 time frame, did you, while you
14 were standing watch, feel the effects of fatigue?

15 A. Not that I recall, sir.

16 Q. You can turn to the voyage data recording transcript if you
17 choose. It's Exhibit 266, page 136. But the second mate, at 1531
18 -- and one of the reasons that we asked the ship's officers and
19 the crew to be here, is so they can help us interpret the
20 transcript in light of, not only operations, but you knew these
21 people.

22 So she's talking about being in Jacksonville, and she says --
23 I'll read it, so that the public can understand. "All right, so I
24 called them up yesterday. I didn't get much sleep yesterday,"
25 which was, or would be the 29th, based on the way the transcript

1 flows, "because I was on the phone with everyone." And then she
2 talked about what caused her not to sleep, and so forth.

3 So would that be typical? I mean, did you ever, as a ship's
4 officer, talk to the mates and stuff, and talk to them so that
5 they would make sure to not have things that would prevent them
6 from getting enough sleep?

7 A. Sir, to the best of my recollection, when people took rest
8 periods, the general understanding was, you know, you wanted them
9 to go get some rest. Rest does not require sleep, per se. You
10 can be sitting in a chair resting. Everybody rests different
11 ways, sir.

12 Q. I understand. Based on your experience and training, what
13 can be some of the ramifications of fatigue on watch?

14 A. Well, if you're fatigued on a watch, you may not be as sharp
15 as you usually are. You may miss something.

16 Q. Have you had bridge resource management training in the last
17 couple of years?

18 A. We do bridge resource training on board the vessel every
19 quarter.

20 Q. Is that now, or is that then?

21 A. It's -- I believe it's one of the requirements. It's a
22 bridge team management, and it's every quarter on board the
23 vessels. It was now and then.

24 Q. Would I be able to find records of bridge team management
25 training? I wasn't aware -- I'm not saying you're wrong, but I

1 haven't seen that. And I'll have to relook for that.

2 A. Sir, I believe it was part of the tracked training, and that
3 would be in binders that were kept in the chief mate's office, if
4 I recall properly, as well as the on-board training log sheets for
5 who was in attendance at those.

6 Q. Can fatigue have the effects of -- you talked about not as
7 sharp, but based on that training, can it have the effects similar
8 to being under the impairment of alcohol?

9 A. I can't speak to that, sir. I mean, fatigue affects
10 different people in different ways, so I don't know.

11 Q. So what was your understanding of the TOTE policy related to
12 the use of over-the-counter medications on board by watchstanding
13 personnel?

14 A. When would this be, sir?

15 Q. This is during the pre-accident time frame, and this would be
16 when a vessel, with people on board the vessel, in any capacity,
17 underway or whatever.

18 A. The way I understand it, sir, is any medication you're on at
19 all, you're supposed to fill out on the -- I can't remember the
20 form name. Maybe it was the Personal 5 form, where you fill out
21 all your medical history. And if you were taking anything, you're
22 supposed to let the captain know, the way I understood it.

23 Q. So the medical history form would be filled out by a sailor
24 before they got to the ship, or when they got to the ship?

25 A. When you sign on at the captain's office, you would fill out

1 that form. Any medication you are on is supposed to be listed on
2 that form, as well.

3 Q. So if you turn to that same exhibit, the transcript exhibit,
4 which is 266, and turn to page 301 -- and I'll give you a moment
5 to dig deep there. So we're talking about a conversation that the
6 second mate has with her AB. And she says, "I slept pretty good
7 last night until 9:00."

8 The next statement, "I guess that's when my ZzzQuil" -- which
9 is an over-the-counter sleep medication, once again, over-the-
10 counter, "wears out. And then, bing, I'm awake."

11 As master of the *El Faro*, would you know when someone's
12 taking an over-the-counter medication?

13 A. Only if they reported it to me, sir.

14 Q. So is the use of over-the-counter medications and
15 prescription medication taken under the care of a doctor, is that
16 specifically contained in a pre-accident TOTE policy?

17 A. I don't recall.

18 Q. If a crewman came aboard -- let's go back to your role as
19 master or chief mate. If someone comes to the ship, how do you
20 know they're medically ready to go? In other words, we know they
21 have their credentials. It's obvious, you know, the Coast Guard
22 does physicals on a 5-year basis, and we know that pilots are
23 required to have it on an annual basis. But how do you know that
24 when they walk up the gangway to the prow, that they're medically
25 ready to go?

1 A. I believe the unlicensed crew members are required to go
2 through a physical before they report to the ship. And they
3 report with paperwork saying that they're fit for duty.

4 Q. Is that the same for officers?

5 A. I believe officers were undergoing physicals, and I don't
6 recall how often.

7 Q. But there's a great difference between someone that undergoes
8 a physical, and then before they get the call to report to the
9 ship, they have an illness, and they see their doctor, and they
10 get prescribed a medication, and they report to the ship. Does
11 the crewing department, to the best of your knowledge, vet crew to
12 make sure that at that moment they board the ship they're good to
13 go?

14 A. I can't speak for that, sir. I'm not in the crewing
15 department.

16 Q. So turning to Captain Davidson, and you worked with him over
17 the course of a year, based on your scheduled rotations. How did
18 he communicate to the crew his expectations that they were rested,
19 and that the effects of fatigue were countered on board the *El*
20 *Faro*?

21 A. I don't recall him ever calling anything fatigue. I remember
22 he used to just make -- tell everybody to make sure they're
23 getting their rest periods and had proper rest.

24 Q. So during that same time frame, did Captain Axelsson approach
25 that any differently?

1 A. Not that I'm aware of, sir.

2 Q. During your tenure, once again, without naming names, there
3 was a chief mate that fell asleep on watch on multiple occasions.
4 Are you aware of the circumstances of that?

5 A. I have heard of that situation. Yes, sir.

6 Q. Was that discussed on board from the standpoint of, not a
7 serious infraction of watchstanding, but like it might have
8 happened?

9 A. I was not on board at the time, so if it was discussed at
10 that time, I do not know.

11 Q. So if you'll turn your attention the transcript, once again,
12 page 251. And earlier we were talking about the crew issues
13 aboard and so forth. And this is a discussion about -- that the
14 third mate was having with his AB about the chief mate falling
15 asleep on a watch. And it's based -- it's an excerpt, so there's
16 preliminary discussion. But the central point, they're talking
17 about an ex-chief mate.

18 "The first time he fell asleep on watch, he must have been,
19 well, that was kind of nice, and refreshing." And then the AB
20 says, "Who's going to say anything?" And then the third mate
21 says, and I'm paraphrasing, just for brevity, yeah, we didn't
22 crash into anything. There's nobody out there; what's the
23 problem? The AB says, does it all the time.

24 The third mate says, then he got caught, and nothing
25 happened. Then he got caught again, and nothing happened. He

1 kept on doing it, the third mate said.

2 What I'm trying to get to here is, the fatigue issue, there
3 was no discussion that you're aware of about let's sharpen up our
4 oversight of fatigue because a senior ship's officer is falling
5 asleep on watch at sea?

6 A. Sir, I didn't see fatigue as being an issue. You had port
7 mates, I believe, in both ports. So the second mate, as well as
8 the third mate, would get some extra time off the deck. The chief
9 mate got his rest periods in. And I didn't see it being an issue,
10 sir.

11 Q. Do you know if there was an investigation conducted into this
12 event so that the ship's officers and the other people on board
13 the ships knew about the potential for someone falling asleep on
14 watch, and without knowing the exact circumstances, but so other
15 ships could learn from this and perhaps positively deal with it?

16 A. I don't know if there was an investigation or not. I was not
17 on board when this happened so I don't know if there was an
18 investigation into this situation.

19 Q. And so, what kind of record-keeping takes place to make sure
20 that ship's officers are in compliance with the requirements of
21 the standards for training, certification, and watchkeeping?

22 A. We had STCW -- excuse me -- records that we would fill out,
23 sir.

24 Q. Please talk about those records, how they were used.

25 A. They were used to track crew members' work hours and rest

1 hours for the day, to make sure you were not in violation of the
2 STCW requirements.

3 Q. Okay. If you'll turn your attention to Coast Guard Exhibit
4 283, which is a different binder. It's a series of STCW records
5 that have been provided to us as a result of a request to TOTE.
6 Commander Yemma has it up on the screen. So it's a whole package
7 of STCW work records that start in July, for some ship's officers,
8 and they go on till the end of the record request that TOTE
9 provided to us.

10 Do those look to be the STCW records that were filled out on
11 the *El Faro*?

12 A. Yes, sir. They look similar.

13 Q. Okay. If you look down at the bottom, there's a place for
14 the individual to sign, and there's a place for the master to
15 sign, and there is a comment block. So if you could -- would they
16 all be signed?

17 A. Yes, sir.

18 Q. So why wouldn't these records be signed?

19 A. These were probably copies kept on the ship's computer, sir.
20 And then when they were printed out, the crew member would sign
21 them, the department head would sign them, and the master would
22 sign them, and they would be given back. I believe the chief mate
23 kept a binder of all the STCW records, either in his office, or
24 they may have kept it on the bridge. I'm not a hundred percent
25 sure where it was actually kept.

1 Q. If you look on page 8, which is the record for the second
2 mate, for July. And you'll notice, in the upper right corner,
3 there's a sort of shaded block. And that shaded block is an
4 automatic function of the STCW records. And there's a Note 3.
5 Could you read Note 3? You probably have the same thing that I
6 do.

7 A. Note 3 says, "No crew member can have less than 77 rest hours
8 in a 7-day period. This is calculated in the column titled 'Rest
9 Hours in a 7-Day Period.' If you are getting close to the minimum
10 permissible rest hours, the cell will turn yellow as a warning.
11 If you have less than the required 77 rest hours, the cell will
12 become shaded with pink and text will turn dark red and bold."
13 And then it has an asterisk, which refers to the master's remarks
14 down at the bottom.

15 Q. So based on your experience, would the comments from the
16 master in the box provided, would the master pen and ink in his
17 comments, or would the master type in the comments? It's a type-
18 written form. Would they type in, for example, guidance to make
19 sure that the second mate got the required rest?

20 A. I don't recall anything specifically like that.

21 Q. So you don't recall whether, for example, Captain Davidson --
22 well, who managed this form? Was it you, as chief mate, or would
23 it have been you, as master?

24 A. The chief mates did their own rest hours, and they would help
25 the unlicensed members of the deck department with their rest hour

1 sheets. Each mate filled out their own rest hour sheets. And
2 then at the end, all were submitted to the department head to
3 sign, and then they were submitted to the master to be signed.

4 Q. So does this seem like an anomaly, that the second mate was
5 in a cautionary area? Or would they, in fact, get more rest than
6 this, more rest periods?

7 A. Can you repeat that please?

8 Q. In other words, she was in a cautionary scheme, to remind
9 people that she was getting close to the boundaries for STCW. Was
10 that typical for her or a crewperson aboard the *El Faro*?

11 A. I don't recall, sir. I'd have to go back and look at all the
12 records.

13 Q. So who would have oversight on board for the -- to make sure
14 that the crewpersons got enough rest?

15 A. I don't know what you mean, exactly.

16 Q. In other words, who was responsible that the crewpeople on
17 board the ship got the rest they were required?

18 A. Well, the captain's responsible for checking the STCW sheets
19 and making sure people are getting the proper rest.

20 Q. And then who at TOTE -- and as a master for TOTE, and
21 knowing, to a certain extent, the shoreside management of ship
22 operations, who at TOTE provides oversight to make sure the
23 crewpeople are getting enough rest, looking at ship-by-ship basis
24 and making sure their records are accurate?

25 A. At what time frame?

1 Q. The pre-accident time frame.

2 A. I don't know who specifically at TOTE, held that job, sir.

3 Q. While you were working, were those records ever audited as
4 part of the internal audit program?

5 A. I believe they were.

6 Q. So Coast Guard Exhibit 304 is the U.S. Code. And it's 46
7 U.S. Code 8104, paragraph (a). And basically, it says that if
8 you're going to take a navigation watch, you must have 6 hours of
9 uninterrupted rest in the 12 hours prior to standing that watch.

10 Specifically, "An owner, charter, active managing operator,
11 master, individual in charge, or other person having authority,
12 may permit an officer to take charge of the deck on a vessel when
13 leaving or immediately after leaving port only if the officer has
14 been off-duty for at least 6 hours within the 12 hours immediately
15 before the time of the leaving." Is that correct?

16 A. That's the way I read it. Yes, sir.

17 Q. Under Captain Davidson's command, do you know how he ensured
18 that that U.S. Code requirement for rest was administered to make
19 sure that when the vessel left and then the officer was about to
20 take his first watch at sea, that he had sufficient rest in that
21 12-hour period?

22 A. I don't know specifically how he handled it, sir. No.

23 Q. If you'll take a moment to glance back at that work-rest
24 history sheet, that STCW sheet, just for a refresher, there's all
25 kinds of cautionary notes on there. Do you see if there's a

1 cautionary note -- and Commander Yemma will blow it up a little on
2 the screen for you there. Does that talk about that U.S. Code
3 requirement?

4 A. I do not see that on there, sir.

5 Q. Prior to the October 1st date, were you aware of that
6 requirement?

7 A. I believe I was, sir, and I believe -- I was aware of it.

8 Q. Was the captain aware of it?

9 A. I can't speak for that.

10 Q. Has the policy, in terms of the oversight of the STCW rest
11 requirements, changed since the accident?

12 A. Not that I'm aware of specifically. We're using actual
13 software now to track the rest hours on the ship I'm on board, not
14 the forms.

15 Q. So looking past the STCW, you mentioned the port mates and
16 the role of the port mates, can you compare the pace of cargo
17 operations in Jacksonville with the operations in San Juan?

18 A. They were similar.

19 Q. So I'm a little confused about the role of the port mate, and
20 maybe you can elaborate on it. Was the function of the port mate
21 to improve the efficiency of the cargo operations, in other words,
22 have an extra body aboard to be able to ensure the securing of
23 cargo and loading of cargo, and so forth? Or was the function of
24 the port mate to physically relieve a watchstanding officer so
25 that they could get the appropriate rest?

1 A. I believe it was both, sir.

2 Q. During your time aboard *El Faro*, were the watchstanding
3 officers given adequate rest to comply with the STCW requirements?

4 A. As far as I understand, yes, sir.

5 Q. Were you aware of a reduction in the availability of port
6 mates in either San Juan or Jacksonville as 2015, as the year
7 unfolded? In other words, you got off in -- on August 11th, I
8 believe, as master of the *El Faro*. Was there difficulty finding
9 port mates?

10 A. I can't speak to that because I wasn't there after, sir. I
11 went out to the West Coast after that.

12 Q. The question was, while you were there, was there a reduction
13 in port mates? In other words, did you have a port mate every
14 single -- to your best of your recollection, every single time you
15 were in port, either in Jacksonville or San Juan?

16 A. To the best of my recollection, we usually had a port mate in
17 Jacksonville and San Juan. As far as every single time, I can't
18 recall.

19 Q. Did they -- what did they do for you personally? In other
20 words, having a -- you're the chief mate. You're responsible
21 basically -- you're not on the watch. You've got the whole port
22 period, it's the chief mate's lot to basically work through the
23 entire period of time. I mean, you get rest and so forth, but
24 what does the port mate do for you, as the chief mate?

25 A. Well, when the port mate came on board the vessel, I would

1 give him a list of what was going on that day. They would look at
2 the cargo orders. I had typed up orders that I would print out,
3 as well, for any specific things that were going on during the
4 day, as far as ballasting or de-ballasting the vessel, if anything
5 needed to be moved out of the cargo hold, or something like that.

6 And then the port mate would go down, they would work with, I
7 believe it was the third mate, for a few hours. Then the third
8 mate would knock off, and the port mate would have the deck. And
9 then the second mate would eventually come out, and also be with
10 the port mate for a while.

11 So, you know, they make sure people have their rest periods,
12 as well as, for an extra person on deck to help with cargo and
13 things like that. And if I recall correctly, we also had standby
14 unlicensed crew members to assist with plugging in the reefers and
15 things like that, as well.

16 Q. So as chief mate or master, during the pre-accident time
17 frame, which was the critical mate that needed rest? Like coming
18 out of Jacksonville, which was the mate that you had to really
19 make sure had adequate rest because they were going to stand sea
20 watch once you've cleared the sea buoy and dropped the pilot?

21 A. It depends.

22 Q. How about typically, with a 2000 departure?

23 A. 2000 would be my third officer, to the best of my
24 recollection.

25 Q. The transcript provides details about the people's assessment

1 of certain conditions aboard *El Faro*, both ashore and afloat. If
2 you'll turn your attention -- pardon me -- to the VDR transcript,
3 page 66.

4 On the morning of the 30th, at 8:53 in the morning, the third
5 mate is having a conversation, and he's talking to, I believe, his
6 AB. And he says, "He showed up after the fact, you know. What's
7 changed is -- I mean, granted, obviously, I missed something.
8 Man, I could not keep" -- and then exclamation, or an expletive --
9 "keep up. I had a dude helping me and he couldn't keep up. I was
10 helping him plug in. I didn't have time to get all the temps down
11 and the ramp came off. Everything just happened in quick
12 succession for a couple of reasons.

13 "I guess 5 hold didn't get finished up until the last minute,
14 so all the reefers had already -- been already in, and plugged in
15 there, weren't there. They all just came on at the end. Yeah, we
16 just had this perfect storm" -- I won't repeat the word -- "of
17 problems. We used to have a port mate and now we don't have. We
18 have a guy from PORTUS, a longshoreman now. We don't."

19 Was the pace of operations about putting the cargo aboard at
20 the last minute, was this this something you experienced aboard *El*
21 *Faro*, as chief mate or master during your time aboard?

22 A. I don't recall anything like this, sir. No.

23 Q. Were you aboard for the period of time when they were testing
24 the new terminal operating system, and they were, you know,
25 realigning the way it had put the cargo aboard the ship? Were you

1 aboard during that time?

2 A. I'm not sure.

3 Q. So this would not be your experience in terms of a typical
4 loading operation on the ship?

5 A. No, sir. Not finishing the reefers.

6 Q. How about the ramp-up for the last loading of the cargo,
7 other than reefers, perhaps?

8 A. Nothing like that, sir.

9 Q. So if a crewperson comes aboard and they are taking a
10 prescription medication -- we're getting to the end of the, sort
11 of, the human factors side of our discussion -- what are they
12 supposed to do? In other words, if I have a, you know, a
13 prescription here, and I'm ready to board, what's the requirement?

14 A. The requirement is they fill it out on that form I discussed
15 earlier, sir.

16 Q. Okay. This prescription is a controlled substance, pain
17 killer, some substance such as that. It's been prescribed by a
18 doctor. It's a narcotic, an opioid. What do you then, as a
19 master?

20 A. Well, any prescription that's brought on is supposed to show
21 you, as well as put it on that sheet. You're then supposed to
22 look it up against the -- I think it's the U.S. Coast Guard banned
23 substances list, as far as medications go. And if there is a
24 problem, you don't sign them on board the vessel.

25 Q. Okay. So the doctor prescribes a narcotic pain medication,

1 and you -- he's showing that to you. Would that be a banned
2 substance or not?

3 A. It would depend if it was on the list that the Coast Guard
4 has.

5 Q. Have you ever put a prescription substance in the ship's safe
6 under your control?

7 A. No, sir, I have not.

8 Q. While you were aboard the vessel, did any crewpeople -- when
9 you were master, in particular, were you aware of any crewpeople
10 that were taking any prescription medications that wouldn't have
11 completed the required paperwork?

12 In other words, if someone -- you come on board the ship, say
13 under Captain Davidson's tenure, and they reported to the captain,
14 as required by company policy, and completed the form. Would
15 Captain Davidson share that form with you on the turnover? And
16 would you be aware of that crewperson being under a doctor's care
17 and taking a prescribed medicine?

18 A. You're saying if I relieved Captain Davidson, sir, as master?

19 Q. Or you relieved any master.

20 A. Usually you go through the crew files with the other captain
21 when you turnover. And then you'll also talk about the crew
22 members and things like that.

23 Q. So we're going to turn our attention to the -- briefly to the
24 selection for the Marlins. Did the crewing for the ships create
25 any problems aboard?

1 A. Not that I'm aware of.

2 Q. Were you ever aware of, leading up to the accident time, of
3 Captain Davidson's status in terms of his selection for the
4 Marlins?

5 A. Leading up to the accident time? Can you clarify?

6 Q. Yes. The time you served -- the crewing for the Marlins was
7 an ongoing process that started in May and continued past the
8 accident date. So my question is, did Captain Davidson talk to
9 you at all about his selection status for the Marlin, whether he
10 was going to the ships or not going to the ships, anything at all?

11 A. To the best of my recollection, he may have mentioned he was
12 not going, and he didn't really specify why.

13 MR. FAWCETT: Captain, I think it's a good time to take a
14 break, before we change the next line for this officer.

15 CAPT NEUBAUER: Let's take -- the hearing will take a recess,
16 and reconvene at 10:40.

17 (Off the record at 10:32 a.m.)

18 (On the record at 10:45 a.m.)

19 CAPT NEUBAUER: The hearing is now back in session. Captain
20 Thompson, if you ever need a break, just please let us know.

21 THE WITNESS: Okay.

22 CAPT NEUBAUER: Mr. Fawcett?

23 MR. FAWCETT: Yes, sir, Captain. Thank you.

24 During the break, attorneys from TOTE came up, and they said
25 that they have some records of your training, and the training

1 that had been conducted. So we'll look those over, and thank you
2 very much.

3 BY MR. FAWCETT:

4 Q. So resuming the new topic -- we'll still on the topic area,
5 and we're about to finish up the last section of that, but it's a
6 discussion about ship operations and bridge resource management.
7 And when we finish this section, we'll go to my colleagues at NTSB
8 and then to parties in interest.

9 So prior to the accident time frame of October 1st, just for
10 clarity, TOTE had entrusted the responsibility as master to you as
11 master of the *El Faro*; is that correct?

12 A. Can you please repeat that?

13 Q. Yes. Prior to the accident, TOTE had entrusted
14 responsibilities as master of the *El Faro* to you; is that correct?

15 A. Yes, sir. I did sail as master on the *El Faro*.

16 Q. So, in a sense, some of the questions I ask you will be
17 asking you as a TOTE master prior to the accident, to interpret
18 some of the contents of the VDR, and what you might do for -- as a
19 master for TOTE.

20 So the first area is the VDR transcript that's Exhibit 266,
21 page 319, at 1:43. The AB and the second mate, they see some
22 flashes on the ship of unknown origin, and there's a conversation
23 about -- the AB draws -- the AB's the lookout; is that correct?

24 A. Yes, sir. The AB would be the lookout.

25 Q. And they look out the windows on the vessel. This is on the

1 morning of the accident, October 1st. They look out forward, and
2 then the AB draws the mate's attention to flashes. The AB and the
3 mate talk about them, and it's determined that they're -- appear
4 to be on board the ship. There's some kind of conversation about
5 the direction the reefers are pointed.

6 If a mate on watch saw unidentified flashes aboard a ship,
7 there's some discussion it might be a combination of windows
8 bouncing the light out forward, or whatever, but if they couldn't
9 come to an agreement as to what the source of the flashes on the
10 ship would be, what would you expect them to do?

11 A. Well, sir, if there is something going on that they don't
12 know what it is, I would expect them to notify me, if I was the
13 master of vessel.

14 Q. Would the duties of a lookout, in terms of the standing and
15 the conduct of a watch, would they be contained in your specific
16 vessel standing orders?

17 A. I don't recall exactly if they would have been in there or
18 not, sir. I'd have to look at them.

19 Q. Talking about the bridge suite of equipment, other than the
20 GMDSS system, was there a high frequency radio set on the *El Faro*?

21 A. As far as what? A satellite radio, or something like that?

22 Q. No, a high seas radio so that you -- in the old days, we used
23 to use 2182 to call, as a distress. There's still some functional
24 purpose for a high frequency radio set. Did the *El Faro* have one?

25 A. I believe it did, sir.

1 Q. Would you recall if you had ever seen it in operation? And
2 the reason I'm getting to this, is that the weather services
3 ashore and the Coast Guard, working in harmony, they put out radio
4 broadcasts of weather information and so forth on that piece of
5 equipment. Have you ever seen that equipment used on board *El*
6 *Faro*?

7 A. I have seen it on, on board the ship, to best of my
8 recollection, sir.

9 Q. No. I'm talking about have you seen that equipment used,
10 tested, receiving information, for example, high seas weather
11 broadcasts?

12 A. That, I don't know exactly.

13 Q. Looking at the *El Faro*, each vessel, or each class of vessel,
14 have unique characteristics. A car carrier has a very high sail
15 area. They have to take into account that when they're
16 maneuvering into docks and so forth. Did the *El Faro* have any
17 unique capabilities or vulnerabilities from a standpoint of your
18 role as a master? In other words, you're standing on the ship.
19 Are there any things you have to think about that vessel to ensure
20 that you operate the vessel safely?

21 A. You would have to think about the way the cargo is secured on
22 the vessel, things of that nature, the stability of the vessel,
23 the wind, the stack heights of containers, things like that.

24 Q. So given that the *El Faro* was propelled by a steam turbine
25 engine, as master, were there any unique engineering or mechanical

1 conditions that you took into consideration when operating the
2 vessel?

3 A. Not that I can speak of specifically.

4 Q. How about maneuvering the vessel with -- in terms of, like if
5 you had to back suddenly, give a series of forward and aft engine
6 commands, like ahead and astern commands? Was it a typical
7 vessel, being that it was a steam-propelled vessel?

8 A. I don't know what you're speaking of exactly. I haven't had
9 any issues giving an ahead bell or astern bell, or anything like
10 that.

11 Q. Do you know anything about operating a vessel with a
12 sustained list and how that might affect the propulsion system of
13 the vessel? In other words, the vessel could be subject to wind
14 heel, based on its high container stack load. Were there any
15 vulnerabilities of the ship at the time that you might have been
16 aware of as it relates to the propulsion system?

17 A. Not that I've had to worry about in my experience on board
18 there as master.

19 Q. Could you repeat just that last part for me?

20 A. Not that -- nothing specific I had to worry about, you know,
21 when I was captain on board.

22 Q. So how did -- when you were in command, how did you -- what
23 was your concept of bridge team management, and how did you
24 practice it?

25 A. I usually have meetings with the crew. I'll let them know

1 where they're going to be, as far as docking, for the bow and
2 stern, if the current's flooding or ebbing, things like that, just
3 so you're watching out for your lines when you're letting go and
4 tying up, who would be watching the radar coming in and out,
5 things like that, who would be listening to the radio and
6 monitoring traffic, things of that nature.

7 Q. So when you mentioned the crew, who were you referring to?
8 Who would be part of those meetings?

9 A. I usually try to have the chief mate, second mate, and the
10 third mate there. I usually do it right before departure or
11 something like that, or pre-arrival.

12 Q. Were Captain Axelsson's concept of bridge team management or
13 bridge resource management, in terms of gathering together the
14 officers prior to departure or arrival, were they similar?

15 A. I don't know that he did it the same way as I did, sir.

16 Q. But you served under him, correct?

17 A. Yes, sir, I did.

18 Q. So you're not able to make an observation based on your
19 service, as to how Captain Axelsson conducted bridge resource
20 management prior to departure and arrival?

21 A. Captain Axelsson, I believe he would discuss things with
22 everybody. You know, I would be up in his office all the time
23 discussing cargo, things like that. If he had anything to relate
24 to me, he would then. And then, I'm not sure, as far as when he
25 would talk to the other mates.

1 Q. And similar question for Captain Davidson.

2 A. It would be the same answer, sir.

3 Q. So looking at Captain Davidson, and we might have discussed
4 this very briefly before, did he create a climate aboard the
5 vessel where bridge officers could freely approach him at any time
6 of the day or night and express their concerns, their opinions,
7 their reservations?

8 And, you know, we looked in gaps at the VDR transcript, and
9 that's the reason I asked you the question. I'm trying to gather,
10 based on your experience, his openness to a third mate coming to
11 him at any time of the day or night and asking for his opinion or
12 guidance.

13 A. I've never had a problem asking him anything, sir. And as
14 far as the other mates, he would always tell everybody his door's
15 open, if you need me, give me a call. So I've never seen any
16 issues with anything like that.

17 Q. At sea, during your experience, did you ever see Captain
18 Davidson -- first of all, have you ever called Captain Davidson
19 during your watch, at sea, to ask for his opinion and advice or
20 provide him any information?

21 A. I may have. I don't know.

22 Q. Do you recall if you ever saw him come to the bridge in
23 response to an officer providing him information and him showing
24 up on the scene to provide guidance or direction?

25 A. I can only speak for my watch, sir. And I've -- I don't

1 recall having to ask him to come up for anything specifically.

2 Q. So if you'll turn your attention to the transcript, pages 266
3 and 267, and what I'm going to do is, I'm going to -- instead of
4 reading it, I'm just going to characterize it.

5 So in the first instance, the third mate calls the captain --
6 and this is the VDR transcript. He discusses the forecasted
7 weather. And then, in the second instance, which appears on the
8 next page, 266, the second mate calls, and also gives forecasted
9 information.

10 MR. REID: Excuse me, Mr. Fawcett, if you would just slow
11 down a little bit, and let him --

12 MR. FAWCETT: Roger.

13 MR. REID: -- read through the transcript. I think that
14 would be helpful, and for the parties. Thank you.

15 BY MR. FAWCETT:

16 Q. Okay, this is 23:05. If you'll take a moment to look through
17 the transcript. And while you're looking at that, it appears that
18 the third mate is calling the captain, in his cabin, from the
19 bridge. And while you read through that, Captain Thompson,
20 there's another entry that's on 266 that begins at 23:13. The
21 third mate, essentially, makes two calls to the master, Captain
22 Davidson, from the bridge, one shortly after the other.

23 A. If I could ask page numbers for the specific conversations
24 that you're referring to?

25 Q. Yes, sir, 267 through 268. The time stamp is 23:13. And it

1 starts out, "Okay, it's the third mate again." So then there's a
2 conversation where the third mate conveys, what I characterize as
3 forecasted conditions to the captain.

4 My question is, I don't see anywhere in there where the mate
5 is relaying the observed conditions on the *El Faro*. The captain
6 is down in his cabin, which is a different atmosphere than on the
7 bridge. Would the mate, the third mate, in the case of the
8 documentation you have just read, been able to, with the equipment
9 the *El Faro* had, accurately give the wind speed, direction, and
10 the conditions observed, when he made that call?

11 A. Sir, I don't know. I wasn't there. I can't speak for what
12 he would have been observing.

13 Q. Without going into detail, we've had a lot of questions about
14 the anemometer. And I don't see anywhere in the transcript where
15 the mate relays what the vessel is experiencing now. And what I'm
16 saying is, the master is in his cabin. The bridge is relaying
17 forecasted conditions. They're not telling the captain what is
18 happening right now, whether the wind's blowing 40, 50, or 100.

19 And I don't see a place on there where they respond to what
20 would be a question from -- you know, the problem with VDR is,
21 when someone is speaking on an electronic telephone,
22 unfortunately, we don't have the other side of the conversation.
23 But if the captain said, hey, what's it doing up there now, the
24 bridge officer would have the opportunity, and we'd see it on the
25 transcript, to say, these are the seas, these are the swells,

1 these are the winds, these are the waves, this is the direction of
2 the wind. And what I'm asking is, do you see any of the observed
3 conditions in the transcript?

4 A. I do not, on these specific pages, sir.

5 Q. And there are similar -- and I will say that, on page 310, at
6 01:20, the second mate makes a call to the master. So, if you
7 want to take the time to look at it, and it -- you know, these --
8 the VDR transcript was very difficult, and it was a collaborative
9 effort to prepare this transcript. So the asterisks represent
10 information we don't have.

11 But if you'll take a quick look through those entries, do you
12 see any discussion of what the bridge is actually observing and
13 reporting to the captain? And for the record, this is a
14 discussion where the second mate calls on the electronic
15 telephone, and I'll read the disputed unresolved words that are in
16 brackets as part of the transcript.

17 But it says, "Uh, I just wanted -- run south of the islands,
18 Old Bahama Weather Channel. We'll be beating the storm. Umm, Fox
19 News just said it's up to a category," with blanks for unresolved.
20 "Yes, yes, that's what I heard. It isn't looking good right now.
21 Right now, umm, my track line, I have 0200. Alter course straight
22 south, and then we'll go through all these shallow areas. Umm,
23 and the next course change will, we're gonna be through the
24 Bahamas, and then just gonna turn." And then she says, "Okay."

25 My question is, you know, you're looking -- you have the

1 ability there of looking at a little bit more than I just read.
2 But do you see that she's reported to the captain the actual
3 conditions observed on the bridge with respect to what's going on
4 at the moment?

5 MR. BENNETT: Excuse me. I think you mischaracterized what
6 the stars are, what the brackets are. The brackets are the
7 unresolved. The stars are unintelligible. You mentioned that the
8 brackets were agreed to. That's not the case.

9 MR. FAWCETT: Correct. The stars represent unintelligible
10 conversation of some duration. And the brackets are the possible
11 words that could have been said, as reviewed by the VDR transcript
12 team. Would that be correct for you, sir?

13 MR. BENNETT: I will agree to what the VDR instructions are,
14 is that there is a dispute as to what it says in the brackets.
15 The language is not agreed to.

16 MR. FAWCETT: Thank you, sir.

17 BY MR. FAWCETT:

18 Q. So Captain Thompson, I'm just -- and I do realize that there
19 was a lot of noise in the background on the VDR. But do you see
20 any reporting of the observed conditions for the *El Faro* in that
21 particular transmission to the captain?

22 A. On that page, I do not, sir. That's page 310 of 311,
23 correct?

24 Q. Just for clarity, I've asked Commander Yemma to put up Coast
25 Guard Exhibit 301, page 3. And once again, we've had a lot of

1 discussion about the anemometer. And there is other conversation
2 on the VDR about the anemometer. But he's going to display this,
3 and I want to just see if you can ascertain if that's the piece of
4 equipment that displayed the wind direction and wind speed on the
5 *El Faro*.

6 A. It looks very similar, sir.

7 Q. Looking at that, will that refresh your memory, to help us
8 understand how wind speed was displayed? In other words, there's
9 some question as to whether or not it would display winds in
10 excess of 100 knots. Looking at that, does that refresh your
11 memory, as if you were looking up and might have seen that, that
12 velocity?

13 A. I believe it would have displayed the three-digit wind speed,
14 yes, sir.

15 Q. And just for clarity, the anemometer direction was believed
16 to be off by a certain number of degrees; is that correct?

17 A. I'm not certain of that.

18 Q. So if you go to page 2, just flip there, you'll see a series
19 of three different GPS receivers. Based on the *El Faro* bridge
20 equipment list, are those the bridge -- or the vessel GPS
21 receivers that were then on board?

22 A. They look familiar.

23 Q. Do you know if they all worked?

24 A. They all would have worked, sir.

25 Q. And just, were they all bridge mounted?

1 A. I don't recall exactly where they were all located. I
2 believe they were on the bridge.

3 Q. Did one of these directly feed the waypoint and route
4 information to one of the ship's radars?

5 A. I believe it did.

6 Q. So, looking at the radar, you not only have the radar
7 picture, but you would have the track line and the waypoints
8 displayed on the radar face, and that GPS plus the radar image of,
9 say, going down through islands or land masses, would allow the
10 navigating officer, the bridge officer, to be able to know where
11 they were, in addition to the traditional paper plot; is that
12 correct?

13 A. I'm not a hundred percent certain, sir. I knew -- I know you
14 can put waypoints into the radars. So I'm not a hundred percent
15 certain. I can't remember exactly if it was fed. I believe it
16 was fed, but I'm not a hundred percent sure.

17 Q. So the watch officer on the *El Faro* would look at those GPS
18 receivers, they would take the positional information off the LCD
19 display that's pictured over here to my right, and they would
20 transpose them onto a chart to put the vessel's fixed positions;
21 is that correct?

22 A. Yes, sir.

23 Q. And then they would use dead-reckoning navigation, which is
24 projecting where the ship should be along its course based on its
25 speed; is that correct?

1 A. I don't know if every mate did that, but I did DR positions,
2 yes, sir.

3 Q. As master of the *El Faro*, would it be a required marine
4 practice to put dead-reckoning positions on the vessel's track to
5 do the complete navigation of a vessel?

6 A. I believe they were all putting the DR positions down when I
7 was on board, sir.

8 Q. So the *El Faro* did not have an electronic chart display and
9 they did not have electronic chart system. Ships of similar size
10 and construction, although it's not required on the *El Faro*, use
11 those systems. Could you briefly describe the advantages of an
12 electronic chart system to navigation, especially on a voyage such
13 as the *El Faro's* last voyage?

14 A. I'm not sure what you're looking for, exactly. I mean, the
15 electronic chart display information system is nice to have in
16 your office, as a master. It's even nicer, because you can see
17 what's going on with the ship. A lot of them are interfaced, so
18 you have AIS's of other targets, and things of that nature as
19 well. Some of them, depending on what's connected to them, you
20 have the wind speed and things like that, as well. So it's an
21 advantage, for sure.

22 Q. Okay. So the watchstanders on the *El Faro* would go to the
23 GPS, they would jot down the positional information, usually on a
24 piece of scrap paper, or something, the logbook, or whatever, and
25 then go to a paper chart, use dividers to put the position of the

1 ship down on a paper chart. That was the practice on the *El Faro*;
2 is that correct?

3 A. I believe that's correct. And then anytime you're within
4 land, you're supposed to do range and bearing observations to try
5 to verify the GPS position.

6 Q. And you stated that if the ECDIS system was in the master's
7 cabin or office space, the master would instantly know by looking
8 at it, not only AIS information, but also positional information
9 on a navigation chart. In other words, it increases the
10 efficiency of operations at all times; is that correct?

11 A. I can't say it would increase it at all times. I said it's a
12 benefit.

13 Q. But it would alleviate the transposing the numbers, alleviate
14 -- your voyage would be already pre-plugged in to the ECDIS
15 system; is that correct? You wouldn't have to do chart work to
16 solve these navigational problems.

17 A. I would still do chart work, sir.

18 Q. Talking about the transcript again, page 315, and then
19 there's another at 337. And I asked you earlier about the
20 approachability of the *El Faro* masters, in particular, Captain
21 Davidson, by his officers. And I'm looking at page 315, and I
22 will read it. The second mate is talking to her AB.

23 "Keep an eye on the helm, also. Make sure she's steering
24 right." This is the morning of the accident. And then she says,
25 "Remember that whole Jacksonville outbound incident," and there's

1 two asterisks behind that indicating an unintelligible comment.
2 And then she continues again, at 2:54, which is on page 337. And
3 she says, "She's doing good. I'm impressed. Knock on wood. A
4 lot better than the Jacksonville experience."

5 Were you aware of any steering issues involving the *El Faro's*
6 steering system, or autopilot, that she might be referring to?

7 A. Not that I was aware of, sir.

8 Q. Were the mates authorized under Captain Davidson to fully
9 control the steering system on the ship, to include the autopilot
10 settings and the rudder control settings?

11 A. I believe they were.

12 Q. Turning your attention to the Coast Guard Exhibit 288. 288
13 is a series of *El Faro* radar images.

14 MR. FAWCETT: And Commander Yemma, if you'll turn just to
15 page 2.

16 BY MR. FAWCETT:

17 Q. So while you're looking for that, the voyage data recorder
18 takes screen captures of one of the ship's radars. And that
19 screen capture is a record of every few seconds of the voyage.
20 This one particularly caught my eye.

21 My first question is, which radar is this on the *El Faro*?

22 A. As far as port side radar, starboard side radar, I don't
23 recall exactly which one this was.

24 Q. So did you have three radars or two radars on board?

25 A. I believe we had two.

1 Q. And if I said that the other radar was a Furuno, would you
2 say from your recollection it was a Furuno radar?

3 A. What are you referring to as the other radar?

4 Q. In other words, this radar is what -- where the radar images
5 are captured for the VDR, there was another radar. This is one of
6 two radars. Do you know where the other radar was, and was it a
7 similar radar to this in terms of the capabilities of the radar?

8 A. Yes, sir. I believe it was.

9 Q. So looking at the character of watchstanding on the final
10 voyage and how the watch was conducted. Under the rules of the
11 road, "not under command" means a vessel which, through some
12 exceptional circumstances, is unable to move as required by the
13 rules of the road, and is therefore unable to keep out of the way
14 of another vessel. Exceptional circumstances could be steering
15 gear failure, engine failure, electrical supply system failure,
16 fire, flooding, uncontrolled cargo shifting, and stability issues.

17 At 17:39, which is the image that you're looking at, the
18 evening before the accident, there was a target on the radar, the
19 *Fuji Song*, which is a large oil tanker. And you can see down in
20 the lower right corner here the AIS information. The status is
21 indicated as not under command.

22 The target eventually passes down the *El Faro*'s port side at
23 11 miles. And my question is, if you were in command of the *El*
24 *Faro*, or if you were a watchstander, what would you do when you
25 saw that target on radar? What would be your expectations of your

1 officers and the expectation be of yourself, if you saw that
2 target?

3 A. That would depend, sir, if -- you know, if they're asking
4 for help over the radio, putting out a mayday or something like
5 that, things of that nature.

6 Q. Using AIS, can you communicate with another vessel?

7 A. I believe you can send messages through AIS.

8 Q. Would you just -- and this is in a merchant service, would
9 you expect to call out to him and see if he's okay? I mean, we're
10 talking about this voyage that was going now in a tropical storm
11 and a building system out there. Do you think that your officers
12 should call him?

13 A. I would hope they would. I -- in that situation, if you're
14 ever not under command, you'd make -- I would usually make a radio
15 announcement to let people know, if it was my vessel. And in a
16 situation like that, I would probably call.

17 Q. So you mentioned coastal piloting, and if you'll flip through
18 that display, there's a exhibit. There's a screenshot --

19 MR. FAWCETT: If you'll flip through, Commander Yemma, where
20 the *El Faro* is going down between San Salvador to the east and Rum
21 Cay to the west.

22 BY MR. FAWCETT:

23 Q. Do you see that, sir? Page 5.

24 A. Yes, I do.

25 Q. To your knowledge, had the *El Faro* ever taken that course

1 before?

2 A. Not to my knowledge, sir.

3 Q. Would that moment, where the *El Faro* is approaching those
4 islands, at some point would it change the status of the vessel,
5 where the vessel was coastal piloting as opposed to ocean
6 navigating?

7 A. As far as, are you looking for frequency of fixes and things
8 on a chart?

9 Q. Yes. Well, what would an officer of the watch be expected to
10 do? The radar's equipped, for example, with parallel indexing.
11 You can do range and bearings to navigation lights, if visible.
12 You can update the frequency of the fixes. What would you expect
13 an officer of the watch to do, under -- when you're in command, or
14 when you're standing the watch?

15 A. I would expect him to use all the tools available to him.

16 Q. Would that be part of your night orders or would that be part
17 of your verbal instructions to the watch?

18 A. I believe it would be part of my standing orders. If I --
19 I'd have to re-read them, but I believe in there it says to use
20 all tools available. And, you know, if certain things were going
21 on, you were going in a certain area, you would put notes in your
22 night orders.

23 Q. Would you update your passage plan, or cause your passage
24 plan or voyage plan to be updated?

25 A. Well, if you're changing your passage plan, you would have to

1 update your passage plan, make a new one.

2 Q. Would you expect to notify shore-side management of your
3 change or deviation for the course to pass down between those
4 isles?

5 A. Me, personally, if I was making a major deviation for some
6 reason, I would probably send an email.

7 Q. Do you know if the *El Faro* at the time of the accident had
8 the adequate charts? The typical chart for this region is 11013,
9 which is a large chart of the Bahamas. Do you know if they had
10 the other charts available to show more depth in detail -- I'm
11 talking about depth of detail, to navigate down through there?

12 A. I believe they would have. I have -- I believe they would
13 have.

14 MR. FAWCETT: At this point, I have no further questions for
15 you, but I will turn my -- turn to Commander Denning and the Coast
16 Guard team. Thank you very much. We have more questions later,
17 sir.

18 BY CDR DENNING:

19 Q. Good morning, Captain Thompson.

20 A. Good morning.

21 Q. I do have just a few follow-on questions to those that
22 Mr. Fawcett brought up. First, on the topic of fatigue, I want to
23 revisit an area he talked to you about in the VDR audio
24 transcript. You don't have to turn to it. I'll summarize these
25 comments.

1 On the 30th of September, when the third mate woke up the
2 captain at 23:05, he called him and said, hey, Captain, I'm sorry
3 to wake you. And then he proceeded to tell Captain Davidson that
4 they'll be 22 miles from the center of the storm at 0400, and he
5 suggested an alternate course to the south.

6 After that call ends, we don't hear anything, any speaking on
7 the bridge, until several minutes later, when the third mate tells
8 his AB that Captain Davidson seems to think we'll be south of it
9 by then so the winds won't be an issue.

10 Again, 22 miles from the center at 0400, but Captain Davidson
11 says we'll be south of it so the winds won't be an issue. If
12 you're 22 miles from the center of the storm, it doesn't really
13 matter which side of the storm you're on, it'll be intensity of
14 the wind, correct?

15 A. I've never been that close to a storm. I have to verify
16 that.

17 Q. And so the real -- just my question then is, since the third
18 mate woke up the captain to have this discussion -- I want to talk
19 more about fatigue -- it makes me question whether the captain
20 actually woke up sufficiently to have that conversation. So about
21 your personal observations when you served as mate, did you ever
22 have an occurrence where you needed to call the captain in the
23 middle of the night?

24 A. I never personally, that I recall, have had to wake him up or
25 anything at night.

1 Q. As a captain of a vessel, have you been woken up in the
2 middle of the night by your mates?

3 A. Plenty of times.

4 Q. And during any of those times, did you find it difficult to
5 wake up at -- you know, this was about 11:00 at night, let's say
6 in the morning. If you're woken up, does it take you a while
7 before you can really comprehend what's going on?

8 A. No, sir. Not really. I can get up pretty quickly.

9 Q. And if you're woken up in the middle of the night, as a
10 captain, when do you deem it worthy to actually go to the bridge
11 versus speaking with the mates and making decisions from your
12 stateroom?

13 A. It would depend on the situation and what's going on, sir.

14 Q. Did you feel like you got enough rest as master of the
15 vessel?

16 A. Yes, sir.

17 Q. Mr. Fawcett spoke to you about some comments on the VDR
18 transcript from the second mate, about wearing ear plugs and
19 taking over-the-counter medication. Are you -- did you ever wear
20 earplugs to help sleep?

21 A. No, sir.

22 Q. Did you attend safety meetings on board the *El Faro*?

23 A. Yes, sir.

24 Q. So again, I'm going to refer some sections of the VDR via
25 transcript. We don't have to turn to them, but I'll summarize.

1 On pages 260 through 264, there's a conversation between the
2 third mate and the AB on watch with him, and they discuss
3 reluctance to bring up safety issues at the shipboard safety
4 meeting. They use phrases like, there's that troublemaker again;
5 that's how I learned to keep my mouth shut at safety meetings;
6 they don't want to hear anything you got to say, so don't say
7 anything. Later they say, so many -- expletive -- things to
8 address.

9 Did you observe reluctance of the crew members to bring up
10 things that they perceived as safety issues at safety meetings?

11 A. I did not, sir.

12 Q. And if someone did bring up an issue at a safety meeting that
13 they felt was a safety concern, was it taken seriously by the
14 officers and the master?

15 A. Yes, sir. I believe we would put it in the minutes. I don't
16 know if it would say an AB brought this up, or -- however, you
17 would put it in the minutes, but then you would try to address it
18 right away.

19 Q. Can you recall any examples of topics that were brought up at
20 safety meetings?

21 A. I believe one time there was a mention of something, and I
22 don't recall exactly what it was, if it was the frame for the
23 ladder under the lifeboat. And it was immediately addressed.
24 They re-welded the frame back to the deck, and things like that.
25 So it was stuff that was addressed immediately, anything that was

1 in a safety meeting.

2 Q. Is that the only example you can recall on *El Faro*?

3 A. The only major example. There was other things, like non-
4 skid in certain areas, and then non-skid would be applied, things
5 of that nature.

6 Q. So these concerns that the AB is bringing up about whether he
7 thinks it would be taken seriously if he brings something up,
8 there isn't any discussion there necessarily about calling the DPA
9 about safety concerns. If a crew member has concerns about safety
10 and doesn't feel like they're being taken seriously, should -- is
11 that the role of the DPA to address those issues?

12 A. I know they could call the DPA with those issues. Yes, sir.

13 Q. Do you know how the DPA would address that situation, if it
14 came up?

15 A. I'm not in that position, so I don't know exactly how it
16 would be addressed.

17 Q. Are you aware of any safety issues having been brought to the
18 attention of the DPA from *El Faro*?

19 A. Not that I'm aware of specifically.

20 Q. And are you -- have you heard of any crew members on *El Faro*
21 express any reluctance to bring safety issues to the attention of
22 the DPA as we heard this AB expressing reluctance to bring them up
23 at the safety meetings?

24 A. No, sir.

25 MR. DENNING: Thank you, Captain. That concludes my

1 questions at this time.

2 BY CAPT NEUBAUER:

3 Q. Captain Thompson, I just have a couple of follow-up
4 questions. Sir, can you recall ever experiencing an instance
5 where you loaded the *El Faro* at Jacksonville without a port mate
6 assigned?

7 A. I believe I said earlier, I don't recall. I'm sure there has
8 been times where we may not have had a port mate, but the majority
9 of the time, almost every port call, there was port mates in San
10 Juan and Puerto Rico. I mean Jacksonville -- San Juan and
11 Jacksonville. Sorry.

12 Q. Did you serve on board the *El Faro* while the Polish riding
13 union workers were doing conversion work on board?

14 A. No, sir, I did not.

15 Q. While you were serving on *El Faro*, did you have a primary
16 source of weather information that you used?

17 A. No primary source. You had a satellite radio you could
18 listen to. You had the BVS program, the SAT-C, the NAVTEX. You
19 could email out for weather faxes. I believe there was also a
20 weather fax on the vessel. You had a satellite television,
21 DIRECTV, where you could also get weather from. In port, you'd
22 use your cellphone or, you know, go on the Internet or something,
23 and get the weather as well.

24 Q. In regards to the BVS system, was it your experience that the
25 master had to download that in the stateroom before that could be

1 distributed to the crew?

2 A. The way BVS worked on that ship was, an email would come in
3 with a file to the master, his computer. And then he would have
4 to send it up to the bridge for the bridge to upload it on their
5 computer.

6 Q. Did that ever create any issues for you, as master or chief
7 mate, during the hours that the master would be asleep?

8 A. I don't recall. I was checking email quite frequently,
9 especially since it was, you know, my first trip as a master. So
10 I was pushing it more than I should have, probably, but just
11 wanted to make sure I wasn't missing anything.

12 CAPT NEUBAUER: Those are the questions I have at this time.
13 We'll now go to the NTSB. Mr. Kucharski.

14 MR. KUCHARSKI: Yes, thank you, Captain.

15 BY MR. KUCHARSKI:

16 Q. Good morning, Captain Thompson.

17 A. Good morning, sir.

18 Q. I'm actually going to maybe jump around a little bit. We'll
19 go back to crew questions first, personnel related questions, and
20 then we'll go into some safety questions, and cargo-related
21 questions.

22 Starting off with crew questions, did the TOTE vessels have a
23 permanent bosun?

24 A. I believe so.

25 Q. When you were chief mate on the vessel -- you served a number

1 of tours as chief mate on the vessel, did you?

2 A. Which vessel?

3 Q. All TOTE vessels.

4 A. Yes. I've served as chief mate on a number of tours.

5 Q. So when you were serving on board, did they have permanent
6 bosuns at that time?

7 A. There was a permanent bosun, but at times there would be a
8 relief bosun as well.

9 Q. Do you remember your last tour on the *El Faro*, who the
10 permanent bosun was?

11 A. I do not recall.

12 Q. Did you participate in any of the safety familiarization
13 lectures for the wiring crew?

14 A. In which situation, sir?

15 Q. Well, take a look at Exhibit 337, please. It has a form
16 there, SF-023. Do you see the form?

17 A. Yes, sir. I see the form.

18 Q. Are you familiar with that form?

19 A. Yes, sir.

20 Q. That particular form, the check-off list, who actually was
21 the one who went through that form and familiarization with the
22 particular crew members, say, deck or riding crew?

23 A. That would depend.

24 Q. Okay. Tell us what it would depend on then, please.

25 A. Well, it would depend if they were deck, engine, or steward

1 department. And then I believe there was a form also for non-crew
2 members. If it was people that were non-crew working in a deck
3 department, an officer from the deck department would give them
4 the familiarization. It could have been the second mate, the
5 third mate or the chief mate. As far as engine, it would have
6 been one of the engineers, engineering officers doing it. And as
7 far as steward's department, the steward would usually handle it.

8 Q. Thank you, Captain. Who would then do the riding crew, if
9 there was a riding group on board?

10 A. Well, the riding crew would be considered non-crew members.
11 If they were working for the deck department, a deck officer would
12 do it. If they were working for the engine department, an engine
13 officer would do it.

14 Q. Do you see on there the coverage of the actual watertight
15 door policy of the company, opening and closing them, as opposed
16 to the operation of the watertight doors?

17 A. There's operation of watertight doors other than hull
18 openings, on there.

19 Q. And what was covered under the watertight door operation, to
20 your understanding?

21 A. Are you asking if I was doing this tour?

22 Q. You were the chief officer. If you have a new deck
23 department person coming on board, what was your understanding of
24 the operation of the watertight doors?

25 A. You would be teaching the junior officers how to open and

1 close the watertight doors properly.

2 Q. Would that be cargo watertight doors?

3 A. It would be all watertight doors, accesses to the fo'c's'le,
4 down to the steering gear room, and, you know, the scuttles that
5 were on second deck, anything watertight.

6 Q. How many seamen were on a -- able-bodied seamen were on a
7 watch at sea?

8 A. One.

9 Q. Would you look at Exhibit 26? It's the Emergency
10 Preparedness, Section 9.7. Look at the fourth paragraph, please.
11 And for the record, at the top of the page, it says, Emergency
12 Preparedness Manual, Vessel, Dry Cargo Ship Safety.

13 A. Can you pull it up on the screen, please? I can't find it in
14 the book.

15 Q. It's Exhibit 26. Oh, I'm sorry. It's page 163. A little
16 bit easier to get there. And Section 9.7. It's the paragraph
17 that starts, "Cars, trucks, trailers and containers."

18 A. I see that.

19 Q. The second sentence says, "Special patrols should be carried
20 out at regular intervals throughout the voyage to ensure that all
21 lashes are secure." While you were on board, were there regular
22 patrols throughout the voyage? And how were they carried out,
23 please?

24 A. Yes, sir. There was regular patrols. I would inspect the
25 lashing every day after my watch, in the 4 to 8 in the morning

1 watch.

2 Q. Okay. You've mentioned you do. It talks about regular
3 intervals. Were there intervals at night at all to go and inspect
4 the cargo, the lashes?

5 A. I believe on the night watches, the AB was going and doing a
6 round of the cargo decks with the radio, was taking a look at
7 everything. As far as after 1700, there would have been no actual
8 tightening, that I'm aware of, of the lashings. Usually -- well
9 make that 1930. Sorry. The daymen usually work from 8 to 17, and
10 then 1730 to 1930. So anytime after that, it would have just been
11 an inspection, not actual rounds to tighten lashing.

12 Q. I'm sorry. After the daywork ended, were there rounds made
13 at night?

14 A. I believe there was, yes.

15 Q. And that was made by the AB?

16 A. I believe so.

17 Q. So the AB left the bridge and then went down on deck while
18 the ship was underway to go make these special rounds?

19 A. I don't recall exactly how it was being done. I don't know
20 if it was after watch, they got off watch before they went, you
21 know, to knock off for the night, or not. I'm not a hundred
22 percent sure how it was being done.

23 Q. You stood the 4 to 8 watch in the morning, did you?

24 A. Yes, sir.

25 Q. And did you log that, any of these special rounds, or any

1 rounds? Did you put that in the logbook anywhere?

2 A. I would log my rounds that I did in the morning after watch.
3 And as far as that time in the morning, I don't recall any rounds
4 being done. The daymen were up at 6 in the morning, so they'd be
5 walking around the ship and were seeing everything anyway.

6 Q. You mentioned checking lashings at sea. What was the routine
7 of the mates as far as checking lashes? All the mates -- was it
8 just the chief mate that checked the lashes?

9 A. No, it wasn't. More sets of eyes are usually better. So
10 when I was on board, the second mate would also check lashing, as
11 well as the third mates. The third mates would concentrate more
12 on the safety issues -- not issues, safety inspections, and
13 getting those done. But the second mate would be the one that
14 would usually, you know, do a double-check of my check of the
15 lashing to make sure I may not have missed something.

16 Q. And then if the second mate detected a problem with the
17 lashing, what would happen to that? Would he or she actually
18 physically change the lashing, or add lashings? Or how would that
19 work?

20 A. It would depend on the situation. They would let me know.
21 And then if you needed to add lashing, you would add lashing.

22 Q. Okay. So the -- depending on the situation, would the second
23 mate, at times, actually put another lashing on there, or type of
24 lashing, at sea, when making those rounds?

25 A. If they had to, or there was an instance where they needed

1 to, yes.

2 Q. Did the deck department also check lashings after the vessel
3 left port?

4 A. Yes.

5 Q. And was that a regular routine?

6 A. Yes, sir.

7 Q. What about the container lashes; how were they checked?

8 A. You would go around the main deck and check all the container
9 lashings for tightness, making sure nothing was loose, and that
10 they were properly lashed and in the right spot.

11 Q. How did you check the twist locks to make sure that they were
12 locked?

13 A. You would make sure they were locked by looking at the
14 position of the lever. As far as the semi-automatic twist locks,
15 you would look at the position of the pull-cord that was on the
16 twist lock itself.

17 Q. So the ones that are three tiers high, you would just sight
18 them from the main deck?

19 A. Excuse me. You could sight them from the main deck. On the
20 bays closer to the house, you can sight them from the bridge or
21 the bridge wing as well.

22 Q. And the manual twist locks, were they left-handed or right-
23 handed?

24 A. I don't recall a hundred percent, to be honest with you.

25 Q. Were they all to one side or the other, do you recollect?

1 A. I believe they all locked the same way, yes.

2 Q. If a manual twist lock -- I think you may have answered this
3 -- was on the top tier, you would be able to look at it from the
4 deck and see if it was engaged or not?

5 A. I don't think a manual twist lock should have been on the top
6 deck. It would have been a semi-automatic twist lock, as far as
7 up on a top tier, like you said.

8 Q. And how about the second tier? Would that be a manual or a
9 semi-automatic?

10 A. Manual twist locks would only be on the bottom of the first
11 tier. Everything else would be semi-automatic twist locks.

12 Q. Please look at Exhibit 19. It should be an email from the *El*
13 *Faro* chief mate back in -- it has an inventory on there of the --
14 a lashing inventory table, the lashing inventory.

15 When was the last time you served as chief mate on board the
16 *El Faro*?

17 A. I believe it was August 2015.

18 Q. Did you see a more current inventory than the one dated in
19 April?

20 A. There should have been a more current inventory.

21 Q. Did you make that inventory?

22 A. I may have. We were doing inventories basically at the end
23 of our 10-week tours.

24 Q. So you're saying that there should have been an inventory,
25 but you don't recollect if you saw one or not?

1 A. I know we were doing them every 10 weeks, is all I can tell
2 you.

3 Q. Your standing orders, Exhibit 354, Chief Mate Standing
4 Orders, can you take a look at that, please?

5 A. Okay.

6 Q. At page 3, where it talks about the opening and closing of
7 watertight doors, are those the cargo watertight doors there?

8 A. Yes, sir.

9 Q. On page 2 of the same exhibit, there's one of the orders
10 which says, ensure no lashings to any part of the wheels of the
11 automobiles; do you see that?

12 MR. MASSEE: Sir, could you tell us where on the page? If I
13 could -- oh, I see.

14 THE WITNESS: Yeah, I see that.

15 BY MR. KUCHARSKI:

16 Q. You see that?

17 A. Yes, sir.

18 Q. And why would you not allow them to put lashing on any part
19 of the wheel?

20 A. Well, the wheel, depending on where you lashed it to -- the
21 wheel, depending on where you lashed it to, if they had accidentally
22 did it just to the rim, the rim could pull off, or something. The
23 bumper on a car could break. The tailpipe on a car could break.

24 Q. While you were chief mate on this vessel, on the *El Faro*,
25 were you also a -- remind me, you were also chief mate on the

1 other, one of the other vessels, also?

2 A. Yes, sir. On the *El Morro*.

3 Q. Did you ever see any problems with the lashes on Roloc boxes?

4 A. Not that I recall.

5 Q. Would you -- this is a little bit stability related. Would
6 you look at Exhibit 59, please? It's the corrected sailing for
7 the *El Faro*, the CargoMax. It's entitled, the CargoMax Printout,
8 EF185_JX_1 October 15. And if you would turn to page 2 of that.
9 It has fuel tanks, fresh water tanks. On the top of page 3, it
10 has saltwater ballast tanks.

11 Have you seen this CargoMax -- it's titled the CargoMax
12 Printout -- before?

13 A. Yes, sir.

14 Q. So starting on page 2, where it says "fresh water tanks" in
15 bold across the top, and then it lists a whole bunch of tanks
16 under there; do you see that?

17 A. I see that.

18 Q. How was fresh water put in that tank? How was it put into
19 that tank?

20 A. Which tank specifically?

21 Q. Four feet tank.

22 A. We would use a hose, sir.

23 Q. You would use a hose? And that was from?

24 A. We would run it from the fresh water supply on the dock, up
25 to the vessel, and load the tank with fresh water.

1 Q. Okay. So was that pretty much so that the -- let's do the
2 potable water and distilled water. But all the other tanks on
3 there that are listed as fresh water tanks, say double. So
4 double, DT number 1BS, and then it has a weight of 150 tons there.

5 Is that another tank that you used fresh water from shore?

6 A. 1B Starboard, I believe, was saltwater, if I recall
7 correctly, sir.

8 Q. Well, it's listed as a freshwater tank. It says, D tank,
9 number -- the second one down, after -- 4B, it says, DT number 1
10 BS; do you see that?

11 A. Yes. I do see that.

12 Q. So are you saying that's a mistake, or -- that it's listed
13 under fresh water tank?

14 A. It's listed under a fresh water tank, but I don't believe
15 fresh water was kept in it, sir. We were filling it, if I recall
16 correctly, with saltwater. And it was adjusted for with a
17 specific volume, I think. They would adjust the number for salt
18 versus fresh water.

19 Q. The other tanks on there that -- this double-bottom 1 port,
20 double-bottom 1 starboard, double-bottom 2, IP, DB number 2 IS,
21 those are all listed as fresh water tanks in there?

22 A. That's what they're listed as, yes.

23 Q. Do you recollect putting saltwater in any of those tanks?

24 A. I believe for an ABS inspection, at one time we had to take
25 fresh water out of a set of double-bottoms. So we put saltwater

1 into a set of the double-bottoms. We did the inspection, and then
2 inspected the other set of tanks after, and then filled them back
3 up with fresh water.

4 Q. And why were they filled with fresh water instead of
5 saltwater?

6 A. For the preservation of condition of the tanks.

7 Q. So it was -- normal operation was to go ahead and keep fresh
8 water in these tanks?

9 A. Sorry. Can you repeat that?

10 Q. Under normal operation of the vessel, fresh water was kept in
11 tanks to keep down the corrosion; is that correct?

12 A. Yes, sir.

13 Q. Starting at the top of page 3 of that same exhibit, it has SW
14 Ballast Tanks. What is SW?

15 A. Saltwater ballast tanks.

16 Q. When you served as chief mate on that vessel -- well, both
17 vessels, they have -- did they have the same practice on the *El*
18 *Morro*, to also put in fresh water in the tanks?

19 A. I believe it was the same practice.

20 Q. It's a little bit confusing. You believe? Weren't you the
21 chief mate on there?

22 A. We had the same practice, sir. We were trying to keep fresh
23 water in all the tanks that we were not ballasting on a regular
24 basis, for the condition of the tanks.

25 Q. So did the saltwater ballast tanks, you used them to put

1 saltwater ballast in; is that correct?

2 A. As far as these four tanks, Deep Tank 1A, we would use for
3 saltwater ballast. We never used Aft Peak Centerline or Port.
4 Aft Peak Starboard, I believe, was referred to as the cow tank,
5 and that was fresh water, if I recall. It was fresh water for
6 when we were carrying livestock.

7 Q. Do you know if it had any of the piping change on that tank,
8 any was removed?

9 A. I believe there was a modification to the piping that I've
10 heard of in discussion.

11 Q. What tanks would you use on there to compensate for the fuel
12 burn, if you needed to, to increase stability?

13 A. I would use a set of double-bottom tanks that were empty.
14 Usually you have available dead weight, and then you'd -- if you
15 were burning fuel and you wanted to increase your GM, you can go
16 ahead and start filling up a set of the double-bottom tanks. They
17 had a lower vertical center of gravity.

18 Q. And then, which -- on this particular form, which set of
19 double-bottoms? Would you use the fresh water tanks? Or what
20 tanks would you actually use on here to increase stability?

21 A. If you had to increase stability in an emergency or any
22 situation, the tanks you would use would be listed under the fresh
23 water tanks.

24 Q. Were you aware that the draft marks of that vessel the *El*
25 *Faro* were raised, or the vessel was allowed to go deeper by 2 feet

1 in the water? Were you aware of that?

2 A. I don't know what specifically you're speaking to.

3 Q. In approximately 2005, the front of the trim of the -- you've
4 looked at the trim and stability book?

5 A. Yes, sir. There's a table on page 5 or 6, I believe, with
6 draft marks.

7 Q. So you're not aware, in the life of this vessel, if it was --
8 the draft marks were raised by 2 feet; is that your answer?

9 A. I don't recall.

10 Q. What crew members aboard the *El Faro* --

11 MR. REID: Excuse me, Captain Kucharski. Could I ask for
12 clarification of something? Were you saying that the draft marks
13 were increased by 2 feet, or the Plimsoll mark was increased by 2
14 feet?

15 MR. KUCHARSKI: I said the draft marks were raised by 2 feet.
16 But let me ask you then, the Plimsoll mark, raising it 2 feet,
17 does that affects the drafts at all?

18 MR. REID: I think you're referring to the fact that the *El*
19 *Faro* was -- attained a larger permissible draft in 2007, which had
20 the effect of raising the Plimsoll mark. The draft marks didn't
21 change.

22 MR. KUCHARSKI: Thank you. Thanks for pointing that out.

23 BY MR. KUCHARSKI:

24 Q. So Captain Thompson, were you aware that the Plimsoll was
25 raised 2 feet?

1 A. I was aware of what was in the stability book and what I read
2 in the stability book, sir.

3 Q. Was there an on-board ISM committee when you sailed on board
4 the *El Faro*?

5 A. Can you repeat that? A what committee?

6 Q. Was there an on-board ISM committee -- we can refer to
7 Section 16.1 of the OMB, if you'd like to refresh your memory on
8 it.

9 A. Yes, sir.

10 Q. And your answer is?

11 A. Yes, there was an ISM committee on board.

12 Q. Thank you. And who comprised that committee?

13 A. I believe it was the captain, the chief mate, the chief
14 engineer, the first engineer, the bosun and the steward.

15 Q. So while you were on board as chief mate and master, you were
16 part of that committee?

17 A. Yes, sir.

18 Q. Were there meetings held of this committee?

19 A. Usually in conjunction with the monthly safety meeting, sir.

20 Q. Thank you. And were those minutes also included in the
21 safety meeting minutes?

22 A. I believe so. I believe it was all one set of minutes, the
23 safety meeting as well as the ISM committee meeting.

24 Q. The scuttles on the *El Faro*, when they were opened, was there
25 anything to either tie them open or lash them open to prevent them

1 from dropping down?

2 A. Not that I recall, sir.

3 Q. Was there any company policy or shipboard policy for
4 investigating the bilge alarm in the cargo hold?

5 A. I don't know what you mean, investigating.

6 Q. If the bilge alarm went off in the cargo hold, would anybody
7 go down to look and see what caused the bilge alarm to go off?

8 A. I believe it would sound in the engine room. They would
9 contact the mate on watch, and somebody would go check the bilges.

10 Yes, sir.

11 Q. Was this a policy, company policy, or was this something that
12 was just decided amongst the vessel personnel?

13 A. I don't remember.

14 Q. When you served on board the *El Faro*, *El Morro*, those
15 vessels, were you ever informed that a bilge alarm went off in the
16 cargo hold?

17 A. Not that I remember.

18 Q. Were you aware of the location where the bilge alarm in the
19 cargo hold sounded?

20 A. You're saying the audible alarm or --

21 Q. Yes, sir.

22 A. I don't recall that exactly, the exact location.

23 Q. To communications, was the radio equipment, the GMDSS
24 equipment on the *El Faro* tested daily?

25 A. It was tested every -- pre-departure, and I believe every day

1 at noon, sir.

2 Q. I'm sorry. Did you say every day at noon, while the ship was
3 underway? Is that --

4 A. Yes. It was tested pre-departure, and every day at noon.

5 Q. And who actually tested it every day at noon?

6 A. The second mate would have done the testing at noon.

7 Q. I believe you testified to this. I just want to be
8 absolutely clear, so please forgive me for asking it again. The
9 satellite phone calls, where could they be made from?

10 A. I believe the captain can make a call from his state room.
11 And then they could make a call from the bridge, as well.

12 Q. And was the radio set also in the chief engineer's office?

13 A. There was a handset there. I don't recall if it could make a
14 satellite phone call or not.

15 Q. And did all satellite phone calls have to be authorized by
16 the master?

17 A. I believe that was the policy.

18 Q. What was the company baggage, luggage search policy?

19 A. One hundred percent bag search.

20 Q. And who actually performed that search?

21 A. They had hired security guards in both San Juan and
22 Jacksonville that would perform the inspection of the luggage and
23 bags and things like that.

24 Q. So these security guards -- what year was that? Was that --
25 refresh my memory. When did you first start working on the

1 *El Morro*, the *El Faro*? What year was that?

2 A. I believe 2013, on the *El Morro*, I did 3 weeks as second
3 mate. And then I don't recall exactly when I signed on as chief
4 mate after that.

5 Q. So that was 2013 that you first came to those ships; is that
6 a good characterization?

7 A. 2013, I believe. Yes, sir.

8 Q. And you said you went aboard as second mate?

9 A. I did 3 weeks as second mate.

10 Q. Do you remember what part of the year that was? Was it the
11 beginning, end, middle?

12 A. I would have to look at my discharges.

13 Q. Was there any procedure at the terminal for inspecting the
14 bags at the gates and through the gates at either San Juan or
15 Jacksonville?

16 A. Not that I recall.

17 MR. KUCHARSKI: Thank you, Captain Thompson. Thank you.

18 CAPT NEUBAUER: Captain Thompson, we're getting near the end
19 of the first line of questioning. Do you feel comfortable
20 continuing with the parties in interest questions, and then taking
21 a break for lunch?

22 THE WITNESS: I'm fine.

23 CAPT NEUBAUER: Or we could stop for a break now, if you'd
24 like.

25 THE WITNESS: If -- yes. A quick break, please.

1 CAPT NEUBAUER: The hearing will recess, and reconvene at
2 12:25.

3 (Off the record at 12:12 a.m.)

4 (On the record at 12:26 p.m.)

5 MR. MASSEE: Captain Neubauer, I'll be asking the questions.

6 BY MR. MASSEE:

7 Q. Captain Thompson, turning to Exhibit 354, page 2, you were
8 asked a question about instructions in the cargo standing orders
9 restricting where lashings should be placed on cars. Do you
10 recall being asked those questions?

11 A. Yes.

12 Q. Okay. And turning to that section, it says, "Ensure no
13 lashing to any part of the wheels, bumpers, or tailpipes." First
14 off, were cars lashed through the wheels on the Ponce-class
15 vessel?

16 A. Yes.

17 Q. And was that a permissible way of lashing the cars?

18 A. Yes.

19 Q. Okay. So what was this instruction to ensure no lashing to
20 any part of the wheels, bumpers or tailpipes? What was that
21 instruction about?

22 A. Just to any part of the wheel. You would want the lashing to
23 go all the way through the wheel, around and back. You wouldn't
24 want it just a specific little part of the wheel.

25 Q. Okay. And why would you -- why would that be an instruction?

1 A. Because if that part broke, or something like that, then it's
2 not secured.

3 Q. Okay. You were asked about -- well, I'll stick to lashing.
4 On some of the cargo decks there were attachments known as
5 buttons, correct?

6 A. Correct.

7 Q. Okay. And in your experience, are you familiar with the
8 arrangement of the buttons on the *El Faro*?

9 A. Yes.

10 Q. And prior to your testimony today, did you have the
11 opportunity to review the stow plan on the last voyage of the *El*
12 *Faro*?

13 A. Yes.

14 Q. And were you also able to review the cargo securing manual?

15 A. Yes.

16 Q. And based on your review of the stow plan, the cargo securing
17 manual and your own experience, were you able to come up with an
18 evaluation of how many trailers would have been on button on the
19 *El Faro* on the last voyage?

20 A. Yes.

21 Q. Okay. And what was your determination?

22 A. Almost all of the trailers would have been on button.

23 Q. Okay. And when you say almost all, how many trailers would
24 have been off the button?

25 A. I believe on that load plan, four would have been off button.

1 Q. Four, out of all of the trailers?

2 A. Correct.

3 Q. Okay. And do you know which ones of those, those four would
4 have been?

5 A. Yes. There was one in Hold 2A, forward of the ramp, of that
6 forward ramp. And I know that, because that button was removed.
7 Then at 2D, there was two of them, I believe, on the outboard
8 sides. And there was one in 3B, if I recall correctly.

9 Q. Okay. Changing, to follow up on the questions that were
10 being asked about safety training and bridge resource management
11 training on board, I believe you had testified earlier about a
12 tracked training program.

13 A. Yes, sir.

14 Q. Okay. And how often is tracked training done?

15 A. Every quarter.

16 Q. Okay. And did that include bridge resource management?

17 A. Yes.

18 Q. And were records kept of that training?

19 A. Yes. Training log sheets.

20 Q. Okay. And I'm going to ask you to take a look at this
21 document, which is also being supplied to the Board. It's dated
22 February 15th, 2015. And it's for the *El Faro*, and it's called an
23 On-board Training Log Sheet. Would you tell me, does this
24 document reflect the bridge team management that you were talking
25 about?

1 A. Yes, sir.

2 Q. Okay. And routinely, these would be done quarterly on board
3 the *El Faro*?

4 A. Yes. There was a bunch of tracked training that was required
5 to be done every quarter, as well as safety training and safety
6 drills that had to be done every quarter.

7 Q. Okay. And is this document, this one dated January 15th,
8 2015, is that an example of the record-keeping of that tracked
9 training?

10 A. Yes. This would have been signed by everybody that took part
11 of the training.

12 Q. Okay. And as far as the persons that took -- that were
13 involved in the bridge resource management training, what does
14 that document reflect, as far as who participated?

15 A. The master of the vessel was Captain Michael Davidson. The
16 chief mate was myself. The second mate was Danielle Randolph, and
17 the third mate was Alejandro Berrios.

18 Q. Okay. Thank you. Now as far as safety training, I'm going
19 to ask you to look at three documents, which are also entitled,
20 On-board Training Log Sheets, and they're dated July 17th, 2014;
21 May 21st, 2015 and -- I'm sorry -- it also looks like February
22 29th, 2015. I had these out of order.

23 If you would go ahead and take a look at these; these are
24 just examples of the on-board training records. Would you please
25 review those?

1 A. Yes.

2 Q. Okay. And starting with the one in July of 2015, what do you
3 understand this document to be?

4 A. This is a log sheet saying who was at the drill, or the
5 training. And then at the bottom, it discusses the topics that
6 were covered during the training.

7 Q. Okay. And speaking of the topics, I notice that among the
8 topics are exposure suits and heavy weather safety. First of all,
9 can you elaborate what the exposure suit training was?

10 A. Exposure suits, we would don quarterly. So everybody would
11 bring their exposure suits down to the mess and they would put
12 them on. And then the third mate would usually inspect them to
13 make sure they were in good condition, as well.

14 The heavy weather safety, you would discuss anything and
15 everything from watertight integrity of the ship to securing the
16 mooring lines, securing gear in lockers, securing gear in the
17 galley, on deck, things of that nature, checking lashings.

18 There's a powered rolling equipment safety video. That was
19 probably for the forklift that we had on board the vessel.

20 Harassment, we would go over the harassment policies; PPE, and
21 then galley electricity, and that.

22 Q. So among those topics, heavy weather safety was covered, at
23 least in that meeting of July 17th, 2014?

24 A. Yes, sir.

25 Q. Okay. Looking at the February 29th, 2015, is heavy weather

1 safety a topic of conversation in that training session?

2 A. Yes, sir.

3 Q. Okay. And you had mentioned in the training, as far as
4 mooring lines, what was the practice for, you said, stowing
5 mooring lines when you were expecting heavy weather?

6 A. You would stow them below deck.

7 Q. Okay. And just to go back to the July 17th, 2014, it shows
8 that Jeremy Riehm was a participant at that safety training?

9 A. Yes. I believe I was captain at the -- on that one. Yes.

10 Q. Okay. And on the -- sorry -- January 29th, 2015?

11 A. That was Captain Davidson, myself, Second Mate Danielle,
12 Third Mate Alejandro, and various other crew members.

13 Q. And then finally, on May 21st, 2015 safety training record?

14 A. Heavy weather is again covered, and that was Captain Michael
15 Davidson, myself, Second Mate Danielle Randolph, and Third Mate
16 Alejandro Berrios, and then various other crew members.

17 Q. Okay. Thank you. Now as far as a heavy weather plan, the
18 safety management system has a section on heavy weather
19 procedures, correct?

20 A. Correct.

21 Q. Okay. And as a master, you would also have your standing
22 orders as to what the watches are expected to do for heavy
23 weather?

24 A. Correct.

25 Q. Okay. Was there any other separate heavy weather plan that

1 you know of that was issued to the vessels outside of the safety
2 management system or as far as the captain's individual
3 responsibility?

4 A. Not that I'm aware of.

5 MR. MASSEE: Thank you. That's all the questions we had.

6 CAPT NEUBAUER: Thank you. One follow-up question. For the
7 May 21st, 2015 discussion for safety training, you and Michael
8 Davidson were both present at that meeting. Do you remember what
9 was discussed about the heavy weather safety?

10 THE WITNESS: There was a bunch of things discussed, but I
11 know he would have mentioned, you know, the watertight integrity
12 for sure. He mentioned that pretty much every time he was at one
13 of the drills or at training. So I know that would have been
14 mentioned for sure.

15 CAPT NEUBAUER: Thank you.

16 At this time we'll go to Mrs. Davidson for any questions.

17 BY MR. BENNETT:

18 Q. Captain Thompson, good afternoon.

19 A. Good afternoon.

20 Q. Was Captain Davidson the type of captain to come up and take
21 over other mates' watches so they'd get more rest?

22 A. Yes. He would do that at times.

23 Q. Did he ever do that to you -- for you?

24 A. I never asked for it, so no, not that I recall.

25 Q. There was a question asked by Mr. Fawcett. He used the

1 term -- I don't know what the question was, but it was something
2 of the like of, quote, "a divide and conquer plan," end quote.
3 Did you ever hear anything like that before?

4 A. Not that I remember.

5 Q. Did you and Captain Davidson, as chief mate and the master,
6 instill a good atmosphere on the ship?

7 A. Yes, sir. I believe we did.

8 Q. If you could turn to the transcript, the VDR transcript, and
9 in particular, page 69. It's the 09:06:14 excerpt, AB-3. Can you
10 read that to yourself, and tell me when you're done?

11 A. Okay. I've read it.

12 Q. We've previously heard from Bosun Walker about the concerns
13 Captain Davidson had for his crew, and how he cared for his crew.
14 From reading this excerpt, do you get the opinion that this AB,
15 this particular AB enjoyed working with this crew and on this
16 ship?

17 A. Yes.

18 MR. BENNETT: Thank you. No further questions.

19 CAPT NEUBAUER: Does ABS have any questions?

20 MR. WHITE: No questions, sir.

21 CAPT NEUBAUER: Does HEC have any questions?

22 MR. SCHILLING: No questions, sir.

23 CAPT NEUBAUER: At this time, I'd like to recess for lunch,
24 and reconvene at 1:30. The hearing is now recessed.

25 (Whereupon, at 12:38 p.m., a lunch recess was taken.)

26

A F T E R N O O N S E S S I O N

(1:39 p.m.)

1
2
3 CAPT NEUBAUER: The hearing is now back in session. We're
4 continuing with Captain Thompson, and Mr. Fawcett will lead the
5 questioning.

6 BY MR. FAWCETT:

7 Q. Good afternoon, sir.

8 A. Good afternoon.

9 Q. So a couple of follow-ups on the last line of questioning
10 from the party in interest. I just want to be clear. I heard you
11 say that the storage of mooring lines for heavy weather, they were
12 struck below; is that correct?

13 A. Yes. We would strike them below.

14 Q. Is that a ship policy or company policy?

15 A. I don't recall.

16 Q. And we've been provided the STCW records. And we've been
17 provided the training -- tracked training records. One of the
18 questions I asked you earlier was about the bridge resource
19 management training. And what I meant by that was by the
20 accredited course that lasts usually a week, for 4 days to 5 days.
21 When was the last time you attended that kind of training?

22 A. I would have to go back and look at my training records from
23 the union.

24 Q. Could you approximate?

25 A. Not off the top of my head, sir. No.

1 Q. The heavy weather safety training, was any of that training
2 that took place, did it incorporate like operating a vessel in
3 terms of seakeeping courses? Was it just related to like personal
4 safety in heavy weather, or did it relate more to the shipboard
5 operation and how the ship was handled?

6 A. I believe it was mostly just safety on board the vessel
7 itself as far as securing things properly, and things like that.

8 Q. And then, the forms that we've seen have been unsigned.
9 There have been no comments on them. And an explanation has been
10 offered as to where those forms came from. But if I'm Mr. -- or
11 Captain John Lawrence, and I'm the director of, or the manager of
12 safety, how would I know what's going on aboard a vessel?

13 And I know there's an audit process, but in addition to that,
14 how do I know that the tracked training is taking place and that
15 it's quality? And then how do I know if the STCW records are,
16 first of all, accurate, and that I have them in a constant feed so
17 I make sure that this work is being done properly on the vessel.

18 MR. REID: Mr. Fawcett? Just to clarify. The safety
19 training records that are provided, we do have signed copies of
20 them, and those have been emailed to Mr. Bray.

21 BY MR. FAWCETT:

22 Q. More importantly, the STCW records. How do -- how does
23 Captain Lawrence, the manager of safety, or some other person at
24 TOTE who supervises the STCW, how do they know that the ship is in
25 fact complying with the records and the requirements of the law?

1 A. I can't speak to that, sir.

2 Q. We're going to do a little bit of change-up in the order of
3 the topics. We're going to end up with cargo securing, because my
4 colleagues have some questions to ask related to the transcript.
5 So we're going to begin with the voyage plan.

6 MR. FAWCETT: And the first exhibit I'd like you to call up,
7 Commander Yemma, is Exhibit 314. Yes, please.

8 BY MR. FAWCETT:

9 Q. 314 is a chart showing the track line of the *El Faro* on the
10 accident voyage. And as a master for TOTE, I just want to ask you
11 if these actions could be done at the different decision points on
12 the chart.

13 The first decision point is the point where the *El Faro*
14 received an INMARSAT message from the *El Yunque*, that they had
15 experienced 100-knot relative wind. At that point could you, as
16 master of the *El Faro*, could you have slowed your vessel to
17 determine what was going to actually happen with the weather from
18 Hurricane Joaquin or a similar system?

19 A. I believe so.

20 Q. At that same point, could you have ordered a diversion
21 through Northwest Providence Channel to utilize the old Bahama
22 route?

23 A. I believe so.

24 Q. Further down along the line, I'm going to flip through this
25 thing now -- sir. At 7:30 p.m., the chief mate first mentions the

1 Crooked Island passage. As the master of the vessel, could you
2 have at that point diverted through New Providence Channel?

3 A. I believe so.

4 Q. At that same point, could you have slowed your vessel until
5 the weather information was better developed so you could know
6 what the storm was going to do, or a storm was -- you'd know what
7 a storm was going to do?

8 A. Yes.

9 Q. Moving down the track line, this time is 11 p.m. This is
10 where the third mate calls the master. At that point, could you
11 have slowed the vessel down or even retraced your route to
12 avoid -- let's put it this way, as the storm avoidance measure?

13 A. To retrace your route, you mean go back?

14 Q. Yes, sir. That's one option.

15 A. I believe so. I mean, I wasn't on board at this time, so I
16 don't know what they were actually seeing outside the window and
17 things like that to be able to make that decision.

18 Q. But that's -- that would be a viable option for you, as
19 master, at that point in the voyage; is that -- that's what I'm
20 getting to. At that point in the voyage, could you have made
21 those choices?

22 A. Possibly.

23 Q. The final point is where the second mate calls the master.
24 There was a discussion, to the best of our ability to understand
25 it on the transcript. There was another mention of utilizing the

1 Crooked Island Passage. Could the *El Faro* have used the Crooked
2 Island Passage?

3 A. Do you mean based on this trip and the weather, or at all,
4 ever?

5 Q. I'm talking as an alternate route for whatever reason?

6 A. I believe it could have.

7 Q. Did you have charts aboard, to your knowledge, with enough
8 detail to allow you to use the Crooked Island Passage?

9 A. I believe we did have charts for most everywhere, sir.

10 Q. So what I'd like you to do -- and I'm just trying to nail
11 down the ability to use the Crooked Island Passage. If you'll
12 turn your attention to Exhibit 285.

13 MR. FAWCETT: Commander Yemma, if you'll display that.

14 This is a Coast Guard-prepared exhibit, which is described as
15 the southern route option. And what I've done here is I've
16 prepared some expanded views of navigation chart 11013. Looking
17 at that -- and take your time if you need to look through it,
18 there is a blue arrow, which is difficult to see.

19 Commander Yemma, if you'll put the pointer on it. Put the
20 pen on it, at least, on the blue --

21 That's the southern route.

22 If you can put it back up there, please, sir.

23 BY MR. FAWCETT:

24 Q. Could the vessel navigate down through there? Is it
25 practical? Or let's put it this way. If you were in command of

1 the ship, could you have navigated the *El Faro* down through that
2 body of water? And I've created other slides which enhance the
3 navigational hazards, and they're circled in red, just so I --
4 you're not caught blindsided. And also, for clarity, I put a
5 legend in there with distance, so you can tell the distance
6 between objects.

7 A. Just looking at the chart is different from, you know, what
8 you're actually going through when you're on the ship, with
9 weather and things like that. So you'd have to take all that into
10 consideration.

11 Q. So as master of the *El Faro* during the time you served as
12 master, how would you operate the *El Faro* running between --
13 running with a large sea and swell on your stern?

14 A. Can you define large?

15 Q. Large ocean swells, 15 to 20 feet, and you had to handle the
16 ship, how would you run before the sea, in terms of, would you run
17 hooked up, at 19 or 20 knots? Would you reduce speed
18 significantly? I'm trying to understand how you would run the
19 ship and maintain the safety of the vessel, given those
20 conditions.

21 A. I didn't experience those conditions on *El Faro*, so I can't
22 speak as to exactly how it would handle in those conditions.

23 Q. So if you were confronted with that situation on a voyage on
24 the *El Faro*, how would you know how to operate? In other words,
25 in those conditions, where would the expertise come from?

1 A. From your years of sailing experience.

2 Q. Have you ever had an experience where the *El Faro* had
3 significant sea and swell on the stern, in terms of how it
4 affected the handling characteristics of the weather, in terms of
5 was the rudder the right size, and so forth?

6 A. Not that I recall, sir.

7 Q. At that point -- now I asked you earlier about San Salvador
8 and Rum Cay, looking at those chartlets that I provided, would you
9 be in a coastal piloting situation, where you'd be -- not just in
10 a hurricane situation, but you would you be using more than simply
11 the GPS to help you pilot through there?

12 A. I would. Yes, sir.

13 Q. So on *El Faro* with Captain Davidson, if I asked you to hand
14 me the voyage plan, what would I be looking at?

15 A. Can you repeat that, please?

16 Q. On the departure messages, the master of the *El Faro* said
17 he's reviewed and approved the voyage plan. So it's an object.
18 So if you handed me the voyage plan, and I was a junior officer,
19 what would I be looking at? What would it contain?

20 A. Passage plan would be hanging on the bulkhead, and it should
21 have a dock to sea buoy, and then sea buoy to sea buoy, and then
22 sea buoy back to the dock. And it would have all your waypoints,
23 courses, and everything written right on it, or typed on it, for
24 review.

25 Q. With heavy weather ahead, what other notations would that

1 voyage plan contain?

2 A. I haven't seen one for heavy weather, so I don't know.

3 Q. Is it a ship's form? Is it a company form? Is there -- and
4 I'll give you a chance to answer, but does it contain an area like
5 for heavy weather, that might be blank because you didn't
6 experience it?

7 A. Not that I recall. It's a -- I believe it's a ship's form.
8 And you would put all the waypoints in for the routes, and that
9 would be the voyage plan. And then there was additional things
10 you could add to the voyage plan as far as contacting, you know,
11 the port on the radio channels, and things of that nature, that
12 would be added in there as well.

13 Q. So moving on to a different topic area, that topic is safety.
14 And I'd like for you to turn your attention to the VDR transcript.
15 It's page 266. Or, excuse me, Exhibit 266, page 322. The time is
16 1:46 a.m. The second mate is talking to the AB on watch with her.

17 She says, "We don't have any life jackets up here on the
18 bridge, do we? Like the *El Faro*?" The response of the AB-2 is
19 unintelligible. Or correction, *El Morro*, pardon me.

20 The second mate, at 1:46, says, "Cause I'm thinking about
21 that safety stuff was" in brackets, "on the *El Morro*, we don't
22 have over here -- it used to be in the" unintelligible. And then
23 the bracketed area, which means -- we've discussed what it means,
24 and we may have amplification on that. But it says, "They're not
25 here/it was much better."

1 Did you in fact have life jackets on the bridge of the *El*
2 *Faro*?

3 A. I honestly don't recall, sir. I remember we had life jackets
4 on the *El Morro*, and I believe they were on the *El Faro* bridge as
5 well. I believe that it was a requirement to have the life
6 jackets up there.

7 Q. Okay. So you conduct drills and training on the *El Faro*.
8 Not you, personally, but the ship is required to conduct it. When
9 the emergency drills take place, are the watch on the bridge
10 expected to be donning life jackets?

11 A. When I am master of the vessel, yes, sir.

12 Q. Serving under Captain Davidson, did you observe the watch on
13 the bridge grabbing life jackets and putting them on for emergency
14 drills that required them?

15 A. I wouldn't have been on the bridge when we were doing abandon
16 ship drills, so I would not have seen that.

17 Q. Could you explain why the second mate and the AB would not
18 know the location of the life jackets, as they served under you on
19 the *El Faro* in different capacities?

20 A. I cannot explain that. No.

21 Q. So who brought the EPIRB to the boat?

22 A. The EPIRB would have been brought to the boat by one of the
23 mates on the bridge.

24 Q. So the ship's public address system, in an emergency
25 situation, did it reach all of the manned spaces on the bridge?

1 And by that, I mean accommodations, engine room, house?

2 A. I don't recall.

3 Q. Have you ever heard the public address system out on deck
4 when some kind of word was passed?

5 A. No, sir.

6 Q. So do you evaluate the mates to make sure that they're
7 conducting their duties? For example, the third mate is required
8 to take care of the safety equipment; is that correct?

9 A. Yes, sir.

10 Q. So do you evaluate the mate on the effectiveness of how the
11 mate carries out their jobs?

12 A. As far as when?

13 Q. When you were supervising them.

14 A. We're required to fill out an evaluation on each crew member
15 every time we sign off the vessel, and if they sign off the vessel
16 as well.

17 Q. So in previous testimony, we've seen that there are some
18 missing evaluations, but you've said they were conducted. And
19 speaking to the same oversight, do you know why TOTE wouldn't have
20 all of your evaluations in your personnel file?

21 A. I do not know, sir.

22 Q. When you served with Captain Davidson, did he make use of all
23 available tools to determine the effects of weather on board the
24 *El Faro*? And by that, you mentioned a whole suite of tools. You
25 mentioned NAVTEX, SAT-C, BVS, Sirius, satellite, commercial radio

1 and DIRECTV. Did you see him use all of those tools to determine
2 the weather as it affected the voyage?

3 A. I don't recall going through, like I said, I think
4 previously, any heavy weather with Captain Davidson, any storms or
5 anything.

6 Q. But for a typical voyage -- I mean, it doesn't have to
7 necessarily be a hurricane. It could be a winter cold front
8 moving through the Atlantic. Were all those tools used, or just
9 some of them?

10 A. I believe he would use them all.

11 Q. So did you go through any rough weather on the *El Morro*?

12 A. I don't believe I did, sir. No.

13 Q. On any voyage, did you experience cargo damage?

14 A. Not that I recall. As far as what, for cargo damage? What
15 do you mean?

16 Q. Any cargo damage that would be the kind of damage that
17 insurance claims might be filed, for example, damaged containers,
18 damage to Ro-Ro chassis, fittings torn off, anything like that?

19 A. Not that I recall, that would require that. No.

20 Q. So moving on to the next topic, the weather. The voluntary
21 weather observation program, can you tell me how it was practiced
22 on the *El Faro* when you were on there?

23 A. The mates would send in their weather observation from the
24 bridge laptop. I can't remember what the program was specifically
25 called, but you would fill out the weather and then send it in via

1 email.

2 Q. There are some disparities on a month-by-month basis in the
3 last half of 2015. For example, the month of August, there is
4 only one report. The month of September, there's one report. And
5 it is an erroneous report, which at the time, put the *El Faro* over
6 the island of Cuba, as opposed to being at sea.

7 So what I'm asking to you is, who supervised the training and
8 preparation for the mates to actually fill out the voluntary
9 weather report and send it ashore?

10 A. I don't believe we had any specific supervisor for that, sir.
11 Instructions were all on the program itself. Then there is
12 instructions inside the various weather books that were on the
13 bridge. And we had the paper form, if I recall, as well, and that
14 had instructions in it.

15 Q. So there was a safety order that came out in August of 2015
16 about Hurricane Danny. And it put the fleet on notice that they
17 were at the beginning of a hurricane season and to take special
18 work precautions and so forth.

19 At any time, did -- whether it was TOTE or whether it was one
20 of the captains that you worked for and with, did they mention
21 about that the reports of ships are very important if they're
22 going to be within 300 miles of a hurricane, so that the weather
23 service could use the ship as a reporting station to improve the
24 weather forecast?

25 A. Can you break that down, please?

1 Q. Okay. So part of what the National Hurricane Center needs,
2 and the voluntary ships observation program supports, for weather,
3 is if there's a hurricane, all ships within 300 miles are
4 encouraged to participate and send weather reports, so that the
5 weather service can update the forecast based on ships at sea, as
6 weather platforms that are able to send the weather ashore to the
7 hurricane center. And then they look at their satellites and
8 their aircraft and stuff, and they say, well, wait, this one ship
9 is sending something completely different.

10 Were you aware of the -- that's not a requirement, but the
11 request, for ships within 300 miles of hurricanes to report?

12 A. I was not specifically aware of that. No.

13 Q. And the weather service had to throw out the *El Faro's* report
14 because the anomaly was it was over mainland Cuba. So did anybody
15 assess the accuracy of how the mates -- I believe I asked that
16 before, how they did that job, to make sure it was being done
17 correctly?

18 A. I don't know, sir.

19 Q. Would you expect, as master, for the watchstanding mates on
20 the ship to inform you of significant changes in the weather they
21 were encountering, for example, a decrease in barometric pressure?

22 A. If I was expecting a storm, and I had something like that in
23 my night orders for them to do that, I would expect it. If there
24 was no weather out there that we were expecting, I would hope that
25 they would take all precautions necessary and still let me know.

1 Q. The same thing for changes in wind velocity of great
2 magnitude, in other words, winds moving above gale force and
3 continuing to increase, would you expect the mates to let you know
4 that?

5 A. Yes, sir.

6 Q. Do you recall any of Captain Davidson's night orders or
7 standing orders that contained verbiage where the watchstander was
8 required to notify him of significant weather changes?

9 A. I don't recall exact verbiage. I know we always logged the
10 weather when it was Force 5 or higher. Every hour it would be
11 logged, and I believe we'd let the master know as well.

12 Q. On the accident voyage -- pardon me -- at 14:14 on the
13 afternoon of the 30th of October, if you'd like to turn your
14 attention to the VDR transcript, page 129.

15 CAPT NEUBAUER: For clarification, that would be the 30th of
16 September.

17 MR. FAWCETT: Yes, sir. Thank you, Captain.

18 BY MR. FAWCETT:

19 Q. So what you're going to see there, when you get there, is
20 there is a Coast Guard aircraft. And we discussed this in other
21 testimony. And he indicates the international verbiage for an
22 important navigational message, and he says, "Sécurité, Sécurité,
23 Sécurité." Then there's an unintelligible portion. "The National
24 Hurricane Center has issued a hurricane warning for the Central
25 Bahamas, including Cat Island, Exuma, Long Island, Rum Cay, San

1 Salvador. The National Hurricane Center has issued a hurricane
2 watch for the Northwestern Bahamas, including Abaco, the Canary
3 Islands, Bimini, Isle of Brook, Grand Bahama Island and New
4 Providence. The Coast Guard requests all" an unintelligible word,
5 "mariners use extreme caution for" unintelligible. "The United
6 States Coast Guard aircraft standing by on Channel 16."

7 In your seagoing career, have you ever seen an aircraft make
8 a broadcast such as that to alert mariners of significant weather
9 in a certain operating area?

10 A. I have not heard one, sir. No.

11 Q. As a TOTE master, what consideration would you give that, in
12 terms of you hear that broadcast, or that broadcast is reported to
13 you?

14 A. I would take all precautions necessary to avoid the storm,
15 sir.

16 Q. I believe the final area we're moving into is cargo securing
17 and cargo ops. I'm turning everything upside down here. My
18 question is kind of related directly to what I looked at in the
19 voyage data recorder transcript. And I'm trying to compare what
20 your experiences were versus what the ship's crew experienced.

21 So one of the questions Captain Kucharski asked you was about
22 the lashing inventory. So the lashing inventory would be the
23 ship's copy of all the miscellaneous securing gear; would that be
24 correct?

25 A. I believe so.

1 Q. How would you say, at your -- during the time you were on
2 board, and you stepped off the ship around the 11th of August, did
3 that lashing inventory show a robust number of spares in good
4 condition and adequate for their intended use aboard *El Faro*?

5 A. I don't recall. I would have to see the lashing inventory.

6 Q. The VDR transcript, which is page -- or Exhibit 266, page
7 259, contains a conversation between the AB and the third mate.
8 This would have taken place on the evening of the 30th of
9 September of 2015.

10 So the AB says, "Speaking of cargo lashings, but we don't
11 have any spares down there. I didn't -- found two little screws,"
12 and the contention, or we'll straighten out what those brackets
13 mean, but it says "stripped."

14 The third mate said, "Those straps." The AB said, "Stripped
15 out, you know, the binders in them." The third mate says, "Oh
16 yeah, we're coming up short." The AB says, "We're looking around,
17 and I'm like, what the -- man. Are they using, or used on every
18 damn thing on here? Had to work the whole damn length of the
19 cargo hold to find a spare."

20 So my question is, you make rounds of the ship as chief mate.
21 You load the ship, you use the lashings and gear. Is that an
22 anomaly, that conversation? Or was that what you experienced as
23 the chief mate?

24 A. I don't know specifically what he's speaking to, but it's not
25 what I experienced, no.

1 Q. Did you ever ask for replenishment of lashings, and be told
2 that you weren't going to get them, or you'll -- we'll get them in
3 Tacoma, or anything of that like?

4 A. No.

5 Q. What was the condition of the gear, in general?

6 A. In general, the condition of the gear was very good.

7 Q. So if gear was damaged or worn out or frayed, and you were
8 the chief mate, what happened with that equipment?

9 A. It would be marked. If I recall properly, we had a bin. I
10 believe we put, I want to say plywood, over the bin to label it as
11 damaged, do not use. It would be landed ashore, and then either
12 be repaired and/or new gear would be put on board the vessel, as
13 required.

14 Q. Did the company have a policy of how you condemned gear? In
15 other words, in some segments of different industries, gear is
16 destroyed; in other words, so it can't possibly be used. Like a
17 strap or a sling might be cut in half, so that, when it's disposed
18 of, nobody could inadvertently use it. What was TOTE's policy
19 about damaged, worn, or unserviceable gear?

20 A. It wasn't supposed to be used. We're supposed to use gear in
21 good condition.

22 Q. But was there a policy?

23 A. I don't recall, sir.

24 Q. The transcript, on page 57 and 58 of the same document, has a
25 September 30th conversation between the captain and the chief

1 mate. It occurs at 7:23 in the morning. So the chief mate says,
2 "He was doing it wrong, and I was trying to help." The captain
3 says, "Go right to the foreman, cut out the middleman. I do it
4 all the time. That guy right there."

5 The captain, further on, says, "Just document everything. I
6 send it with all -- in with all the paperwork." And then it's
7 either in port, or important, and then unintelligible.

8 The captain indicates -- it's indicating there's an
9 unintelligible conversation. And then there's a pair of square
10 brackets. That means that the transcription team is offering an
11 explanation. And they said, "being spoken over by the chief
12 mate."

13 The chief mate continues, unintelligible, "They were doing"
14 unintelligible "some of the things" unintelligible, "not" -- and
15 then being in contention, or we'll explain this a little bit
16 later, "route through the D-ring in the back."

17 Then it's unintelligible, "the side of it, yeah, dead-end it
18 and wrap the chain. The grab-hook goes on the chain. That's it.
19 One lashing from here to the Roloc box, and another lashing from
20 the" unintelligible "to the deck. Same theory as" unintelligible
21 "to independent chain binders."

22 And then, once again, there's a conversation where the
23 captain says, "Yeah," unintelligible. There's an explanation by
24 the VDR team that the captain was trying to speak over the chief
25 mate, closed brackets. And then the chief mate says, "Yeah,

1 that's what they do."

2 Looking at that -- and take a minute to look at it, do you
3 infer anything from that as to whether or not they were saying
4 that the lashers did the job properly, or they didn't do it
5 properly?

6 A. I mean, you're asking me for my opinion, or I guess --

7 Q. Yes, Captain. What I'm saying is, looking at what you see
8 there, can you offer an interpretation, meaning that does what you
9 read there indicate someone is doing things the way it should be
10 done, or something different?

11 A. I don't know, because I don't know what the whole
12 conversation was previous to that about this.

13 Q. Have you seen the PORTUS longshoremen make lashings, and done
14 it incorrectly?

15 A. Occasionally.

16 Q. Have you seen the same kind of occasional problems in
17 Jacksonville that you would see in San Juan? I mean, the number
18 of errors in lashing by stevedores or lashing crews.

19 A. I can't speak to that specifically. It was not often that
20 there was errors with the lashing.

21 Q. Turning to cars, we did have a conversation about lashing
22 through the wheels; is that correct?

23 A. Yes.

24 Q. Have you ever seen them lashed to like the plastic hubcaps or
25 wheel coverings, and had to correct them?

1 A. Not that I recall.

2 Q. Turning to Coast Guard Exhibit 266, the transcript once
3 again, on page 164 and 165, and if you'll look down -- I'm only
4 going to focus on one part. That's the time when the captain and
5 the chief mate are speaking at 16:18. And at 16:18:19, the
6 captain says, "Yeah." And the chief mate say -- says, "I can't
7 read one on the port side." And we're talking about calculation
8 of drafts. And there's a previous discussion about using the
9 Radian Rule.

10 And I, personally, have never heard of the Radian Rule used
11 for draft calculations, but -- "I can't read one on the port
12 side." And the chief mate says, "Everywhere I look, there's no
13 secret spot." Looking at -- you know, sort of looking at that
14 page and that conversation, is he talking about the offshore draft
15 marks on the port side?

16 A. If I had to guess, I'd say it would be the offshore draft
17 marks.

18 MR. FAWCETT: Thank you very much, Captain Thompson. I will
19 turn the rest of the cargo questions over to Commander Denning.
20 Thank you very much, sir.

21 BY CDR DENNING:

22 Q. Captain, you said a minute ago, that you had seen some of
23 PORTUS longshoremen make some errors, you said, not often. Can
24 you describe the errors that you have seen in a little more
25 details for us?

1 A. Yes. And it wasn't specifically the PORTUS longshoremen.
2 They used to have temporaries sometime come on board the vessel to
3 help. But occasionally they would put the chain and the hook
4 right to the D-ring, instead of going through the D-ring and then
5 back to the chain itself, things like that.

6 Q. And how did you address that situation on that -- on those --
7 on that occurrence? Or was it more than once? How often did that
8 type of thing occur?

9 A. I don't recall how often it occurred, but you would go to the
10 foreman. There was a header, basically, a foreman on each deck on
11 the vessel. And you would point it out to him, and he would
12 usually bring somebody in, and it would be addressed right then,
13 at that point in time.

14 Q. And to the best of your recollection, how many times have you
15 seen that particular scenario?

16 A. I don't know, sir. It's -- I've been on those ships, the *El*
17 *Morro* and the *El Faro* -- I mean, occasionally they may put
18 something in the wrong place, and you have them fix it. So it's
19 -- I wouldn't say it's every week. You know, it's -- I can't give
20 you a specific number.

21 Q. Not a specific number, but in general, would there be a
22 mistake or more than one on each voyage? Or were there voyages
23 where there were no mistakes?

24 A. There was voyages where there was no mistakes. Yes.

25 Q. You testified just before lunch that you had reviewed the

1 accident voyage stow plan, and somehow determined that most of the
2 trailers would have been on a button. How did you go about that
3 particular analysis?

4 A. I used the load plan for the final voyage, looked at the
5 sizes of the trailers, looked at the diagram portion of the cargo
6 securing manual, where the button locations were for the different
7 trailers. And based on that, and my past experience on the
8 vessel, came up with a determination.

9 Q. Okay. And knowing that the plan, the final stow plan is --
10 you know, does it -- do they -- is it possible to draw exactly
11 where the trailers end up? Or is it a plan that is -- has all the
12 boxes already identified, and they simply write in the number
13 associated with that particular piece of cargo?

14 A. It's a plan that has positions on it. They write the
15 description -- excuse me. Sorry. They write the description of
16 the trailer in that box that's in that position on that plan, and
17 the weight, and some of the specifics, I believe.

18 Q. Not being on that particular voyage, how can you be sure that
19 the boxes are where they're shown on that pre-printed plan?

20 A. Because I've been on the ship, and the boxes -- it's a
21 regular run. It's pretty much the same boxes week in and week
22 out, leaving Jacksonville. Most of the cargo on the second deck
23 would have been reefer containers, and they're pretty much put in
24 the same spots all the time, sir.

25 Q. If you could turn to Exhibit 354. We've talked about this

1 before. That is your -- the standing orders for mates during
2 cargo ops. On page 1, the very last bullet point there speaks
3 about securing for trailers. Roloc boxes are to be handled tight
4 when on the button, and two chains on the after-end of the trailer
5 -- it says, shortest lead possible. Can you describe to us what
6 you mean there by shortest lead possible?

7 A. No longer than approximately like a 4-foot lead. You wanted
8 a short lead.

9 Q. So you want the lead to be as short as possible, in other
10 words, the -- as the D-ring, or cruciform fitting it will be
11 attached to, would be as close to the trailer as possible? Is
12 that what you mean by that?

13 A. Not as close as possible. No, sir. It had to have an angle,
14 as well. But you didn't want it to be 10, 12 feet away, because
15 then, you know, you're not really going to get a tight lashing.
16 It's going to get loose on you.

17 Q. So the purpose of that is to make sure that you get tight
18 lashings?

19 A. Yeah, the purpose was to have a shorter lead so that the
20 lashing wouldn't loosen up on you as easily, with a longer lead.

21 Q. I'm sorry. I didn't understand the last part.

22 A. So that it wouldn't loosen up, as it would tend to do if
23 there was a much longer lead.

24 Q. Okay. And the reason I bring this up -- so I'd also like you
25 to turn to Exhibit 40, which is the Approved Cargo Securing

1 Manual, on page 38. And I'll give you a minute to go there, and
2 then I'm going to ask you a related question. I just want to
3 clarify what's in the standing orders as compared to what I see in
4 the cargo securing manual.

5 So again, we're looking at Exhibit 40, page 30.

6 A. Okay. I only have it onscreen, sir, just so you know.

7 Q. What's that? You have it on the screen?

8 A. Yeah.

9 Q. Okay. Look at paragraph 4. It says, "athwartship run, or
10 lead of a standard trailer lashing wire shall be a minimum of 4
11 feet when lashed to the trailer of a chassis. When lashes are led
12 directly to the strongest securing points on the cargo loaded on a
13 flatbed, the angle between the lashing to the deck in the
14 athwartship direction shall be 45 degrees or less."

15 Do you see the image above that paragraph? And it's pointing
16 to the angle between the deck and the lashing chain. And it's
17 saying that that is to be the smallest -- well, it's saying, in
18 the words on -- in the cargo securing manual, that that shall be
19 45 degrees or less.

20 Does that seem to be in contradiction with what is in your
21 standing orders? I'd like you to explain the nuances there.
22 Because you spoke in terms of shortest lead. This seems to be the
23 opposite.

24 A. That says the athwartship lead, sir. So if the trailers were
25 facing fore and aft, you were supposed to take the chains and run

1 them away from the trailer in the same direction as the trailer.
2 So that would be a fore and aft lead, not an athwartship lead. So
3 I believe it would be different.

4 Q. Thank you for that clarification. Do you believe that your
5 mates fully understood your guidance and the guidance in the cargo
6 securing manual, in this regard?

7 A. I believe so, sir. And the standing orders are just for
8 guidance and it refers to use the cargo securing manual, as well.

9 Q. Okay. At this time I'm going to change directions a little
10 bit from cargo securing, and just ask one new question.

11 Just after lunch you were provided with a new image that we
12 put together recently. It's an image showing BVS generated wind,
13 seas, significant wave heights. It's based on the email package
14 that would have been received on *El Faro* at 2300 on the 29th of
15 September.

16 So this would have been the image available to the crew of
17 the ship at the very beginning of the VDR audio recording. They
18 made comments about this particular image. Later, they receive
19 updated BVS packages. But something on this -- I wanted to ask
20 you about, and Commander Yemma is pulling it up on the screen here
21 so that others can see the particular images that we're talking
22 about.

23 And this is, this BVS image draws its data from hurricane
24 forecast -- from National Hurricane Center Forecast Advisory
25 Number 8. And that's described in Exhibit 153, beginning on page

1 11. So if you'd have that handy, as well, to kind of walk through
2 some of the nuances that we see here.

3 So again, that's Exhibit 153, beginning on page 11. So just
4 let me know when you have that up, and then I'll start with my
5 questioning.

6 CAPT NEUBAUER: Commander Denning, I'm sorry. Are we
7 focusing on number 8 only?

8 CDR DENNING: Yes. We're focusing on Advisory Number 8, in
9 Exhibit 153, which begins on page 11, because that corresponds
10 with the same data that's available in this BVS submission.

11 BY CDR DENNING:

12 Q. You don't need to read it all right now. I'm going to refer
13 to a few specific paragraphs. So beginning with the BVS image,
14 can you tell me what you see, Captain, as far as the coloring, the
15 shaded areas that are in a semicircle to the east? So I see, you
16 know, sort of bisected at the Hurricane Center, a bisection in the
17 north and south direction, and I see shaded areas to the right
18 that are, you know, appear to be semicircles with right angles.

19 Do you see that?

20 A. I do.

21 Q. What are -- what's your understanding of what this is
22 communicating to a mariner? And I'm not trying to trick you
23 there. I think it corresponds with, if you look back at Exhibit
24 153, right, you have the max sustained winds at various times
25 illustrated there. And it'll say, for example, halfway down the

1 page, max sustained winds 55 knots, gust to 65, and then I see,
2 50-knot wind fields, 34-knot wind fields. I see, what I believe a
3 radii there, 30 miles to the northeast, 50 to the southeast, 0 to
4 the southwest, and 0 to the northwest; do you see that?

5 And that seems to correspond with this particular image,
6 which shows wind fields that are to be expected in those areas.

7 A. Okay. I see that.

8 Q. Does this image appear consistent with your experience of
9 tropical cyclone behavior? In other words, the reason -- what I'm
10 asking you is, the yellow -- let's just take it piece by piece,
11 right. The yellowish area immediately to the right -- you see
12 where the --

13 A. Yes, sir.

14 Q. What is that area? What is that particular color telling you
15 as a mariner?

16 A. The yellowish area would be high seas and swell. The
17 yellowish area would be high seas, I believe, and swells.

18 Q. And I want to make sure -- it's hard to see up here. There
19 are two different yellow areas. So there's the yellow heat map,
20 all around the image. That would be the seas. Just a small
21 little semicircle to the right, and then there's a darker,
22 reddish-orange semicircle that the pointer's on. Those
23 correspond, I believe, to the max sustained wind fields that you
24 would see in that message; is that correct?

25 A. I believe so.

1 Q. And areas of -- some are 50 knot max. There's a 50-knot
2 zone, 34-knot zone. Later, if a storm was going to intensify, you
3 would see a 64-knot zone, indicated in red, around the center.

4 On these images, later we see a 64-knot forecasted zone in
5 the center. But again, it's only to the right of the storm. Do
6 you typically see tropical cyclones that only have the intense
7 wind zones like that on the east side, especially for a storm
8 that's traveling in a southwest direction?

9 A. I haven't been in any storms like that, sir.

10 Q. If you were in a storm and you saw something like this, what
11 would that -- would that indicate to you that the west side of the
12 storm is safer to navigate than the east side of the storm? Would
13 it lead you to that conclusion, perhaps?

14 A. It could.

15 CDR DENNING: Okay, thank you, sir. I don't have any further
16 questions. I'll pass to Captain Neubauer.

17 CAPT NEUBAUER: At this time I'd like to go to the NTSB.
18 Mr. Kucharski.

19 MR. KUCHARSKI: No, Captain.

20 CAPT NEUBAUER: We'll go to the parties in interest. TOTE,
21 do you have any questions?

22 MR. REID: No questions, sir.

23 CAPT NEUBAUER: Mrs. Davidson?

24 MR. BENNETT: Yes, Captain. I have quite a few, if you want
25 to take a break.

1 CAPT NEUBAUER: All right. The MBI will recess, and
2 reconvene at 2:45.

3 (Off the record at 2:36 p.m.)

4 (On the record at 2:47 p.m.)

5 CAPT NEUBAUER: The hearing is now back in session.
6 Mrs. Davidson, your line of questioning.

7 MR. BENNETT: Thank you, Captain.

8 BY MR. BENNETT:

9 Q. Good afternoon, Captain Thompson. Sir, I would ask you if
10 you would put the VDR transcript in front of you. Sir, the VDR
11 transcript only records conversations on the bridge, correct?

12 A. That is correct.

13 Q. And Captain Davidson would have had breakfast, lunch, and
14 dinner with at least one or two officers during the course of his
15 voyage, correct?

16 A. Correct.

17 Q. And would you expect Captain Davidson's officers to discuss
18 the storm and his expected voyage plan during meal hours?

19 A. I believe he would, yes.

20 Q. The VDR does not grab any conversations in the engine room,
21 correct?

22 A. Correct.

23 Q. Nor does it collect any information, or any conversations
24 that would have occurred in the captain's office, correct?

25 A. Correct.

1 Q. Wouldn't have captured any conversations in the chief mate's
2 office, correct?

3 A. Correct.

4 Q. And Mr. Fawcett had mentioned that sometimes there was
5 unintelligible conversations because of background noise. That
6 occurred as well?

7 A. Yes.

8 Q. And if you look on the early start of the VDR, for example,
9 at the start of the VDR, which is page 1, at 05:57 in the morning
10 of the 30th, Captain Davidson is on the bridge, correct?

11 A. Yes.

12 Q. And even then, the first excerpt on that VDR, it indicates
13 unintelligible conversation, correct?

14 A. Yes.

15 Q. And that's at a point in time the vessel wasn't experiencing
16 any significant weather, and yet the VDR was unable to pick up
17 conversations, correct?

18 A. That looks to be correct.

19 Q. So we have to be very careful when we review this VDR. It's
20 not the Bible, correct?

21 A. That is correct.

22 Q. Sir, we know that the captain was on the bridge at 05:57, and
23 from reading the transcript, he doesn't leave the bridge until
24 sometime after 7 in the morning; is that correct?

25 A. That is correct.

1 Q. And you testified that you read the transcript, and all
2 during that hour, he and the chief mate are discussing and
3 assessing the weather and their voyage, correct?

4 A. That is correct.

5 Q. If you turn to page 16 of the transcript, at 06:04:37 -- tell
6 me when you got there.

7 A. I'm there.

8 Q. The chief mate and the captain are talking about the Old
9 Bahama Channel. And the chief mate says, "Let's assess the
10 weather when we get there." Based upon your knowledge and the
11 forecast of the storm, when they were talking about the Old Bahama
12 Channel, when they get there, they had to have been talking about
13 Crooked Island Pass as an option, correct?

14 A. I believe so.

15 Q. If you go to page 18, 09 -- 06:09:51, am I correct that the
16 captain and the chief mate are talking about securing the deck for
17 sea for heavy weather?

18 A. You're correct.

19 Q. Go to -- if you go to page 31, 06:28:45, captain tells chief
20 mate, quote, "I think that's a good little plan, chief mate," end
21 quote. Do you see that?

22 A. Yes, sir.

23 Q. So the captain and the chief mate are developing this plan
24 while assessing the weather, correct?

25 A. Correct.

1 Q. Did you know who the chief mate was on the *El Faro*, Chief
2 Mate Schultz?

3 A. Yes, sir.

4 Q. Was he a licensed master?

5 A. Yes, sir.

6 Q. So at this point in time, two masters are assessing the
7 weather and assessing the voyage plan, correct?

8 A. That is correct.

9 Q. If you go to page 46, at 6:55:37, the captain says he's going
10 to go talk to the steward about the weather, correct?

11 A. Correct. Correct.

12 Q. And in fact, the captain actually leaves the bridge and goes
13 down to the steward, and comes back up several minutes later;
14 isn't that correct?

15 A. That looks to be correct, sir.

16 Q. And again, on page 51, the captain and chief mate are talking
17 about the storm, talking about Old Bahama Channel, and again, the
18 captain reminds the chief mate to secure the deck for sea; isn't
19 that correct? It's page 51.

20 A. Correct.

21 Q. And if you go to page 55, at 07:18:56, the captain says, "And
22 take a hard look at some of the cargo down there. Delegate the
23 men to look at the lashings that you deem necessary," correct?

24 A. Correct.

25 Q. If you go to page 64, 8:30:15, the captain returns to the

1 bridge and discusses the weather with the third mate, correct?

2 A. Correct.

3 Q. If you go to page 70, 09:20:59, the captain is back on the
4 bridge again, correct?

5 A. Correct.

6 Q. And there's an indication there that the barometer is rising,
7 correct?

8 A. Correct.

9 Q. And at 9 -- on page 71, at 9:21:34, the captain recommends to
10 the third mate that they log the weather every 3 hours, correct?

11 A. I'm sorry. What time is that?

12 Q. Page 71. It'd be 9:21:34. It may be on page 70. Sorry,
13 Captain.

14 A. Okay. Yes, I do see that on page 70.

15 Q. Captain, I'm going to read you an email that was sent by
16 Captain Davidson. It's at 10:22, latest weather.

17 "I've monitored Hurricane Joaquin tracking erratically for
18 the better part of a week. Sometime after 9:30, 0200, she began a
19 southwesterly track early this morning. I adjusted our direct
20 normal route in a more southeasterly direction towards San Juan,
21 Puerto Rico, which will put us 65, plus or minus, nautical miles
22 south of the eye. Joaquin appears to be tracking now, as
23 forecasted, and I can anticipate us getting on the back side of
24 her by 10/1, 0800.

25 "Present conditions are favorable, and we're making good

1 speed. All departments have been duly notified as before. I've
2 indicated a later than normal arrival time in San Juan, Puerto
3 Rico, anticipating some loss at sea throughout the night. I will
4 update an ETA tomorrow morning during our regular pre-arrival
5 report to San Juan port" et cetera, et cetera.

6 That was at 10:22. You would expect the master to notify the
7 office that he was going to make a small diversion, correct?

8 A. Yes, sir.

9 Q. Does that email indicate that he'd been tracking the storm
10 for the better part of a week?

11 A. Yes, sir.

12 Q. If you turn to page 84, the timestamp is 11:09:11. The
13 captain alters course to 138. Again, he's back up on the bridge
14 on the 11:00 hour, correct?

15 A. Correct.

16 Q. And throughout the transcript, you hear what appears to be --
17 you don't hear, but you read, that there's a satellite
18 transmission and a ripping of paper. That would be the SAT-C
19 weather data that they're reviewing, correct?

20 A. I believe so.

21 Q. So based upon your reading of the VDR, you would agree with
22 me that the captain, chief mate, third mate and the second mate
23 were relying on hourly readouts of the SAT-C weather that was
24 coming in?

25 A. I would agree.

1 Q. If you turn to page 84, timestamp 11:09:44, the third mate
2 reports to the captain, quote, "It looks pretty much in line with
3 what BVS is saying as far as direction," end quote. What he's
4 talking about is that the SAT-C and the BVS are lining up,
5 correct?

6 A. That looks to be correct.

7 Q. If you turn to page 95, timestamp 11:53, the captain returns
8 to the bridge, correct?

9 A. Correct.

10 Q. At 12:19:19, page 101, the captain is back on the bridge, and
11 he's actually taking weather reports with him, sending weather
12 data to the office, correct?

13 A. What was the timestamp on that one again, sir?

14 Q. 12:19:19.

15 A. Correct.

16 Q. If you go to page 113, timestamp 13:17:01, which is 1:17
17 p.m., local time, the captain instructs the second mate to log the
18 wind direction and barometer every hour. You see that?

19 A. Yes.

20 Q. So that's -- now the captain has been on the bridge in the
21 5:00 hour, the 6:00 hour, the 7:00 hour, the 8:00 hour, the 9:00
22 hour, the 10:00 hour, the 11:00 hour, the 12:00 hour, and the 1:00
23 hour, correct?

24 A. That is correct.

25 Q. It goes along with his reputation of being meticulous and

1 cautious, doesn't it?

2 A. That would be correct.

3 Q. Page 137, 15:32:38, that's 3:00 in the afternoon. The
4 captain's back on the bridge, correct?

5 A. Correct.

6 Q. I skipped one. If you go back to page 125, the 14:04:19, the
7 second mate and the captain are talking about the ship, and that
8 they're built for Alaska; you see that?

9 A. Yes, sir.

10 Q. Go to page 155, at 16:08:44, the captain's back up on bridge,
11 correct?

12 A. Correct.

13 Q. If you go to page 163, timestamp 16:16:06, the captain and
14 the chief mate are talking about how erratic the storm is,
15 correct?

16 A. Correct.

17 Q. They're talking about how it's unpredictable?

18 A. Correct.

19 Q. And they discussed altering course again, correct?

20 A. Correct.

21 Q. At 179, at 17:30, the captain is back on the bridge, correct?

22 A. Correct.

23 Q. And if you go to -- excuse me -- the timestamp of 17:30:09,
24 the chief mate is talking to the captain, and he says, quote, "The
25 second mate mention the weather," end quote; do you see that?

1 A. I do.

2 Q. Given the timestamp, the chief mate is asking the captain
3 whether, when the second mate and he met at mealtime, whether they
4 discussed the weather; isn't that correct?

5 A. I would agree with that.

6 Q. If you go to page 189, it's at timestamp 18:51, the captain
7 is back up on the bridge, correct?

8 A. Correct.

9 Q. And if you go to 18:55:44, on page 190, the chief mate and
10 the captain are talking about going on the, quote, "other side of
11 San Salvador," correct?

12 A. Correct.

13 Q. And at page 226, they began talk about -- it's timestamped
14 19:28:39, they again talk about the option of the Crooked Island
15 Pass, correct? Page 226.

16 A. That is correct.

17 Q. And that's the second time that the chief mate, who's a
18 master mariner, and Captain Davidson, discussed the option of
19 taking Crooked Island Pass, correct?

20 A. Correct.

21 Q. When reading the VDR, did you also take note that Captain
22 Davidson also let the second mate and the third mate know that
23 they could alter course as they see fit, and just to give him a
24 call?

25 A. I believe so.

1 Q. So from 0 -- from the 5 -- from the 0500 hour all the way up
2 until the third mate started his 8 to 12 watch, the captain was on
3 the bridge at least once per hour, discussing with his mates the
4 weather, the course, and potential course changes, correct?

5 A. That is correct.

6 MR. BENNETT: Commander Yemma, would you please put on the
7 screen, Exhibit 314?

8 BY MR. BENNETT:

9 Q. Captain, you were asked questions about this exhibit. This
10 is an exhibit that was created by the Board. The navigation of
11 the ship all depends on what weather forecast you're getting, what
12 seas to expect, et cetera, correct?

13 A. Correct.

14 Q. I will tell you that this exhibit is a little misleading
15 because it tracks the actual course of Joaquin, not the forecasted
16 course of Joaquin; you understand that?

17 A. Yes, I do, sir.

18 Q. So to be making decisions to go through either the Northwest
19 Passage or the Crooked Island Passage, as a master, you want to
20 know how is your ship handling, what the weather is, what's the
21 expected weather, where are the seas coming from, correct?

22 A. Correct.

23 Q. And all that is 20/20. It's hindsight, correct?

24 A. That's correct. We would only have the forecast.

25 MR. BENNETT: Commander Yemma, if you would put up Exhibit

1 268. And if you can go to 118 of that -- 118. And if you'd
2 blow that up a little bit.

3 BY MR. BENNETT:

4 Q. So Captain Thompson, what you're looking at now, this is
5 actually 11:25. It's 25 minutes after the, what was reflected in
6 the Exhibit 314. And you can see that the BVS storm track
7 predicts the storm to head north, correct?

8 A. That looks to be correct.

9 Q. And these are all the things that you assess as a captain,
10 what am I being told by the National Weather Hurricane Center, so
11 that I can make the best possible decisions for my ship; isn't
12 that correct?

13 A. That is correct.

14 MR. BENNETT: Commander Yemma, if you could put up Exhibit
15 153 for me, please. And if you can go to page 11, please. And if
16 you'd scroll up a little bit, to 1800Z, please.

17 BY MR. BENNETT:

18 Q. Captain Thompson, this is the SAT-C weather data that the *El*
19 *Faro* was receiving. When you see 1800Z, that's Greenwich Time,
20 right? You have to back out 3 hours to get to 1:00 local time of
21 the ship?

22 A. Yes. You would have to adjust the time.

23 Q. And that would have been the forecast that the ship was
24 receiving at that time, correct?

25 A. Correct.

1 Q. And based upon the forecast, the ship was not supposed to
2 experience hurricane force winds, correct?

3 A. That looks to be correct.

4 Q Captain, thank you for your time. But it appears that your
5 exercise in being here simply establishes the fact that this is
6 20/20, and that as a master of a ship there are a multitude of
7 things that you have to assess in making course changes, correct?

8 A. Correct.

9 Q. And at the recommended, 0200, and heading down to 180 through
10 Crooked Island Pass, that may have been something the captain
11 assessed was not appropriate at that time, correct?

12 A. That could very well be.

13 Q. Sometimes there are risks. If the storm picked up speed, he
14 would have been caught in the Crooked Island Pass with Joaquin
15 above him; that's a possibility, right?

16 A. That could be possible.

17 Q. The point is that we can't put ourselves in Captain
18 Davidson's position because we were not there. Correct?

19 A. That's correct.

20 MR. BENNETT: No further questions.

21 CAPT NEUBAUER: Does ABS have any questions?

22 MR. WHITE: No questions, sir.

23 CAPT NEUBAUER: Does Herbert Engineering have any questions?

24 MR. SCHILLING: No questions, sir.

25 CAPT NEUBAUER: At this time, I'd like to ask if there are

1 any final questions for Captain Thompson?

2 Captain Thompson, you are now released as a witness in this
3 Marine Board of Investigation. Thank you for your testimony and
4 cooperation. If I later determine that this Board needs
5 additional information from you, I will contact you through your
6 counsel. If you have any questions about this investigation, you
7 may contact the Marine Board Recorder, Lieutenant Commander Damien
8 Yemma.

9 (Witness excused.)

10 CAPT NEUBAUER: The Board will now recess, and reconvene at
11 3:25.

12 (Off the record at 3:09 p.m.)

13 (On the record at 3:25 p.m.)

14 CAPT NEUBAUER: The hearing is now back in session. At this
15 time, we will hear from Dr. Stettler, from the U.S. Coast Guard
16 Marine Safety Center.

17 (Witness sworn.)

18 CAPT NEUBAUER: I wanted to make a note for the record that I
19 had asked the Coast Guard's Marine Safety Center to conduct a
20 structure and stability assessment of the *El Faro* during the
21 accident voyage, and that the commanding officer of the Marine
22 Safety Center, Captain John Mager, chose Dr. Stettler to complete
23 that assessment and study, along with other assistance from Coast
24 Guard Headquarters. He's going to testify today on the findings
25 of his study.

1 And he has already submitted a preliminary report which has
2 become an exhibit. And we have stipulated that preliminary report
3 to the parties in interest. And he -- his presentation, it'll be
4 a summary. We'll still be accepting input and comments on the
5 report after the hearing today.

6 And at this time, I'll pass it to you, Dr. Stettler, to give
7 a -- the overview presentation of your findings.

8 LCDR YEMMA: Okay, Dr. Stettler. Can we start, please, state
9 your name, full name, and spell your last name for the record?

10 THE WITNESS: Yes. Jeffrey Wright Stettler, S-t-e-t-t-l-e-r.

11 LCDR YEMMA: And Counsel, can you also state your full name
12 and spell your last name, please?

13 LT NOYES: Lieutenant Travis Noyes, N-o-y-e-s.

14 (Witness sworn.)

15 LCDR YEMMA: And Dr. Stettler, can you also tell the Board
16 where you are currently employed, and what your position is?

17 THE WITNESS: Yes. I'm a naval architect at the Marine
18 Safety -- U.S. Coast Guard Marine Safety Center.

19 LCDR YEMMA: Can you also describe some of your prior
20 relevant work experience, please?

21 THE WITNESS: Yes. Prior to my current position at the
22 Marine Safety Center, primarily, I served in the U.S. Navy for 28
23 years, most of my career as a engineering duty officer. And
24 served in a number of tours of duty including ship operations at
25 sea, shipyard construction and repair, ship design and

1 engineering, and multiple tours in deep-sea diving and marine
2 salvage operations and engineering. Toward the end of my career,
3 I was assigned as a military professor in naval architecture at
4 the U.S. Naval Academy.

5 LCDR YEMMA: And what is the highest level of education,
6 please?

7 THE WITNESS: I have a Ph.D. in the field of naval
8 architecture and marine engineering.

9 CAPT NEUBAUER: Captain Stettler, can you just maybe slow
10 down a bit, and the court -- and speak into the microphone. Go
11 ahead.

12 LCDR YEMMA: Okay. Tell us your highest level of education,
13 please?

14 THE WITNESS: Yes, a Ph.D. in the field of naval architecture
15 and marine engineering.

16 LCDR YEMMA: And do you currently hold any professional
17 licenses or certifications?

18 THE WITNESS: Yes. I'm a professional engineer, a PE.

19 LCDR YEMMA: Thank you, Captain.

20 (Whereupon,

21 JEFFREY STETTLER, Ph.D.

22 was called as a witness and, having been duly sworn, was examined
23 and testified as follows:)

24 EXAMINATION OF JEFFREY STETTLER, Ph.D.

25 CAPT NEUBAUER: Dr. Stettler, will you give your presentation

1 at this time?

2 THE WITNESS: Thank you, Captain. Good afternoon.

3 The purpose of this briefing this morning -- or this
4 afternoon, is to provide a summary of the preliminary report of
5 the Marine Safety Center's review of the stability and structures
6 and analysis of the sinking of the *El Faro*. It is intended that
7 my prepared briefing will take approximately 45 minutes. Once
8 I've made the prepared briefing, I would like questions and
9 comments from the Board, NTSB, and the parties in interest.

10 For brevity, I will use the abbreviation MSC for Marine
11 Safety Center.

12 At the request of the Board, the Marine Safety Center
13 conducted reviews of the stability and structure of the *El Faro*,
14 including assessment of intact and damage stability, and a
15 forensic sinking analysis to assess the likely contributing
16 factors of the sinking.

17 The MSC review and analyses were completed based upon the
18 documentation made available to the Center by the Board.

19 The MSC report is currently considered preliminary. As
20 Captain Neubauer mentioned, we have solicited review and comments
21 from the parties in interest, and the final report will not be
22 released until after the consideration of those comments.

23 My briefing today is intended to provide only an overview of
24 the report for the public hearing. I will focus primarily on the
25 sinking analysis, but I will also touch on a few other aspects,

1 including the intact and damage stability assessment in order to
2 help put the sinking analysis into perspective.

3 Just a note that the Marine Safety Center conducted these
4 reviews and analyses at the request of the Board, as specified in
5 MBI Exhibit Number 243.

6 To aid in the accomplishment of the reviews and analyses, the
7 MSC independently generated a detailed computer model. The
8 computer was generated, and analyses completed using the software,
9 General HydroStatics, or GHS, which is one of the popular,
10 commercially available AOR types of software packages for ship
11 stability and strength assessment.

12 The hull model was initially created using the Rhino CAD 3D
13 surface modeling software, using the *El Faro* final offsets
14 document and a line drawing as the primary references.

15 Note that the model also includes a separate volume for the
16 semi-enclosed or free-flooding second deck, shown here in bold.
17 This free-flooding volume was not part of the main hull, but was
18 included in the hydrostatic model for two reasons. First, it was
19 necessary for wind area calculations, and second, it was intended
20 that a free-flooding volume might be utilized for assessment of
21 partial buoyancy effects with trapped water on deck.

22 The hull model was then converted into a GHS format,
23 including definition of stations located at 2 to 3-foot spacing,
24 as shown here. It was desired to model the hull with close
25 station spacing, so that hydrostatic properties and internal

1 compartments created using the hull stations would be as accurate
2 as possible. Additional volumes were added to the hull model for
3 watertight ramps and boiler casing in the semi-enclosed second
4 deck. Shown here is the watertight envelope included in the
5 Marine Safety Center computer model.

6 Internal tanks and compartments were added to the model,
7 referencing additional available vessel documentation. A simple
8 superstructure was added, and appropriate sail areas were added,
9 corresponding to each of the container loading conditions, so that
10 the direct wind area calculation would be completed by the
11 software for each condition.

12 Shown here is the inboard profile and plan views of the
13 finished Marine Safety Center computer model. In this graphic,
14 what is shown is the vessel loaded for the accident voyage.

15 The Marine Safety Center was asked by the Board to review the
16 most recent stability test documentation, and estimate the
17 uncertainty in the height in center of gravity, or KG, and for the
18 lightship condition, and the metacenter height, or GM, for the
19 accident voyage.

20 The most recent stability test, which is also called an
21 inclining experiment, was completed in 2006, after the 2005-2006
22 conversion. ABS computed and approved the stability test
23 procedure and the stability test report, and an ABS surveyor
24 witnessed the test on behalf of the Coast Guard.

25 Based on the test, the data test, the guidelines of ASTM

1 F1321-92 were applicable, and based on the Marine Safety Center
2 review, it appears the guidelines were achieved with minor
3 exceptions.

4 There were two results of the review that are most notable.
5 First, the dead weight survey, conducted during the stability
6 test, did not keep track of the transverse center of gravity
7 values of the weights to be added or removed. The result of this
8 is that the calculated transverse center of gravity for the
9 lightship condition was not entirely correct. Subsequently, a
10 lightship transverse center of gravity value of zero was assigned
11 in CargoMax software for the lightship condition. This offset
12 resulted in error in the predicted list calculated by CargoMax,
13 and ultimately required operators to try to compensate for the
14 error in load planning. This issue was discussed during previous
15 hearing testimony.

16 The second was that there is some uncertainty in the KG and
17 in the related GM for the vessel. This is actually quite typical,
18 but it was of interest to the Board for the Marine Safety Center
19 to estimate the uncertainty through an uncertainty analysis based
20 on the results of the stability test.

21 Note that the uncertainty analysis documented in the
22 preliminary report has been revised, and the revised results are
23 shown here. This will be included in the final report.

24 Based on the revised uncertainty analysis, the uncertainty in
25 the departure GM of the accident voyage condition is on the order

1 of 0.7 feet, with a 95 percent confidence. It is important to
2 note that this uncertainty is on the same order as the GM margin
3 calculated for the accident voyage, so it is of some
4 insignificance.

5 It should be noted that the uncertainty in the KG and GM of
6 the departure condition is attributed -- attributable only to a
7 minor extent to the angle and plan weight measures in the
8 stability test. The majority of the uncertainty comes from the
9 accumulating effects of the uncertainty in the hydrostatic
10 properties calculated from the drafts, and uncertainties
11 associated with weights and locations of cargo in the contained
12 loads.

13 The Marine Safety Center was also asked by the Board to
14 review the trim and stability booklet, and the CargoMax stability
15 loading software.

16 The trim and stability booklet was revised most recently in
17 2007, having been based on the 1993 trim and stability booklet.
18 It was modified to account for loading of containers on deck and
19 for inclusion of variable hand pack. The modification of the trim
20 and stability book for carrying containers on deck included new
21 minimum required GM curves, which were provided as a series of
22 curves for different numbers of container tiers.

23 Using the trim and stability book, the operator would find
24 the minimum required GM from the curves, the calculated drafts
25 based on the number of tiers.

1 It was noted during the previous hearing testimony that the
2 minimum required GM curves in the trim and stability book were
3 based on the intact stability criteria, but no damage stability
4 analysis had been done to verify that intact stability criteria
5 would remain the limiting criteria for all loading conditions.

6 A damage stability analysis should have been done, since
7 there had been a 2-foot increase in the load line draft as a
8 result of the conversion, and the previous damage stability
9 analysis, as a result, no longer applied.

10 Post-accident analysis by ABS and the Marine Safety Center
11 demonstrated the damage stability criteria could limit GM for some
12 loading conditions. This will be discussed more, shortly.

13 The CargoMax stability software was reviewed and approved by
14 ABS in 2008, and permitted for use as a supplement to the trim and
15 stability book. It was noted during previous hearing testimony
16 that the slack tank requirements testified in the trim and
17 stability book were not always followed by vessel operators.
18 Specifically, more than the maximum number of slack tanks
19 specified in the trim and stability booklet existed for the
20 accident voyage.

21 These slack tank requirements were not specifically checked
22 or enforced by the CargoMax software, but it is noted that the
23 CargoMax software does account for the actual free surface of all
24 slack tanks in its calculations, so the added risk associated with
25 the excessive free surface is at least assessed in the software.

1 The Marine Safety Center does not normally review cargo
2 securing manuals and cargo securing calculations, and therefore
3 the calculations of CargoMax were not assessed as part of the
4 review. However, it was noted by the Marine Safety Center that
5 CargoMax was not specifically reviewed or approved for cargo
6 securing calculations by either ABS or the Coast Guard.

7 The Marine Safety Center did review the strength analysis in
8 CargoMax for the accident voyage, and completed an independent
9 analysis using the Marine Safety Center computer model. It was
10 noted that CargoMax was not specifically approved or reviewed by
11 either ABS or the Coast Guard for calculation of loading and ship
12 strength for the *El Faro*, but it has been used by vessel operators
13 for that purpose.

14 Also as requested by the Board, the Marine Safety Center
15 completed a basic review of ship structure of the *El Faro*, and a
16 review of the CargoMax software application for hull bearing
17 strength assessment. The Marine Safety Center effort focused on a
18 review of the available ship's structural drawings, and a review
19 of structural assessments completed on behalf of the vessel owners
20 and reviewed by ABS. The Marine Safety Center did not perform
21 detailed structural independent calculations.

22 Based on a review of the available documentation, the Marine
23 Safety Center assessed the *El Faro* ship's structures met
24 regulatory classifications type requirements at the time of the
25 accident voyage.

1 Review of the CargoMax software application included a review
2 of the basic software functionality, and a comparison of
3 calculations of bending moments for the accident voyage departure
4 condition against the Marine Safety Center computer model. It was
5 noted during a results comparison that there was a difference in
6 calculated bending moments of between 10 and 15 percent of the ABS
7 allowable bending moments.

8 Upon investigation, it was determined that the source of the
9 difference stemmed from the assumed lightship weight
10 distributions, including differences in the modeling of the fixed
11 ballast and the underwater tanks. However, it is noted that
12 bending moments calculated using CargoMax and the Marine Safety
13 Center model, both fell well within ABS allowable values.

14 As requested by the Board, the Marine Safety Center conducted
15 an independent assessment of the intact and damage stability of
16 the *El Faro*, based on the available vessel documentation. This
17 section of the report includes four main topic areas.

18 First, a primer on basic ship stability was provided,
19 including an introduction to stability and stability measures,
20 including righting arms, righting energy, and metacentric height,
21 or GM.

22 Second, an overview of intact stability criteria is provided,
23 including GM criteria and righting arm criteria.

24 Third, the *El Faro* was assessed against applicable GM
25 criteria and, as requested by the Board, against righting arm

1 criteria which would apply if she were built 2016.

2 Finally, the topic of damage stability is addressed,
3 including a description of damage stability standards, and
4 assessment of the *El Faro* against these standards.

5 In order to remain upright, the external forces and moments
6 acting on a ship must be counteracted by internal forces and
7 moments sufficient to ensure that the vessel will not capsize.
8 First, for a ship at sea, external forces include primarily wind
9 and wave forces acting on the hull, and may include structure,
10 including superstructure and above-deck cargo.

11 The internal resisting, or righting moments, arise in the
12 ship's own buoyancy and weight forces. As the ship is heeled by
13 external forces, the change in the shape of the underwater volume
14 results in a shift of the underwater volume, where the center of
15 the underwater volume, called the center of buoyancy, or B. It is
16 through the center of buoyancy where the force of buoyancy acts.

17 As long as the weights on board the ship do not shift, the
18 center of gravity, through which the resulting of all weights
19 acts, remains fixed, and a righting moment is created. It was
20 created due to the horizontal separation of the lines of action of
21 the buoyance force and the weight force.

22 This horizontal separation, designated GZ in this figure, is
23 referred to as a righting arm. It is the arm, or lever producing
24 the righting moment. As heel angles increase, GZ increases,
25 achieves a maximum, and then decreases to zero as the lines of

1 actual weight and buoyancy are then aligned.

2 Heel beyond the second point results in capsizing of the
3 vessel, and this point is often referred to as the angle of
4 vanishing stability, or the range of stability. Therefore, the
5 righting arm curve, or GZ, is a function of the angle of heel, and
6 can be used as a measure of the ability of the ship to remain
7 upright.

8 Note also, in this figure, the annotation of a point, M.
9 This is the point through which the lines of action of the buoyant
10 force act, as the vessel is inclined through a small angle of
11 heel. This point, called the metacenter, is the center of the arc
12 traveled by the path of the center of buoyancy, through the small
13 angles.

14 However, since the path of B is not a true circular optimum
15 -- excuse me -- circular path in most vessels, the metacenter is
16 only applicable at small angles. It should be noted that as long
17 as the center of gravity is below the metacenter, then the vessel
18 would have positive righting arms for small angles of heel, and
19 the vessel would return to an upright condition when disturbed by
20 an outside force.

21 The distance from G to M is called the metacentric height, or
22 simply GM. This magnitude is frequently used as an indicator of
23 the initial stability of a vessel.

24 A plot of the righting arms, or GZ, as a function of the heel
25 angle, is called the righting arm curve, or stability curve. A

1 plot of the righting moments could also be created by
2 multiplication of the righting arms with the weight of the
3 displacement on the vessel. The area of the righting moment curve
4 to a given angle, would be the righting energy available to
5 restore the ship to an upright position. And the entire area on
6 the righting moment curve would be the righting energy available
7 to resist capsizing, or conversely, the energy required to capsize
8 the vessel. For this reason, the area on the righting arm curve
9 is often used to evaluate the ability of the ship to resist
10 capsizing. This is the case, since the righting arm curve is
11 simply a scaled version of the righting moment curve, scaled by
12 the displacement for the weight of the vessel.

13 Recall from the previous graphic, the distance from G to M is
14 called the metacentric height, or GM, and that its magnitude is
15 frequently used as an indicator of the initial stability of a
16 vessel. As it turns out, with a little bit of mathematics, it can
17 be shown that GM is actually the initial slope of a righting arm
18 curve, where one radian -- or excuse me -- one radian is set to
19 57.3 degrees.

20 Since GM is the initial slope of a righting arm curve, it is
21 often shown graphically, as shown here. So you'll see, in a
22 number of righting arm curves that I show subsequently, in most
23 cases, there'll be a GM also indicated on the curve.

24 However, importantly, since GM is only the initial slope of
25 the righting arm curve, and is only applicable for small angles,

1 the magnitude of GM does not give a good indication of the overall
2 righting arm curve. Therefore, the use of GM as a stability
3 indicator may be misleading in some cases.

4 However, since calculation of GM is relatively simple
5 compared to the calculation of righting arms, GM is used as a
6 basis for evaluating stability of many types of ships, including
7 general cargo vessels. It is reiterated, though, that the better
8 measure of stability of a ship is the righting arm curve,
9 especially the area of the righting arm curve, which is a measure
10 of the righting energy of the vessel, or the energy available to
11 resist capsizing. For this reason, the Marine Safety Center
12 analysis of the sinking of the *El Faro* focused on assessment of
13 the righting arm curve, considering the impacts of flood water,
14 wind and waves.

15 Following the capsizing and sinking of eight offshore supply
16 vessels in the Gulf of Mexico between 1956 and 1963, it was
17 realized by the Coast Guard that vessels like offshore supply
18 vessels, with larger beams and lower freeboards, could have large
19 GMs, and easily meet GM criteria but have comparatively low range
20 of stability and area on the righting arm curve, or righting
21 energy.

22 As a result of this series of capsizings, the Coast Guard
23 began to apply more stringent stability criteria to offshore
24 supply vessels, adapting criteria based on righting arms. These
25 criteria are generally applied, in 46 Code of Federal Regulations

1 Section 170.173, to vessels under 100 meters in length, or for
2 other vessels of unusual proportion and form. But these righting
3 arm criteria were not applied to larger cargo vessels, which
4 remain governed by the GM criteria of 46 CFR Section 170.170.

5 This graph shows a comparison of righting arm curves for a
6 notional conventional cargo vessel and offshore supply vessel,
7 which was generated as part of a Coast Guard study back in the
8 1960s. The comparison illustrates that GM is not necessarily a
9 good indicator of the overall stability of a vessel, and only --
10 and is really only an indicator of the initial tendency of the
11 righting arm curve, or of the slope of the righting arm.

12 For comparison, the righting arm curve of the *El Faro* for the
13 accident voyage is also applied. Note that although the *El Faro*
14 has a slightly larger GM than the conventional cargo vessel shown
15 here in this example, the total area under the righting arm curve,
16 or the righting energy, is only a fraction of the conventional
17 cargo vessel, and is similar to that of the offshore supply
18 vessel. The reason for a lower range of stability and area under
19 a righting arm curve has primarily to do with lower freeboards,
20 causing deck edge immersion at lower angle of heel.

21 In order to assess the intact stability of the *El Faro*, the
22 Marine Safety Center defined eight benchmark loading conditions.
23 These benchmark conditions included the following: the accident
24 voyage condition at departure and at an estimated loss of
25 propulsion, these are the red curves shown here. Another

1 represented a recent departure and arrival condition from August
2 of 2015 -- these are the green curves shown here; and the
3 homogenous full load departure and 10 percent arrival conditions
4 from a 2007 and 1993 trim and stability booklets. These are the
5 blue and black curves, respectively. Details of the eight
6 benchmark conditions are provided in the report.

7 Based on the date of construction of the *El Faro* in the
8 1970s, and major conversion in 1992 to 1993, the *El Faro* was
9 required to meet only the intact stability criteria of 46 CFR
10 170.170 for minimum required GM. These criteria are called the
11 weather criteria, since they specify minimum required GM to limit
12 static heel angle due to a steady wind acting on the beam of a
13 ship.

14 As discussed previously, the intact heeling criteria was
15 implemented on the *El Faro* -- in the *El Faro* trim and stability
16 booklet, using a series of required GM curves for different
17 container tier heights. So those curves are shown here, on the
18 trim and stability booklet.

19 This graph is an interpretation of the minimum required GM
20 from the accident voyage departure condition, drawn under required
21 GM curves from the trim and stability booklet. The departure
22 draft of the accident voyage was approximately 30.1 feet.

23 Since the majority of the container tiers for the accident
24 voyage were three high, based on the required GM curve, the
25 operator would select three tiers, with a three-tiers curve, so

1 the draft of 30 feet, and the intersection of that with the three-
2 tier curve, which is this smiley-face-looking curve. So this
3 little circle area is the intersection of those two locations.
4 And then one would follow that over to interpret the required GM.
5 So on this curve, it's a little hard to see, but that value is
6 about 3.9 feet, based on the GM curves.

7 The CargoMax also includes a feature called auto wind heel,
8 which is the direct calculation of the required GM from the actual
9 CFR formula. This was actually discussed in previous hearings.
10 That calculation, which is implemented in CargoMax, is also shown
11 on this graph. That comes out to about 3.64 feet, and is shown
12 here. And then, finally, based on the Marine Safety Center GHS
13 analysis, the calculated minimum required GM was 3.8 feet, as
14 shown here.

15 Based on the Marine Safety Center analysis, the eight
16 benchmark loading conditions evaluated all met the intact
17 stability requirements which were applicable to the *El Faro* at the
18 time of the accident voyage.

19 As requested by the Board, the Marine Safety Center assessed
20 the *El Faro* against criteria which would apply if she were built
21 in 2016. If built in 2016, the *El Faro* would be required to
22 comply with Part A of a 2008 IMO intact stability letter. Part A
23 is the mandatory part. It includes two sets of criteria:
24 criteria regarding righting arm properties, which is Section 2.2,
25 and severe wind and rolling criteria, which is Section 2.3.

1 Shown here is the righting arm curve for the accident voyage
2 departure condition of the *El Faro*. On the left, in the upper
3 left quadrant, is a listing of the attained values and the
4 required values within Section 2.2, Righting Arm Criteria. Note
5 that the loading condition does not meet the righting arm criteria
6 due to insufficient area above 30 degrees, and also, the angle of
7 maximum GZ is too low.

8 Shown on the right is a listing of how the *El Faro* would
9 compare to a set of recommended criteria for container ships
10 greater than 100 meters, or 328 feet, which are listed in a non-
11 mandatory Part B, of the intact stability letter. These criteria
12 are scaled to the section --

13 MR. REID: Excuse me. I'm sorry to interrupt. I think our
14 exhibit is different than the one that's up here. Is that --
15 Mr. White, are you getting the same thing?

16 MR. WHITE: Yes. Ours is different than what's being shown
17 as well.

18 MR. REID: Is this a slide that changes on the presentation?

19 THE WITNESS: It is. If you printed out the PowerPoint,
20 you're seeing what's on the front, so you really would need to
21 look at the PowerPoint show. So I apologize for that. Do you
22 have the PPSX file?

23 CAPT NEUBAUER: So I think we could take a recess, and print
24 this series that's presented on the slide. Can we print off --

25 THE WITNESS: I'm not sure how that -- if that's possible to

1 do that or not.

2 CAPT NEUBAUER: Okay. I recommend we just take a 5-minute
3 recess --

4 THE WITNESS: Okay. Why don't we take a break --

5 CAPT NEUBAUER: -- to see if we can get this presentation --
6 yes.

7 (Off the record at 3:57 p.m.)

8 (On the record at 4:19 p.m.)

9 CAPT NEUBAUER: The hearing is now back in session.

10 I believe all the parties in interest have the PowerPoint
11 presentation. And for the people following along here at the
12 Convention Center, we'll have the slides displayed on the screen,
13 for the slides that you'll have in your packet.

14 Dr. Stettler, can you continue? I believe you were on Slide
15 14 of your presentation.

16 THE WITNESS: Yes, thank you. I apologize for that.

17 So as mentioned, it was requested by the Board that Marine
18 Safety Center look at stability criteria which would apply to the
19 *El Faro* if she were built in 2016. And then I said that, if built
20 in 2016, she'd be required to comply with Part A, which is the
21 mandatory part of the 2008 IMO Intact Stability Code. And under
22 that, there are two parts, or two sets of criteria. One is a
23 general righting arm criteria, and one is a severe wind rolling
24 criteria.

25 So I briefly discussed the general righting arm criteria,

1 which is the Section 2.2 criteria, which basically just looks at
2 area under the righting arm curve up to certain angles, and there
3 are requirements for different groupings of angles. So up to 30
4 degrees is a requirement for area, and above 30 degrees is a
5 requirement for area. And the takeaway from this is that because
6 of the low range of stability, relatively low range of stability
7 for the *El Faro*, which drops off at about 38 degrees, as you can
8 see there, there is insufficient righting energy or area under the
9 curve above 30 degrees.

10 So I was then discussing the stuff on the right up there, the
11 upper right quadrant. That is a summary of a non-mandatory
12 recommended set of criteria for container ships greater than 100
13 meters, and against the Part B criteria. And they're essentially,
14 they use the same righting arm curve, it just -- it has a
15 different set of criteria for each area, if you will. And those
16 areas are -- those required areas are scaled by applying a scaling
17 factor, or a so-called form factor, which relates to the shape of
18 the ship and some other things.

19 And the takeaway from this is that it didn't meet any of
20 those, these criteria for the container ships, as you can see in
21 the upper right-hand corner there. But again, I was noting that,
22 even though it doesn't meet those requirements, those recommended
23 criteria have not been implemented in the United States in the
24 CFR. So even if the *El Faro* were built in 2016, she wouldn't be
25 required to meet those recommended container ship criteria.

1 Of the eight benchmark loading conditions, only the 1993 trim
2 and stability book values, so that would have been prior to the
3 2005-2006 conversion, would meet the Section 2.2 criteria. And
4 specifically the actual operating conditions from 2015, those with
5 the red and the green curves on the previous slide, would not meet
6 the criteria due to insufficient righting area above 30 degrees.

7 Okay. The other set of criteria that are mandatory are the
8 so-called severe wind and rolling criteria, which is basically an
9 energy balance. So you look at wind being applied and roll being
10 caused. And it's empirical in nature, but there's an energy
11 balance component to it, so basically you're comparing area, area
12 1 and area 2 there. And as it turns out, all eight of the
13 benchmark conditions would actually meet this severe wind and
14 rolling criteria.

15 One important note should be made here regarding these
16 righting arm criteria, and that is that they do not include -- or
17 for the *El Faro*, they do not include any consideration for vessel
18 downflooding. Specifically, there are no actual downflooding
19 angles on the *El Faro*, although one might think that the cargo
20 ventilation openings that we've been discussing might be
21 considered as downflooding points since they were typically not
22 closed at sea; however, based on the regulatory definition, if an
23 opening -- it's only considered a downflooding point if it cannot
24 be made weathertight and it cannot be closed, so in other words,
25 if it cannot be made weathertight. So an opening that can be

1 closed at sea, even though it may not be closed at sea on a
2 regular basis, would not be considered as a downflooding point.

3 So the effect of adding a downflooding point, if they were to
4 be added, would be to truncate all of these righting area above
5 whatever downflooding that angle might be. So I just wanted to
6 highlight -- we'll be discussing some downflooding here in a
7 moment.

8 So that was the intact stability standards. The Marine
9 Safety Center also took a look at the damage stability standards.
10 And damage stability standards have typically or historically been
11 established to restrict or limit spacing of watertight bulkheads
12 in order to keep the ship afloat and upright, or sufficiently
13 upright, after breaching one or more of the main compartments.

14 In 1992, damage stability standards, so-called probabilistic
15 damage stability standards became applicable to dry cargo vessels
16 over 100 meters, including Ro-Ro vessels, which were newly
17 constructed or undergoing major conversions.

18 So when the *El Faro* underwent the 1992 to 1993 lengthening
19 conversion, which was a major conversion, she was required to meet
20 the probabilistic damage stability standards of SOLAS 1990. So in
21 1993, a damage stability analysis was completed, confirming that
22 the limiting criteria for the *El Faro*, for all loading conditions,
23 would be intact stability criteria, not a damage stability
24 criteria. However, as discussed in previous hearing testimony, a
25 new damage stability analysis was not completed following the

1 2005-2006 conversion, even though there had been a 2-foot increase
2 in the load line as a result of that conversion.

3 As stated in his previous testimony, Mr. Gruber, of ABS,
4 completed a damage stability analysis using an ABS computer model
5 as it would have been completed in 2006. Similar analyses were
6 also completed by the Marine Safety Center using the Marine Safety
7 Center computer model as shown in this table.

8 The results of these analyses indicate that, for GM values in
9 the range of 2.9 to 3.3 feet at both the load line and the partial
10 load line drafts, the load line being about 30.1 feet and partial
11 load line would be 26 feet, the required subdivision index of 0.6
12 would be attained, meaning that that would be the limiting GM
13 buffering for that load condition.

14 For illustration, the range of values of GM, as a result of
15 these damage stability analyses, are plotted on the required GM
16 curves from the trim and stability book, as shown here. This
17 suggests that for loading conditions with more than two tiers of
18 containers, the limiting criteria would remain the intact
19 stability criteria. But for two tiers or fewer, the limiting
20 criteria could be the damage stability criteria.

21 So this was the basic conclusion of Mr. Gruber back in -- I
22 think it was his May testimony he reported on this. And
23 basically, our results confirmed his analysis, although our
24 results were slightly higher in required GM value.

25 As requested by the Board, the Marine Safety Center also

1 looked at damage stability criteria which would apply if *El Faro*
2 were built in 2016. In this case, the *El Faro* would be required
3 to meet the 2009 SOLAS standards.

4 Applying those 2009 standards, at the bottom there, at the
5 bottom of the table, you see that it would require a GM of
6 approximately 5.8 feet, to meet -- in order to meet the 2009 SOLAS
7 standards. The large increase in GM, due to the different -- are
8 due to the differences in the 1990 and 2009 SOLAS standards. The
9 most important difference is in the specified permeability for Ro-
10 Ro, roll-on/roll-off, cargo holds, which increased from 0.7 in the
11 1990 SOLAS standards, to 0.9 or 0.95, depending on the loading
12 condition, with the 2009 standards.

13 So it was a significant increase in the permeability, which
14 is the floodable volume, if you will, so more weight, in other
15 words, gets counted in flooding in the 2009 standards. So the
16 difference, really, is an illustration of an increased level of
17 safety provided by the 2009 SOLAS damage stability standards.

18 The hydrostatic safety analysis made use of the Marine Safety
19 Center computer model, and we took a first principles approach.
20 So the focus in our assessment was on righting arms and righting
21 energy and range of stability considerations, in order to gain
22 insight into the impacts of wind and flooding on the vessel.

23 We looked at potential sources of flooding, and perhaps how
24 those sources might impact the condition of the vessel. We looked
25 at the effects of wind heel, and both in a -- in flood water, and

1 both in a general and kind of nuanced sense, considering such
2 things as the free surface of the flood water, and compartment
3 permeability and so-called pocketing effects, which I'll describe
4 shortly.

5 We investigated the sinking with an array of wind heel and
6 flooding combinations to assess the conditions leading to the
7 capsizing and sinking of the *El Faro*, given specific things
8 extracted from the environmental conditions and based on insight
9 gained through review of the voyage data recorder audio
10 transcript.

11 At the time of the loss of propulsion and sinking, the *El*
12 *Faro* was in close proximity to Hurricane Joaquin. Precise wind
13 and wave conditions are not known, however, based on a
14 meteorological hindcasting, it can be estimated that between the
15 hours of 0600 and 0740 on October 1st, the *El Faro* likely would
16 have been experiencing 70 to 90-knot sustained winds, with 25 to
17 30-foot seas.

18 This graphic, which was provided by the NTSB, along with the
19 release of the VDR audio transcript on December 13th, shows the
20 ship track data taken from the VDR, along with storm track data of
21 Hurricane Joaquin over the morning -- early morning hours of
22 October 1st.

23 As can be seen on the graphic, prior to the loss of
24 propulsion, the vessel was heading generally west-southwest, with
25 winds and seas generally off the port bow. Following the turn to

1 port and loss of propulsion at 0600, until the sinking around
2 0740, the ship was drifting in a southwesterly direction. Based
3 on hydrodynamic considerations, the ship would likely have been
4 drifting during this time with its beam to the wind and the seas.

5 The only known source of flooding confirmed by the crew, as
6 documented on the VDR audio transcript, was through the starboard
7 Hold 3 access scuttle. The scuttle is shown here in a screen
8 capture from a 2008 video. Based on the VDR audio transcript, the
9 crew believed that the scuttle was either left open or became open
10 for some unknown reason. In any event, this was the only source
11 of flooding that was actually confirmed by the crew, as documented
12 in the audio transcript. However, after the scuttle had been
13 secured, the crew eventually realized that the water level in Hold
14 3 continued to rise, indicating that there was another source of
15 flooding.

16 There was some discussion among the crew, documented on the
17 VDR audio transcript, about the possibility of flooding from the
18 emergency fire pump piping, which was located on the tank top
19 deck, or the fourth deck, in the aft starboard corner of Hold 3.

20 This photo shows the arrangement on the sister vessel, *El*
21 *Yunque*. It is noted that the arrangement on the *El Faro* is
22 similar, but not identical. The insert photo here, which is very
23 difficult to see because it's dark, is the only photo which could
24 be obtained by the Board showing the arrangement on the *El Faro*.

25 A potential source of continued and progressive flooding

1 would be through the cargo hold ventilation system. It is not
2 clear from the VDR audio transcript if this source of flooding was
3 ever recognized by the crew, although there was a mention or a
4 potential mention of this by a crew member at 0600 on October 1st.
5 In any event, there was no mention on the audio transcript of
6 trying to limit flooding through the cargo hold ventilation system
7 by shutting the fire dampers.

8 This photograph shows the port side of the *El Faro* with
9 ventilation openings for Hold 3 highlighted with yellow circles.
10 This additional photo is of the sister vessel, *El Yunque*, taken
11 during December of 2015. The louvered openings for Hold 3
12 ventilation supply and the aft exhaust are highlighted, although
13 it's a little hard to see on the screen. To the right, in the
14 blister, is the supply louvered openings, and to the left there is
15 a single louvered opening for the aft Hold 3 exhaust.

16 So this is the supply blister. So there's supply louvered
17 openings there. And this louvered opening here is to the aft
18 exhaust opening.

19 The load line draft, or the full load draft, if you will, is
20 shown or designated with the red paint. And the opening there,
21 there's a plate kind of blocking, but there's that big opening to
22 the second deck, which indicates where the watertight deck level
23 is. So the openings are between the watertight deck, the
24 watertight second deck, and the main deck above.

25 Due to the shearing, or curvature of the second deck -- and

1 you can actually see this in the upper photograph, due to that
2 shear, or curvature, the Hold 3 openings were the closest to the
3 waterline.

4 This is a scaled drawing, which shows a cross-section of the
5 *El Faro* at frame number 159, which is the location of the Hold 3
6 aft ventilation exhaust. So it shows the arrangement, if you
7 will, of the aft ventilation exhaust system on the *El Faro*.

8 The exhaust arrangement includes an intake plenum, intake
9 plenum, fire damper, baffle plate -- so the top of the baffle
10 plate is up here. So this is the trunk, if you will, and then the
11 exhaust louvered opening. So the louvered opening we were looking
12 at in the previous photograph is this one right here.

13 The louvered opening is forward of the fire damper trunk and
14 separated by a vertical baffle plate. The top of the baffle plate
15 is shown in the figure. Based on the design of the system, the
16 baffle plate is meant to provide a vertical boundary to keep water
17 from entering the cargo hold through the fire damper. This
18 system, however, is not watertight.

19 It has been noted by members of the Board and the NTSB that
20 the exhaust trunk on sister vessel *El Yunque* contained a series of
21 small drain holes, and if similar holes existed on the *El Faro*,
22 these could have provided a path for some additional flooding.

23 This section shows frame 143, which is the Hold 3 ventilation
24 supply arrangement. So these are the blisters. So these are the
25 external hull blisters right there. So the external -- or excuse

1 me -- the supply system includes the external blister with side
2 shell louvered openings, a baffle plate, a bell mouth, which
3 supplies air to the fan, and then the supply plenum going down
4 into the lower hold, which supplies air to the hold.

5 In this case, note that the louvered openings are forward and
6 aft of the bell mouth, and they're separated by these baffle
7 plates. So in order for water to enter this cargo hold, water
8 would essentially have to go in through those louvered openings
9 and over the baffle plates.

10 It is noted that for the accident voyage, the top of the
11 baffle plates were approximately 25 feet above the still
12 waterline, so that's what's shown here, and that they would
13 submerge at an angle of heel of approximately 27 to 29 degrees.

14 The force of the wind acting on the above-water surface area
15 of the hull and any exposed structure, including superstructure
16 and cargo, produces a heeling moment, tending to heel the vessel
17 from its upright equilibrium. For a steady wind in calm water, a
18 ship will achieve an equilibrium heel angle when the heeling
19 moment produced by the wind is balanced by the righting moment
20 produced by the ship's own weight and buoyant forces.

21 An approximate wind heeling moment can be calculated based on
22 wind speed, as a function of the heel angle of the vessel.
23 Dividing the heeling moment by the displacement of the vessel
24 gives wind heeling arms.

25 So subtracting the wind heeling arms -- so these are the wind

1 heeling arms. So if you subtract those wind heeling arms from the
2 righting arm, you get what is called a residual righting arm. So
3 the residual righting arm shows one that was a reduced area under
4 that righting arm. So there's a reduced righting energy, if you
5 will. And it also produces a wind heel, or a wind heel angle. So
6 that would be the angle at the beginning of the residual righting
7 arm.

8 So in this graphic, you could estimate that the wind heeling
9 angle would be about 8 degrees. So this is the accident voyage
10 departure condition. However, I note that this does not include
11 the effects of any flood water. And that will be addressed
12 separately.

13 To get a feel for how various wind speeds affect the residual
14 righting arms, the righting arm curves for the accident voyage,
15 this figure shows the effects of a range of wind speeds from 40
16 knots to 120 knots. Note that as the wind speed increases, so
17 the -- basically, as we go down, so there's your intact condition,
18 if you will, with no wind, 40, 50, 60 -- excuse me -- 40, 80, 100
19 and so on, knots.

20 Note that as the wind speed increases, the area under the
21 righting arm curve or righting energy decreases, that the
22 resulting wind heel angle increase.

23 There are two important effects to consider regarding
24 flooding in the case of the *El Faro*. First, the flood water adds
25 weight to the vessel, increasing the drafts and reducing the

1 freeboards. But the added weight is low in the vessel, and
2 therefore lowers the center of gravity of the vessel, resulting in
3 a stabilizing effect on stability.

4 However, the second -- the more important effect is the free
5 surface of the flood water. This free surface effect is shown
6 graphically here. The free surface of the flood water is free to
7 move as the vessel heels overall to the seaway. So as the wedge
8 of water shifts from one side to the other, the center of gravity
9 of the ship likewise shifts. So as shown here, the center of
10 gravity of the ship would shift from a position G-0 to a new
11 position, G, based on the shift of the wedge of water from one
12 side to the other.

13 There's an equivalent effect that goes with this, that the
14 equivalent reduction in righting arm can be attained by applying
15 what we refer to as a virtual rise in the center of gravity. And
16 you can see this graphically, that that resulted righting arm, GZ,
17 is the same as the righting arm we would get if we simply moved
18 the center of gravity up to a virtual position.

19 So we call that position the virtual location of the center
20 of gravity, and we call that a virtual rise in the center of
21 gravity. Now you may recall from previous testimony a discussion
22 of a free surface correction regarding slack tank free surface,
23 and that is how that free surface correction is calculated in GM.

24 It should be noted, though, that this free surface correction
25 only applies to small angles of heel, since GM only applies to

1 small angles of heel. However, the reduction in righting arm
2 applies through all angles of heel, and can be calculated easily
3 using software by keeping track of the weight of the flood water
4 that shifts at each end. So this effect on the righting arm curve
5 can be easily evaluated.

6 There are two other important considerations regarding flood
7 water, which must be carefully considered in performing a forensic
8 analysis. Permeability is the fraction of a volume of a
9 compartment that can be filled with liquid, accounting for such
10 things as internal structure, piping, machinery, and internal
11 components, including cargo. The permeability factor
12 proportionately reduces the floodable volume and the free surface
13 associated with flood water. This is especially important in the
14 case of cargo holds, where a large fraction of the compartment's
15 volume can be taken up by cargo.

16 In the case of the trailer containers and automobiles carried
17 below decks on the *El Faro*, permeability should be considered
18 highly variable in both overall fraction and in uniformity. It is
19 therefore appropriate to consider a range of values in the
20 analysis.

21 Based on some basic engineering estimates, a range of
22 permeability values of 0.7 to 0.9 was used in the Marine Safety
23 Center analysis, with variations due to cargo uniformity and
24 locations also considered.

25 In addition to the effects of permeability, the effects of

1 free surface are also reduced due to the effect of pocketing of
2 the flood water in the lower cargo hold. The term pocketing is
3 used to describe the reduction of free surface due to the
4 interaction of the free surface with the overhead of the
5 compartment. So in this graphic, pocketing would relate to the
6 decrease in free surface due to the interaction with the deck, in
7 this case, the third deck.

8 This is important in the lower cargo hold because the third
9 deck, while effectively non-watertight, contains relatively small
10 deck openings, which would limit the rate of water through the
11 deck as the vessel rolls in the seaway. So effectively, there is
12 an effective pocketing effect, although the deck is non-
13 watertight, so water can flow through that deck.

14 We've previously considered the effects on the righting arm
15 curve of wind heel alone. Now we consider the effects of flooding
16 alone. Then we'll look at the combined effects of wind heel and
17 flooding.

18 Consider the flooding of Hold 3, which was discussed by the
19 crew, as documented in the DVR audio transcript. This figure
20 shows the righting arm curves, with flooding in Hold 3, in 10
21 percent increments, from 10 through 60 percent, with permeability
22 values of both 0.7 and 0.9. The solid curves are the higher 0.9
23 permeability values, and the dashed curves are the lower 0.7
24 permeability values. The most obvious conclusion that can be
25 drawn from this is that the results vary significantly with

1 flooding increment, and also with different values of
2 permeability.

3 Note that the lower -- for the lower increments of 10 and 20
4 percent, for the higher permeability values these would be the
5 solid blue, the red curves. So for small angles, there is a
6 significant drop in the slope or the initial values of the
7 righting arm. And this is due to the initial free surface effect.

8 In the final equilibrium condition, which are the blue
9 curves, and they're kind of hard to see here, but right about
10 here, they have the highest GM, or the initial slope, but due to
11 the stabilizing effect of the weight of the flood water being low
12 in the vessel was the reason they have the highest GM. But
13 despite this stabilizing effect, the overall effect on free
14 surface is significant in the reduction of the righting arms. So
15 the righting arms go between no flooding, which the vessel has
16 righting arms out to 38 degrees, to a range of stability of about
17 22 degrees with Cargo Hold 3 flooded.

18 Based on a review of the VDR audio transcript, it's not clear
19 when and where additional flooding took place, until a report to
20 the bridge at 7:16 a.m. on October 1st, that Hold 2 -- that the
21 Hold 2A bilge alarm had been sounding. By this point, it had been
22 reported that the vessel was heeling to an angle of approximately
23 15 degrees, and it was likely that water would have been entering,
24 at least intermittently, through the cargo hold ventilation system
25 into Hold 2A.

1 This figure shows the effects of progressive flooding in Hold
2 2A after complete flooding of Hold 3. So the dark line -- the
3 dark curve is the Hold 3, completely flooded, and then the
4 subsequent curves are Hold 2A flooding in the different
5 increments.

6 However, this righting arm curve, or this righting arm
7 assessment does not consider the important effect of wind heel, so
8 we must look at those effects together.

9 So this figure provides results of an analysis which includes
10 effects of both wind heel and flood water in Cargo Hold 3. So
11 this is just water in Cargo Hold 3, combining with 80-knot beam
12 wind. So the dashed curves are without wind, and the solid curves
13 are with wind.

14 Note that at the 20 and 30 percent flooding level -- so these
15 are the green and the light blue curves at the bottom, the
16 resulting wind heel is approximately 15 degrees. And that happens
17 to correspond with the wind heel reported by the captain on the
18 VDR audio transcript. While this is certainly not conclusive, it
19 does demonstrate that the reported wind heel angle by the master
20 of 15 degrees is reasonable with some flood water in Hold 3, with
21 70 to 90-knot winds.

22 The more important aspect of these curves, though, is the
23 extremely small residual righting arms, especially at the 30
24 percent flooding level, with the wind heel. Based on the previous
25 figure, showing the effect of progressively flooding Hold 2A, with

1 Hold 3 flooded, it can be expected that in this condition, with 20
2 to 30 percent flood water in Hold 3, any small amount of flood
3 water in Hold A -- Hold 2A, would likely result in capsizing.

4 This is the scale drawing of the cross-section at frame 159
5 then, which is the rotation of the aft Hold 3 ventilation exhaust.
6 This is a condition with Hold 3 flooded to 20 percent, with a 15-
7 degree wind heel superimposed. And actually, this is the
8 calculated condition that goes with those two things. Based on
9 the VDR audio transcript, this is a condition which may have
10 existed around 0700 on October 1st.

11 The cross-section shows the still waterline at that frame
12 location, not accounting for waves and the ship roll motion. Note
13 that the downflooding point at the top of the baffle plate -- and
14 so this is that -- top of the baffle plate is right there, is 8½
15 feet above the still waterline in this condition.

16 It is likely that with vessel roll motion and wave heights in
17 excess of 25 feet, that this ventilation opening would have been
18 submerging at least intermittently as the waves passed and the
19 vessel rolled around the mean heel angle.

20 This is the cross-section at frame 134-22, which is the
21 location of the Cargo Hold 2A ventilation exhaust. This is the
22 same condition with Hold 3 flooded to 20 percent and heel of 15
23 degrees. So this is what the section at, in Hold 2A would look
24 like. Note also that the downflooding point, the top of the
25 baffles, right here, is actually less than 9 feet above the still

1 waterline in this condition.

2 It is likely that, again, with vessel roll motion, and wave
3 heights in excess of 25 feet, that this ventilation opening also
4 would have been submerging, at least intermittently, as the waves
5 passed and the vessel rolled around the mean heel angle.

6 We conclude from the VDR audio transcript that the *El Faro*
7 was experiencing flooding of Hold 3, and was experiencing
8 significant wind heel, resulting in a mean heel angle of
9 approximately 15 degrees.

10 Following the loss of propulsion around 0600, on the morning
11 of October 1st, the vessel would have been drifting with its beam
12 to the wind and waves, and it could be expected that the vessel
13 was also rolling around the mean heel angle due to wave action.

14 In this condition, eventually, Hold 2A, and perhaps
15 eventually, Hold 2 and Hold 1, the ventilation supply and exhaust
16 openings would have immersed, allowing additional flood water into
17 Hold 2A. This was suggested by the bilge alarm, as reported at
18 07:16 on the VDR audio transcript.

19 As demonstrated by the Marine Safety Center analysis, the
20 free surface associated with the additional flood water would
21 likely have been sufficient to cause the vessel to partially
22 capsize. However, the capsizing may have been slowed or arrested
23 as containers on deck began to go overboard, providing a
24 stabilizing effect.

25 But as the vessel slowly rolled onto its side, flood water

1 would have entered through the ventilation openings of all of the
2 cargo holds and the engine room, resulting in the sinking. Due to
3 the 6700 tons of iron ore fixed ballast and the double-bottom
4 tanks, the vessel would have returned to an upright condition as
5 the vessel sank.

6 In conclusion, based on the review of the available technical
7 documents, and the independent analysis by the Marine Safety
8 Center, we've determined that the *El Faro* met applicable intact
9 and damage stability and structural strength requirements as
10 loaded for the accident voyage. However, it is noted that the
11 vessel was operated very close to the maximum load line drafts,
12 with minimal stability margin compared to the required metacentric
13 height, and with limited available ballast capacity and available
14 freeboard, leaving little flexibility for improving stability at
15 sea, if necessary.

16 The results of the sinking analyses were highly sensitive to
17 estimated cargo hold permeability, including overall fraction and
18 uniformity due to the distribution of cargo. The results were
19 also highly sensitive to variations in wind speed, essentially --
20 especially in combination with flood water free surface and
21 permeability.

22 Given the sea conditions and reported initial flooding
23 through the Hold 3 scuttle, the ventilation openings would have
24 allowed at least intermittent flooding into the cargo holds, as
25 the vessel was subject to variable wave height on the side shell,

1 and rolled about an estimated mean heel angle of approximately 15
2 degrees. Single compartment flooding of Hold 3, with the combined
3 wind heel, due to 70 to 90-knot beam winds, resulted in very small
4 residual righting arms and very little residual righting energy,
5 or area under the righting arm curve.

6 This would suggest that it would be highly unlikely that the
7 *El Faro* could have survived even single-compartment flooding of
8 Hold 3, given the sea conditions, with estimated 70 to 90-knot
9 winds, and 25 to 30 foot seas. But free surface associated with
10 the flooding of additional cargo holds would have resulted in
11 capsizing.

12 As requested by the Board, the Marine Safety Center also
13 compared the stability of the *El Faro* against criteria which would
14 apply if she were constructed in 2016. Based on the MSC analysis,
15 the *El Faro*, as operated, would not have met the required righting
16 arm criteria due to limited available righting energy under the
17 righting arm curve. Additionally, based on the Marine Safety
18 Center analysis, the *El Faro*, as operated, would not have met
19 current damage stability standards.

20 Captain, that concludes my prepared briefing. I'd be happy
21 to address questions and comments at this time.

22 CAPT NEUBAUER: Thank you, Dr. Stettler. Would you like to
23 take a break before we field questions, or are you ready to
24 continue on?

25 I'd like to go to the parties in interest first.

1 TOTE, do you have any follow-up questions?

2 BY MR. REID:

3 Q. Good afternoon, Dr. Stettler. I'd like to refer to your
4 Slide 32, just to make sure I understand. So is your conclusion
5 that the *El Faro* satisfied the legal requirements for its intact
6 and damage stability; is that correct?

7 A. Yes. Based on the available documentation, that is our
8 assessment.

9 Q. And you indicate in your slide, that if built in 2016, it
10 would not meet current standards; is that correct?

11 A. Specifically, as the vessel was operated, yes, in terms of
12 drafts and height of center of gravity.

13 Q. And so just so I understand, is this akin to, let's say,
14 applying 2016 emission standards on a car that was built in 1975?
15 Is that a fair analogy?

16 A. I'm not sure that I can answer that directly. That might be
17 a question for Mr. Sirkar tomorrow. I think -- I don't think
18 there's a real equivalence there. There is also the possibility
19 if *El Faro* were to undergo a major conversion, that if deemed
20 reasonable and practicable by the Coast Guard, that she might also
21 be required to meet current standards. But I'm not sure that I
22 could draw a parallel with emission standards.

23 Q. Is it fair to say that it's fairly routine to apply old
24 standards to older vessels?

25 A. Yes, unless there were some reason that those standards would

1 need to be updated. Yes.

2 Q. So essentially, the *El Faro* was grandfathered in to the
3 standards that were required in 2007; is that a fair statement?

4 A. I'm not sure about the term grandfathered, but the -- what
5 the *El Faro* was required to satisfy following the 1992 to 1993
6 conversion was not clear, although I believe that the general GM
7 criteria had not changed significantly during that period of time.
8 Since that 1992 to 1993 conversion, she would still be required to
9 meet the criteria that existed at that time.

10 Q. Would you agree with me that the *El Faro* was not legally
11 required to meet the standards of 2015 or 2016, but instead met
12 older requirements?

13 A. I can't assess whether or not she would have been, whether or
14 not there's something else involved. I can only tell you that we
15 assessed the *El Faro* against the standards that would have
16 existed, given its age and the date of the conversion.

17 MR. REID: Thank you.

18 CAPT NEUBAUER: Does Mrs. Davidson have any questions at this
19 time?

20 MR. BENNETT: Yes, Captain. Thank you.

21 BY MR. BENNETT:

22 Q. Good afternoon, Dr. Stettler.

23 A. Good afternoon.

24 Q. Are you aware that in 2008, the United States Coast Guard
25 determined that there were certain issues with the wind criteria

1 for vessels with low freeboard and high sail area?

2 A. I am familiar with that, yes.

3 Q. And the *El Faro* was a vessel with a low freeboard and a high
4 sail area, correct?

5 A. Generally speaking, that is true.

6 Q. And are you also aware that in 2010, the United States Coast
7 Guard chose not to address those issues?

8 A. I can only say that I read a proposed rule from 2008, and a
9 final rule from 2011 where that proposed rule was not implemented.

10 Q. And I think we've discussed off the record, that you'll
11 supplement your report with that, correct?

12 A. Correct.

13 MR. BENNETT: Thank you, sir. No further questions.

14 THE WITNESS: Although, I should clarify, there is -- there
15 was an addition at that time that addresses part of that issue,
16 and that is what I will address in a revision in our report. It
17 will not be assessment of the proposed rule.

18 MR. BENNETT: And we'll submit -- we'll make a submission as
19 well, Captain.

20 CAPT NEUBAUER: Thank you. Any further questions, Mrs.
21 Davidson?

22 BY MR. BENNETT:

23 Q. Fair to say, Dr. Stettler, that all those calculations you
24 made, you don't think Captain Davidson would make those
25 calculations? That's a pretty detailed report, right?

1 A. Yes, of course.

2 MR. BENNETT: Thank you, sir. No further questions.

3 CAPT NEUBAUER: Does ABS have any questions?

4 MR. WHITE: Yes, we do.

5 BY MR. WHITE:

6 Q. Captain Stettler -- or Dr. Stettler, you spoke about an
7 uncertainty analysis during the course of your presentation. And
8 through the last couple of weeks, we understand you've updated
9 your uncertainty analysis to indicate the uncertainty analysis and
10 incline was changed from 0.79 uncertainty to approximately 0.3,
11 correct?

12 A. Approximately, yes.

13 THE WITNESS: Mr. -- Commander Yemma, could you put up that
14 slide? I believe that's -- it's the third slide. Yes, thank you.

15 BY MR. WHITE:

16 Q. So according to Slide 5, the uncertainty, as to the incline,
17 has been reduced from 0.79 feet to 0.2 feet?

18 A. Correct.

19 Q. And in performing this uncertainty analysis and reviewing of
20 the inclining reports relevant to *El Faro*, was there any
21 requirement on the Coast Guard standards or ASTM standards to do
22 an uncertainty analysis?

23 A. No.

24 Q. And in evaluating the inclining in the *El Faro* in 2006 that
25 was done by Herbert Engineering, did you consider the 1993

1 inclining of *El Faro*?

2 A. We did not.

3 Q. You made certain representations in your report concerning
4 uncertainty. And during the course of your report, you evaluated
5 the precision in which the weights were measured aboard the
6 vessel, correct?

7 A. Yes.

8 Q. And as far as the uncertainty, you've updated, or are in the
9 process of reevaluating that uncertainty based on information that
10 Herbert Engineering gave you with regard to the measurement of
11 those weights?

12 A. Correct. Yes.

13 Q. As far as the angle of heel, or the amount the vessel heeled
14 over during the course of the incline, in 2006, do you remember
15 what that figure was?

16 A. The maximum angle?

17 Q. Yes, sir.

18 A. It was 1.15 degrees.

19 Q. And as far as the requirements for ABS to review the
20 inclining reports done by Herbert Engineering, doesn't the
21 standard require acceptance in the event that the angle of heel is
22 between 1 and 4 degrees?

23 A. It requires the angle to be between 1 and 4 degrees, yes.

24 Q. In the course of your report, you refer to, quote/unquote, a
25 "preferred angle" of 2 to 3 degrees. Do you recall that?

1 A. Yes, I do.

2 Q. Isn't it true that in the ASTM publication for inclines, that
3 preferred 2 -- withdrawn.

4 Isn't it true, sir, that if you looked at the ASTM standard,
5 it never uses the word preferred?

6 A. I would have to go back and look at that. That could have
7 been a misterm, yes.

8 THE WITNESS: Could we have just one moment?

9 CAPT NEUBAUER: Yes.

10 BY MR. WHITE:

11 Q. Dr. Stettler, the ASTM standards are Exhibit 194. I bring
12 your attention to two sections, sir. Section 5.6.2, in that
13 section, it indicates approximately halfway down the paragraph,
14 "On smaller vessels, where there is insufficient headroom to hang
15 long pendulums, obtain a 6-inch deflection by increasing the test
16 weight so as to increase the list. The typical inclination is
17 between 2 and 3 degrees, but in no case, should the maximum angle
18 of list be greater than 4 degrees." Do you see that, sir?

19 A. I do.

20 Q. Dr. Stettler, you'll agree with me, there is no use of the
21 word preferred there, and that reference to 2 to 3 degrees angle
22 of heel is significant to, quote/unquote, "smaller vessels"?

23 A. I would agree that's the implication here, yes.

24 Q. If you had looked at the 1993 inclining, which one -- did you
25 look at the 1993 inclining of the *El Faro*?

1 A. I did.

2 Q. And do you recall what the angle of heel was?

3 A. I do not.

4 Q. If I represented to you that the angle of heel was
5 approximately 1.3 degrees, would that refresh your recollection?

6 A. It wouldn't, but that doesn't surprise me.

7 Q. Did you discuss the angles of heel that had been used in
8 inclinings over the last 2 to 3 years with anyone at the Marine
9 Safety Center?

10 A. Yes.

11 Q. And isn't it true that many of the vessels, or most of the
12 vessels that are of the size or increased size than *El Faro*, do
13 not reach an angle of heel of 2 degrees?

14 A. That is correct.

15 Q. During the course of your analysis and your research, did you
16 examine the inclining experiments of any other Ponce class
17 vessels?

18 A. No.

19 Q. You said no?

20 A. It was no.

21 Q. And would that be relevant to an analysis as to whether or
22 not anything was atypical with the inclining of *El Faro*?

23 A. I don't think one could draw that conclusion from a sister
24 vessel.

25 Q. So you didn't draw the conclusion that anything was atypical

1 about the inclining for *El Faro* in 2006?

2 A. Correct.

3 Q. And in fact, the approval of the inclining by ABS in 2006 was
4 proper and in compliance with the guidelines in effect?

5 A. It met the requirements of the guidelines, yes, with minor
6 exceptions.

7 Q. And similarly, the Coast Guard's review of the inclining in
8 1993 indicated that it did, in fact, meet the requirements?

9 A. Yes.

10 Q. You indicated that you reviewed the trim and stability book.
11 You referenced certain changes or anomalies that you found with
12 regard to tank capacities. You recall that in your report?

13 A. Yes.

14 Q. To the extent that the approval of the *El Faro*, the tank
15 capacities, go back to the *Great Land* in 1975, would it be fair to
16 say that those tank capacities, as determined by a naval
17 architect, were not done with the assistance of a computer-
18 assisted design program, such as Rhino?

19 A. That would be my assumption.

20 Q. To the extent that you used the Rhino program in your
21 analysis, a computer-assisted design program, isn't it fair to say
22 that the movement of the tank boundaries with the fairing of the
23 lines by the Rhino program would in fact change or account for
24 differences in tank capacities?

25 A. I don't -- I do not believe that those subtle changes would

1 have resulted in those differences, differences in the hull.

2 Q. But again, the capacities that were presented and approved by
3 the Coast Guard in 1975, were not at issue or changed in 2006. So
4 they were not subject to an additional review then by anyone,
5 correct?

6 A. I'm not quite sure what you're asking. I mean, the trim and
7 stability book was reviewed.

8 Q. And you -- since there weren't changes to the tank capacities
9 in 2006, the analysis, or any analysis done in 2006 for stability
10 or other concerns, were based on the 1975 approvals.

11 A. Okay.

12 Q. As far as the CargoMax program, isn't it true that ABS
13 approved the CargoMax program for stability purposes only?

14 A. Based on the available documentation; that is correct.

15 Q. And the CargoMax program, based on your review of that
16 program, doesn't have the free surfaces, free surfaces that -- or
17 slack tanks?

18 A. That is correct.

19 Q. So even if the vessel didn't press the tanks up, based on a
20 simple or a conservative method in this trim and stability book,
21 the CargoMax program would determine the free surface effect on
22 GM?

23 A. Based on the variable tank data monitoring program, correct.

24 Q. Part of your hydrostatic analysis included an assessment of
25 water or flooding in the number 3 Hold, correct?

1 A. Yes. Yes.

2 Q. And what, if anything, did you conclude as to the role, if
3 any, of the fire pump in the number 3 Hold?

4 A. We made no conclusions about the contribution or potential
5 contribution of the fire main, the fire piping. It was simply
6 listed as a potential source of flood water.

7 Q. As far as flooding analysis, you address a recitation of
8 several of the ventilation arrangements on *El Faro*. You mentioned
9 the use of the dampers, and the fact that some of the dampers were
10 not watertight, correct?

11 A. I don't believe I differentiated it, in my presentation,
12 between the different types, but there are different types, by
13 design in the -- stated on the drawing.

14 Q. But you reviewed, and you were here for the testimony of
15 Mr. Gruber, when he described how the load line convention would
16 treat those dampers, correct?

17 A. Yes.

18 Q. And it's your opinion here today that the vessel on its
19 accident voyage met the load line requirements?

20 A. The Marine Safety Center did not assess the load line as part
21 of our review. In other words, we did not do a load line
22 verification as part of our review.

23 Q. Dr. Stettler, were you ever aboard the *El Yunque*?

24 A. Yes.

25 Q. And can you tell us just the scope of your review or your

1 exam of the *El Yunque*?

2 A. On the day I was aboard? On the day I was aboard?

3 Q. Yes, sir.

4 A. Okay. Yes. We did an external inspection from the pier,
5 looking at side shell, waterline, ventilation openings, draft
6 marks, et cetera. We went aboard and inspected the various cargo
7 decks, looked at the ventilation enclosures. There was one that
8 was partially opened, but otherwise, we inspected them from --
9 externally. And then we looked down, went down into the cargo
10 holds and looked at all the cargo holds, and the engine room.

11 Q. So you didn't inspect each of the ventilation arrangements
12 aboard *El Yunque*?

13 A. I did not. I was basing my assessment off of -- from reports
14 from the other members of the Board.

15 Q. And as far as the *El Yunque*, she was under a different
16 criteria for damage, correct?

17 A. What do you mean criteria?

18 Q. She did not have to meet damage stability, correct?

19 A. Yes. Our understanding, because she was originally built in
20 the late 1970s, and did not have to go -- she was originally
21 constructed in a lengthened configuration, she never would have
22 been required to meet the SOLAS probabilistic standards.

23 However, I -- there -- it's possible that there could have
24 been another applicable damage stability standard that we're not
25 aware of, was not in the documentation.

1 Q. You indicated in your report and your presentation that you
2 did not think the vessel *El Faro* could meet one compartment
3 criteria; is that correct?

4 A. No, that's actually not what I stated. I said that, with
5 flooding of one cargo hold, in 70 to 90-knot winds, 25 to 30-foot
6 seas, she'd likely not survive. That's -- I believe that's
7 different than meeting damage stability standards.

8 Q. And based on her year of build, who would -- who could
9 require the vessel to meet one compartment or two compartment or
10 three compartment damage criteria?

11 A. I don't know.

12 Q. You indicated that there were some limitations as far as
13 design for *El Faro*, regarding the availability of ballast; is that
14 correct?

15 A. I think what I stated was that the vessel was operated with
16 minimal GM margin, with limited available ballast capacity,
17 limited freeboard to the load line, and therefore it didn't have a
18 lot of flexibility to improve stability at sea.

19 Q. Do you think that flexibility or lack of flexibility would be
20 determined by the designer when he first designed the vessel to
21 meet the criteria that was in effect at the particular time frame?

22 A. I think that that's part of the design process, that
23 designers make decisions and tradeoffs as they design a vessel
24 based on the required needs of the owner.

25 Q. To the extent you visited the *El Yunque*, and inspected -- I

1 guess you inspected one vent; is that correct?

2 A. I did not, just externally. The inner portion of the vents
3 are separated with access manholes, and they were not open while
4 we there.

5 Q. And so, based on your inspection of *El Yunque*, did you make
6 any conclusions as to the ventilation arrangements or the
7 condition of repair?

8 A. Not based on my visit, no.

9 Q. And similarly, based on your visit to *El Yunque* and the plans
10 that you reviewed, did you make any conclusions as to the
11 condition of the *El Faro*'s ventilation arrangements on the
12 accident voyage?

13 A. Mr. White, could you repeat the question, please?

14 Q. Did you draw any conclusions as to the condition of the
15 ventilation arrangements aboard *El Faro*, based on the inspections
16 you had of *El Yunque*?

17 A. I don't believe I did. No.

18 Mr. White, if I could just clarify that. You know, I think
19 that there might have been an implication that, given maintenance
20 practices and conditions of one vessel being similar, that there
21 might be a similar condition on another vessel. But I can say, I
22 didn't draw a conclusion regarding the condition on the *El Faro*
23 based on that.

24 Q. Okay. But based on your review of the *El Yunque*, you
25 indicated that you didn't form an opinion as to its state of

1 maintenance, correct?

2 A. Not based on my visit to the *El Yunque*, correct.

3 Q. And are you indicating that, based on someone else's reports
4 or review, you draw any different conclusion as to the condition
5 of the *El Yunque*?

6 A. I did include in my report photographs taken by U.S. Coast
7 Guard personnel and NTSB personnel, and they were referenced in
8 the new report.

9 Q. So those photographs were not taken by you; they were taken
10 by Commander Venturella?

11 A. Some of them were taken by Commander Venturella. Some of
12 them were taken by Mr. Stolzenberg of the NTSB.

13 Q. And did you review the maintenance or survey protocol for the
14 *El Faro's* ventilation arrangements?

15 A. I did not. I did not.

16 Q. Did you review the maintenance performed on the *El Yunque's*
17 ventilation arrangements?

18 A. No.

19 Q. So to the extent that there was any photo of corrosion, you
20 don't know that the plate -- how long the plate was in existence
21 or when it was last surveyed?

22 A. No.

23 Q. So again, you sitting here today, though, have not formed any
24 opinion as to the state or condition of the ventilation
25 arrangements aboard *El Faro* during the accident voyage?

1 A. You say ventilation arrangement? Or the internal condition
2 of the ventilation system?

3 Q. The materials.

4 A. No. I have not drawn any conclusions about the *El Faro's*
5 internal ventilation.

6 MR. WHITE: Thanks, Dr. Stettler. Nothing further.

7 CAPT NEUBAUER: Does Herbert Engineering have any questions?

8 MR. SCHILLING: Yes, sir. Just a few.

9 BY MR. SCHILLING:

10 Q. Good afternoon, Dr. Stettler.

11 A. Good afternoon.

12 Q. It's been a long day, and I'll be brief because I know you've
13 got more questions from the Marine Board.

14 We've actually reviewed the preliminary report that you wrote
15 and submitted our comments, as was mentioned before. And you've
16 replied to those comments, and it's also been, or will be
17 submitted as an exhibit, so I won't ask any questions about that.

18 But I did have one question. As you explained, the GM has a
19 muting effect on the righting energy for the ship. In other
20 words, changes to the GM have a muted effect. Large changes in GM
21 may not have the same increase or decrease in that number righting
22 energy is available.

23 A. I'm sorry. I missed the beginning part. Could you restate
24 your question, please?

25 Q. Yes. It's just -- this is just kind of a lead-in to the

1 question, and it involves the relationship between the GM, the
2 intact GM, and the amount of righting energy. And you explained
3 with some of your graphs there that a change in GM, which is the
4 slope of the zero heel, may not have a direct effect on the amount
5 of righting energy. In other words, it doesn't raise the entire
6 -- change the point of maximum GZ, won't necessarily change the
7 point of energy stability to the same degree. It has a muted
8 effect on how the righting energy changes.

9 And it's not really a question, but I'll use it as a
10 background, and then reflect on the probabilistic requirements
11 that you ran for the 2009 probabilistic rule. And you came up
12 with the required GM of 5.8 feet, I think, would be sufficient to
13 meet the requirement.

14 Given that the ship sails with a GM of about 4.3 or 4.4 feet,
15 I was wondering if it actually sailed with 5.8 feet, would it have
16 been able to survive the flooding, the wind heel, that you noted?
17 The published standards and the requirements don't actually ensure
18 that you can survive all damage scenarios. And so, I was just
19 wondering if you looked at that.

20 A. You're right, and that's -- you know, my understanding of the
21 probabilistic, is it doesn't ensure. As a matter of fact, you
22 could look at the results in Appendix B, and there are conditions
23 that, where the factors, you know, are such that it would not
24 survive that particular combination of properties.

25 So I -- you know, as far as I know, you know, the

1 probabilistic criteria is really relative, you're preparing
2 relative safety, if you will, levels of safety for various ships,
3 as opposed to assessing whether or not a particular ship would
4 survive in a particular sea state and a given wind condition. And
5 I think that's the difference. It's not a -- there's no wind
6 condition and sea state connection to the damage stability
7 criteria.

8 Q. Thank you. I'll just, maybe just to put it just a little
9 more simply. Just considering the intact flooding analysis you
10 did, if instead of using the actual intact GM and sail, which uses
11 a 5.8 foot factor for GM, a 1½ foot increase in GM, would the ship
12 have also had difficulty surviving, and would it have suffered the
13 same fate because of the wind heel, the flooding in the hold,
14 which causes a virtual rise in the VCG of 2 to 3 feet?

15 A. Well, that would depend on the drafts. So, I mean, you could
16 have a lower KG and high drafts, or vice versa. So it really
17 would depend on the way the vessel aligned. But, you know, in
18 general, you know, if the drafts are less, more freeboard would
19 extend the righting arm curve, all else being equal.

20 I think that was shown in the -- there was benchmark
21 conditions we looked at, between 1993 trim and stability book and
22 the 2007. There was a subtle difference there, between the range
23 of stability in the different conditions. So that's my takeaway
24 from it, is that I don't think we can -- you can draw a conclusion
25 either way. But just in general, more freeboard, lower height and

1 center of gravity would, in general, be better.

2 MR. SCHILLING: Thank you.

3 CAPT NEUBAUER: Are there any further questions, Herbert
4 Engineering?

5 MR. SCHILLING: Nothing further, sir.

6 CAPT NEUBAUER: Thank you.

7 Dr. Stettler, I have a question that came to mind during your
8 presentation. On Slide 29, where you showed combined wind heel
9 and flooding for Hold 3. We know from the voyage data recorder on
10 the *El Faro* that there was a considerable amount of water on the
11 second deck. It included the flooding into the scuttle. Did you
12 model that, at all, or were you able to?

13 THE WITNESS: So I guess I would answer this by saying that,
14 in this condition -- so this would be one of the conditions on
15 that curve that you just mentioned, where the vessel has 20
16 percent of flood water in Cargo Hold 3, and is heeled, in this
17 case, apply a 15-degree heel angle would be close to the wind heel
18 that would be produced with an 80-knot beam wind.

19 So this is the resulting condition you get for that. So to
20 that extent, it was modeled so the -- it's not shown there,
21 graphically, and I -- probably was in error. I should have added
22 water on deck, because the way that the -- early on in my
23 presentation, I discussed the hull model went to the water tank
24 deck. So the second deck above that, the yellow volume, is
25 actually a free-flooding volume. So in effect, the water on deck

1 is included in the analysis here, even though it's not shown in
2 this particular diagram.

3 CAPT NEUBAUER: Thank you.

4 At this time, we'll go the NTSB for questions.

5 Mr. Stolzenberg?

6 BY MR. STOLZENBERG:

7 Q. Good afternoon, Dr. Stettler. Thank you for the
8 presentation. Earlier you replied to a gentleman -- I can't see
9 his name; I apologize -- you told him that the *El Faro* met all of
10 the statutory requirements, as I recall you stated. But the
11 presentation noted that the damage stability was not assessed in
12 the 2005-2006 conversion. Does it meet it, if that's the case?

13 A. I think what I said was, based on our analysis, with the
14 given documentation that was provided to us, we assessed that the
15 criteria were met. So we did a damage stability analysis based on
16 the 1990 -- the applicable criteria which would have applied at
17 the time of the sinking, and confirmed that it was not the
18 eliminating GM criteria.

19 Q. You ran the case and it passed in that case, but it wasn't of
20 the time? You're not opining on the regulatory requirement in
21 2006?

22 A. Could you restate the question, perhaps?

23 Q. So your analysis showed that it passed in 2006, but you're
24 not providing an opinion on whether it would have met the
25 statutory requirements in 2006, at that time, without it being

1 done? Let me rephrase.

2 What would have triggered the damage stability analysis in
3 the 2006 conversion for proposed service?

4 A. I think the issue was that the load, the vessel's load line
5 increased from 28 feet to 30 feet and 1 inch, which should trigger
6 it. Because the damage stability analysis that was done, was done
7 at the load line draft and at the partial load line draft, so the
8 one that was done in 1993. So an updated analysis would have been
9 required for current load line draft. And that analysis hadn't
10 been done at the time, but has since been done as part of our
11 assessment and Mr. Gruber's assessment back in May.

12 So that information is what's shown here, basically, is that
13 the GM criteria for the accident voyage was greater than the GM
14 criteria which would have been required, based on the damage
15 stability analysis. So, our conclusion that the vessel met the
16 applicable requirements is correct.

17 In other words, it met the GM for the intact 170.170 GM,
18 minimum GM requirements for the weather criteria, and it met the
19 damage stability requirement because the GM was actually greater
20 than the GM required, based on the damage stability assessment.
21 So even though a damage stability assessment wasn't done, it still
22 met the requirement.

23 Q. In your current position, do you have a recollection, do you
24 recall, why it wasn't done in 2006?

25 A. No. That, I guess, I would refer back to Mr. Gruber's

1 testimony and Mr. Schilling's testimony. It was discussed, and I
2 don't believe there was an explanation given. So no.

3 Q. Okay. And another question regarding an earlier topic, on
4 the limited ballast capacity and available freeboard leaving
5 little flexibility. Is this typical for a large cargo vessel, in
6 your experience?

7 A. I think most of the cargo vessels that I've seen have had
8 some ballast capacity available in double-bottom tanks or other.
9 You know, in this case, they used some of that ballast capacity
10 for fixed ballast, so that that volume wasn't available for
11 ballast water, if you had it. So, you know, really the assessment
12 is about how much available volume existed on the *El Faro*.

13 Q. Are you aware of any statutory requirements or guidance on
14 designers including a method or a margin for a master to improve
15 his GM stability underway at sea?

16 A. I am not aware of any, no.

17 Q. Just trying to get to the questions that weren't already
18 asked -- you also mentioned that the *El Faro* -- I believe you said
19 for a 28 to 23-foot draft range, that the damage stability is less
20 restrictive than the USC weather criteria, and thus the weather
21 criteria is controlling, the full range of operating conditions is
22 the controlling minimum GM. Is this typical for ships the size of
23 *El Faro*, in your experience, to be restricted by weather criteria
24 instead of damage stability criteria?

25 A. I don't have much experience in that. There's no -- folks

1 that I've talked to said this is somewhat atypical for a vessel of
2 this size. But I can't state that, based on my own experience.

3 Q. Does that indicate in any way, then, that the criteria are
4 poorly suited for a vessel like the *El Faro*, with the enclosed
5 second deck and ventilation on the side?

6 A. I don't think I can make that assessment.

7 Q. Regarding the discussion on some of the penetrations, the
8 supply and exhaust vents on the *El Yunque*, and potentially *El*
9 *Faro*, what effects might those have had in the accident sequence
10 verse if they were found to be in the condition, in particular, to
11 *El Yunque*, as on the -- I believe you said some of them were 8
12 feet lower?

13 On the presentation I have, it's page 29, Exhibit 353.

14 A. This is the graphic I was looking for. The one thing in
15 there is, there was some information provided, or at least
16 suggested by photographs of the *El Yunque*'s ventilation trunks,
17 that there were some drainage holes cut in some of these trunks.
18 Specifically, this same ventilation trunk on the *El Yunque*, there
19 were some drain holes cut to allow drainage of this outer part of
20 the trunk, out to the -- presumably out to the second deck.

21 And so, you know, I'm not making a particular statement about
22 it here, but that that provides a potential source of some
23 additional flood water, because water getting into that outer
24 trunk -- and I believe there will be some discussion about this
25 tomorrow, is the aft ventilation trunk for Cargo Hold 3 has a 3 or

1 39-inch -- I'll call it a cofferdam, but a baffle plate, that
2 protects the fire damper, that if those enclosures were
3 compromised by drain holes, could allow water in over that damper.

4 So that's basically this point right here. So you could kind
5 of see that the waterline extending onto that second deck, if
6 those drain holes existed on the *El Faro*, could allow water to
7 spill over that, that 39-inch cofferdam into the fire damper down
8 in the cargo hold.

9 Q. So is it safe to say, the rate of flooding through those
10 holds would be dependent on the wave height striking them, the
11 pressure there behind the wave, and the size of the opening
12 itself, whether they were small or large?

13 A. Correct.

14 Q. Regarding the same dampers, would the *El Faro* supply exhaust
15 ventilation dampers have to be shut at sea to meet required CFR
16 stability criteria?

17 A. As far as I know, there's nothing in the criteria that
18 requires openings to be closed. It only requires for them not to
19 be considered downflooding points, that they be able to be closed,
20 which is the language in the CFR.

21 Q. And that's for stability, not the load line? It's the --

22 A. Correct. Load line, as I mentioned, we did not assess load
23 line at the Marine Safety Center. And I should say, that's intact
24 stability.

25 Q. Okay. If the definition of downflooding point, I believe, in

1 the preliminary version of report, is the first point that has not
2 been made weathertight, how can these be left open at sea and the
3 vessel meet the assumptions the designer used to ensure the safety
4 through the stability criteria?

5 A. Well, I guess I would answer that in two ways. One is, the
6 stability criteria that applied to the *El Faro* was the weather
7 criteria, GM criteria, which doesn't have a downflooding part to
8 it, because it's just the slope and the righting arm curve. So
9 it's only the righting arm criteria that have downflooding point
10 requirements from an intact stability perspective.

11 Q. Okay.

12 A. So, the other part is, how can they be left open, is that
13 they're not -- they weren't applied as -- or defined as
14 downflooding points because -- in terms of intact stability,
15 because they weren't part of the criteria.

16 Q. So although for load line -- I realize you didn't do an
17 assessment, but I've think we've heard earlier, for load line,
18 weathertight are considered part of the on load. And then for
19 stability, they're not necessarily checking the weight. It's just
20 something I looked in -- I'm going to look in further, I guess,
21 because it seems funny to me, unless there is something I'm
22 missing.

23 A. I would suggest this would be a good question for Mr. Sirkar
24 tomorrow morning, since he's the regulatory expert on the
25 stability and load line.

1 Q. Thank you. Additionally, you mentioned the probabilistic
2 assessment with Herbert Engineering earlier. Excuse my ignorance,
3 but were any -- for probabilistic stability, were any of the
4 conditions that were found for the 2009 assessment, were any of
5 those just were able to play on its own, or does it pick out
6 particular cases? Didn't we get the same case show up here?

7 A. I guess I would say it's really complicated, and it would be
8 hard -- I mean, I suppose you could go in and look at it, but it's
9 different in the way it does it. So I can't answer that, based on
10 that.

11 Q. So there's no apples to apples, it's fair to say, if we were
12 to flip through the appendix of the -- and find where a 3-hold
13 would fail on its own?

14 A. Yeah. In the appendix, we only included the applicable to
15 the 1990 assessment.

16 MR. STOLZENBERG: Okay. Thank you.

17 That's all I have. I'll pass him.

18 CAPT NEUBAUER: Mr. Kucharski?

19 MR. KUCHARSKI: Yes, Captain. Thank you.

20 BY MR. KUCHARSKI:

21 Q. Dr. Stettler, you know I'm not a naval architect and I'm not
22 an engineer. I'm going to try to put some of these things in
23 maybe a -- assuming I can understand, maybe as a ship operator, an
24 ex-master. I'm trying to wrap my arms around some of these
25 things.

1 Mr. White brought up, asked about load line review. You said
2 you didn't look at any of the load line issues; is that correct?

3 A. Yeah. The Marine Safety Center does not do load line
4 assessments, so we do not address that.

5 Q. Were you aware, at all, the load line certificate referenced
6 in the trim and stability booklet?

7 A. Sure.

8 Q. And would we need to look at that, or do you realize that it
9 says right on the front page, the first page of the load line
10 certificate, that the trim and stability booklet must follow the
11 guidelines in there?

12 A. Yes. I'm aware of that.

13 Q. Is there -- then you reviewed the trim and stability book; is
14 that correct?

15 A. Correct.

16 Q. And you also reviewed CargoMax as to just trim and stability,
17 what was approved in the trim and stability booklet?

18 A. Correct.

19 Q. Is there any mention of wind effect in either the trim and
20 stability booklet or CargoMax?

21 A. Not directly. Wind comes in through the assessment of the
22 intact stability criteria, in this case, the weather criteria.

23 Q. Okay. Let's -- to another level. In your 105-page report
24 that I think all the parties have, you looked at wind effect on
25 the vessels; is that correct?

1 A. For the intact stability criteria, we simply assessed it
2 against the criteria. So the severe wind here, involving criteria
3 has a wind component to it. We assessed that, you know, if the *El*
4 *Faro* had been built in 2016. So that was part of that assessment.
5 Otherwise, our assessment of wind was associated with the sinking
6 analysis.

7 Q. And this weather criteria that you have, and nice draft, sail
8 and then I believe it's on one page of the trim and stability
9 book, which says it meets the Coast Guard weather criteria. Is --
10 the weather criteria, so I'm understanding this, is both wind and
11 wave trim?

12 A. Say that again, please.

13 Q. Weather criteria, which I believe you said earlier, the --
14 get -- you know, I'm trying to put pieces all together. The
15 impact stability limiting factor was the weather criteria on the
16 -- is that correct, on the *El Faro*?

17 A. Correct. Yeah, Mr. Kucharski, just to restate, the weather
18 criteria is just a name given to that 46 CFR Section 170.170
19 minimum required GM criteria.

20 Q. So what was actually the limiting factor on the *El Faro*? Was
21 it weather related, or what?

22 A. It doesn't -- the criteria isn't quite laid out that way.
23 There is a -- the criteria is set up to calculate a minimum
24 required GM, such that with a specified wind pressure, which is a
25 function of the length of the vessel, and that wind pressure is

1 applied to the wind area, which is calculated based on a cross-
2 section, that the vessel's static heel angle associated with that
3 does not exceed certain guidance.

4 Q. And this pressure, is that associated with a wind, certain
5 wind speeds?

6 A. It's based on a, I guess you would say, a notional, you know,
7 like a historical data. So I mean, it really -- I saw something
8 from the 1920s on it, so it goes back quite a ways. But it's a
9 pressure. You can equate it to a velocity, but it's not
10 explicitly laid out that way.

11 So you're not assessing the vessel against a given wind;
12 you're assessing it -- you're defining a wind pressure to
13 calculate your required GM.

14 Q. In this -- in the formula, is there a small P in this
15 formula?

16 A. Yes. There's a pressure, there's an area, and there's a
17 heeling arm, an arm associated with the wind.

18 Q. And is that like a density? Is that -- is the small P for
19 density?

20 A. You're talking about air density? No. That would be if you
21 were to calculate the pressure from the velocity. There would be
22 a density in there, yes.

23 Q. Does that fluctuate a lot at sea? The small P.

24 A. I don't believe much, but I'm not an expert on that, so I
25 can't say.

1 Q. So if I'm understanding you correctly, it met the weather
2 criteria that U.S. Coast Guard had, the *El Faro* did? This graphs
3 -- do we need to look at those again?

4 A. Well, what I would say is that it was operated with
5 sufficient GM margin, or its GM was in excess of the minimum
6 required. So it met the intact stability criteria of that
7 section.

8 Q. But there's nothing in the trim and stability booklet
9 anywhere, or the CargoMax, that tells you what this number is,
10 whether it's wave or wind, that a master can look at and say how
11 to, you know, how to figure all this complicated stuff out?

12 A. There's nothing in the *El Faro* trim and stability book to do
13 that. No.

14 CAPT NEUBAUER: Dr. Stettler, I had note that if you can
15 speak a little slower, for the record.

16 BY MR. KUCHARSKI:

17 Q. Thank you so far, Doctor. Just a couple of definitions, so
18 I'll understand it in your report and in your brief today. You
19 talked about capsizing and then partial capsizing. Could you
20 maybe explain what capsizing is for us laymen or for -- who are
21 not a naval architect, and then what a partial capsizes is?

22 A. Yeah. I guess, you know, to the layman, or the typical
23 definition of capsizing would be to turn on its side or turn
24 upside down. So the question really, using the term capsizing,
25 some people may be under the impression that it necessarily means

1 that the vessel completely inverts.

2 So when I use the term, partial capsizing, I mean it's losing
3 its upright stability so there's no longer a positive righting
4 arms and -- but it doesn't necessarily invert. So I do not
5 believe the *El Faro* ever necessarily inverted. I think, as it
6 lost its upright stability, ended on its side and continued to
7 flood, probably lost some containers along the way, and then
8 again, because of the fixed ballast, I think, it remained somewhat
9 upright as it did finally sink. That's my interpretation of what
10 I -- from our study, and from reading of the voyage data recorder
11 transcript.

12 Q. Thank you. That's very helpful. And then when you talk
13 about, you know, that GM is really only helpful to determine the
14 overall stability of the vessel at small angles of heel; is that
15 correct?

16 A. Well, I -- hopefully I didn't say it exactly that way. I
17 don't know. I think Mr. Schilling's question is, it's an
18 indicator of the initial stability, and perhaps it guides the
19 shape, the initial shape of the righting arm curve. It just
20 doesn't define what the overall shape of the righting arm curve
21 is.

22 So, you know, the curve go concave down or it could go up,
23 and be -- and so you can't tell from the GM itself what the shape
24 of the curve is, other than the initial tendency.

25 Q. So then it's actually the GZ, if you will, that's the more --

1 or is a better measure of the stability of the vessel at larger
2 angles of heel; is that correct?

3 A. Yeah. I mean, you could say at all angles, but certainly GM
4 is an indicator of its initial upright stability. Yes.

5 Q. Okay. So now the million dollar question. What's a small
6 angle of heel? When we're talking about small angles of heel,
7 what are we talking about?

8 A. It depends on the vessel. And so -- and that's somewhat
9 complicated, although the general rule of thumb has been 7 to 10
10 degrees. Some vessels, it's probably less than that. And really,
11 if you think about the righting arm curve, you know, if that
12 tangent, if you will, Mr. Schilling mentioned that, you know, the
13 real definition is the slope at zero. So it's that initial slope,
14 but, you know, if the curve -- if it's not on the curve for very
15 long, then I would say it's not applicable. It has to do with
16 where the metacenter is during that, during those initial angles.

17 But the general rule of thumb is somewhere in the 5 to 10-
18 degree range, for kind of conventional wisdom.

19 Q. Okay. And can we -- the general rule, can we zero it down to
20 just the *El Faro*?

21 A. It would just be approximate. So looking at the righting arm
22 curves, you know, probably 5 to 10 degrees, in that range. But
23 again, it's not that it doesn't apply, it's just not quite as good
24 as you extend it out beyond the initial angles.

25 Q. So it'd be safe to say that it's under 10 degrees, that it's

1 -- a small angle is under 10 degrees?

2 A. Something like that.

3 Q. In your study, did you have an angle that the water would
4 actually gone on the second deck, an angle of heel or roll,
5 whatever, that the water was actually on the second deck?

6 A. It depends on the loading condition. So in the intact
7 condition, with no flood water, I believe it's around 15 degrees
8 where water reaches the deck edge. So in the departure condition,
9 around 15 degrees to the deck edge.

10 Q. Okay. So all the questions now will be pretty much on the,
11 on the *El Faro's* sail, okay. So it would be about 15 degrees in
12 the vessel loaded condition when it left Jacksonville?

13 A. Approximately, yes. It also depends on trim and where, you
14 know, where you're talking about the deck edge immersion.

15 Q. And just off the top of my head, I mean, the vessel had 4, 5-
16 foot trim, whatever it was. I mean, do -- so is it that much of a
17 difference, you know, the angle -- so it would be about 15
18 degrees?

19 A. Yeah. Around 15 degrees.

20 Q. You mentioned that -- I think it was Captain Neubauer,
21 someone asked about the load, or water on the second deck. You
22 did look at that in your analysis?

23 A. Right. That's actually included, because that second deck is
24 essentially a free-flooding deck.

25 Q. And is that -- that water is sustained, I imagine, for just a

1 moment in time, the weight of that water, though. I mean, there's
2 big openings inside of the ship, where they drive the ramps on and
3 everything else. So the water comes on -- how did you get your
4 arms around that and say, there's a wave of water on there? The
5 water comes on and the ship rolls, but doesn't the water go out
6 these big openings, too?

7 A. Yes. And actually, this is one of the reasons we call this a
8 hydrostatic analysis, because it's only assessing the static
9 condition, if you will, or a fixed state. So we're assuming in
10 our analysis that any liquid levels are constant for a given angle
11 of heel. So that would require a dynamic analysis if one wanted
12 to assess the impact of the wave impact flood water, in terms of
13 inertia and the roll motions and then, you know, the flow of water
14 in and out of those somewhat limiting side shell openings.

15 Q. Okay. So it was static. It was as though the water was just
16 sitting there?

17 A. Correct.

18 Q. And in your analysis of water entering into the vent openings
19 on the side of the cargo, the cargo hold vent openings, is the
20 angle there where it started to enter the hold, actually including
21 the louvres, the baffles inside there, or is it just where it
22 enters into the vent itself? That's what I'm trying to get to is,
23 where does it actually get down into the hold, not just enter the
24 vent? You see?

25 A. So I would guess I would extend on the last answer, where

1 this is a hydrostatic assessment. And I mentioned in my statement
2 that, you know, this is a snapshot, a hydrostatic snapshot of the
3 vessel with 20 percent of flood water in the cargo hold and wind
4 heel of 15 degrees. That does not account for roll motion of the
5 vessel, heave motion of the vessel, and variable wave height, as
6 waves, you know, 25, 30-foot waves pass the vessel. It's very
7 complicated, because you've even got, you know, the fact that
8 those openings are in the lee of the vessel, you know, because the
9 waves would be coming from left to right in that graphic.

10 So it's somewhat complicated, but I guess what I would say
11 is, if there's water in that outer trunk, the -- so where those
12 louvres are, once water's in there, you know, any additional water
13 on the outside, it would basically be, it would be a hydraulic
14 effect.

15 So, you know, if a wave passed, the water would go up. And
16 as the wave went away or the vessel rolled, the water would go up
17 into that trunk, and eventually, you know, if it hit the top of
18 the -- which is a little different, I think, than, you know,
19 boarding seas, you know, if you're driving into the waves, that
20 would be a different effect than the case of the vessel rolling,
21 you know, hydrostatically or rolling with a slower period. You
22 would have a different effect associated with that.

23 Q. I guess I'm not sure if I got my -- the answer I was trying
24 to get to. When you calculated where the water was actually goes
25 down in two holds, what angle were you -- actually goes down in

1 the holds. Does that include the baffles, as fitted?

2 A. Yes. So what we did is, we defined a number of, we called
3 them critical points, which is how they're used in the software.
4 And so those are those numbers you see. So we defined a series of
5 critical points, and we just kind of kept track where we -- and
6 there's a couple of tables in our report, where those critical
7 points fall, in different -- in a couple of different conditions.

8 So all we can really say from a hydrostatic analysis is where
9 the water level would be compared to that critical point. So in
10 this example, I'm saying that that critical point, which is the
11 top of the baffle plate, where the aft would be 8½ feet above the
12 still waterline.

13 Q. That -- thank you. That's just what I was trying to figure
14 out.

15 So I think you mentioned in somewhere in the tables here, or
16 the graphs, that for the 75 to 80-knot wind, the vessel would have
17 an angle of heel somewhere between 7 and 9 degrees; is that fairly
18 accurate?

19 A. I think, in that case I was talking about wind heel only,
20 without flood water, and so I was using the departure condition,
21 so the righting arm curve for the -- well, actually, this is the
22 -- not the departure condition, but this is the estimated -- this
23 would include fuel burn-off. So this would be the condition at
24 the time of loss of propulsion without flood water.

25 So just due to the wind, you would have an, approximately a

1 wind keep angle of somewhere in the 8 degrees range, based on the
2 residual righting arm curve. I think that's what I said.

3 Q. Correct. And do you remember what angle it takes, angle of
4 heel, to actually take water in the scuttle?

5 A. Yeah, could you clarify which scuttle, please?

6 Q. The scuttle is -- well, if you look at your report, you have
7 a picture of what scuttle it is. You want to look at your report?
8 You have it labeled the scuttle, so --

9 A. I know which scuttle. I just want you to say it, please.

10 Q. The one that was popped open, the one that was open, that we
11 heard in the VDR and the DPA's notes and everything else. Do you
12 want to look at it?

13 A. You're talking about the Hold 3 starboard access scuttle?

14 Q. Yes, sir.

15 A. Yeah, could you -- yeah, so you're referring to the starboard
16 Hold 3 access scuttle, which is in one of the figures?

17 Q. Correct.

18 A. I don't remember the angle, off the top of my head, but it's
19 -- in the unflooded condition, it would be somewhere in the 16 to
20 17-degree range, of heel.

21 Q. So help me out here. We have a 75 to 85-knot wind, 7 to 9-
22 degree heel, and it's going to take 16 to 17 degrees to get it
23 into the scuttle. Where's that coming from? And we know that
24 water doesn't -- you calculated the water sitting on the deck, but
25 we know that really doesn't happen. It comes on and it goes off,

1 so --

2 A. These microphones are challenging. No, that -- the initial
3 flooding, I think, would come from roll motion. The vessel is
4 rolling in the seaway. You know, there was some -- early on,
5 there was some question on the VDR audio about, you know, that
6 there was -- certainly it seemed like the crew was under the
7 belief that that was wind heel, for a number of hours, they were
8 experiencing wind heel.

9 So their, the list that they were looking at, they were
10 considering to be due to the wind. So, but on top of that, the
11 vessel would be rolling. So if the scuttle had been left open,
12 you would expect, during that roll motion, you get above 16 or 17
13 degrees, you could be shipping some water on that deck, and that
14 water could go down in that, through that cargo -- that scuttle.

15 And eventually -- and then eventually, when there's free
16 surface in that, then with the combined wind heel with that free
17 surface, you would end up with, potentially, with a static heel
18 angle of 15 or plus degrees.

19 Q. So you were able to calculate, you had some roll of the
20 vessel and the size of the wave, the period of the wave and
21 everything else, to go ahead and figure that water would go down
22 through that scuttle?

23 A. No. So our analysis is a hydrostatic analysis. So, you
24 know, that narrative is based on my education and my knowledge
25 about how ships move in a seaway. In order to do that kind of

1 determination, you would have to do a dynamic analysis.

2 So I guess that would be my plug for, you know, a dynamic
3 assessment, although that's a very difficult thing to do, to see
4 how that -- you know, with what periodicity or, you know, how many
5 times water would ship over those, through those doors and end up
6 down in, over that scuttle level. I mean, that would be the only
7 way you could do it, analytically, anyway.

8 Q. And do you recollect any talk about roll in the actual VDR
9 transcript?

10 A. No. That was interesting. I mean, there was certainly an
11 indication that the vessel was rolling. You know, it probably
12 didn't come out in the audio transcript, but there were a lot of
13 moves, and boy that was a good one, kind of comments, that
14 certainly the vessel was rolling, but there was no indication in
15 the transcript, that I saw, that would have suggested a particular
16 roll angle during any of that time.

17 Q. Thank you, Doctor. In your report, you talk about trailers,
18 trailer containers. Are we talking about Ro-Ro cargo when you
19 have this?

20 A. Could you repeat that, please?

21 Q. The term trailer containers, what's that mean to you?

22 A. Trailered containers, so those would be the containers that
23 are loaded on trailers. So that's the, you know, the old fashion
24 -- originally the *El Faro* was a trailer ship. You know, so the
25 trailers, containers would go on the trailers on board, and they

1 still do that.

2 Q. Great. And did you look at a shift of cargo in your report?

3 A. I did. And I have a backup slide I could show you quickly.

4 You know, basically, a cargo shift would be -- just equates to a
5 weight shift. It's a little different than a free surface shift,
6 but let me -- if you would just give me a moment here to find the
7 one I was looking for. There it is.

8 So basically, if you wanted to assess the impact of a couple
9 of trailers and things, say, by 10 feet, you would apply that as a
10 weight shift. So you would take that weight, and you would shift
11 it 10 feet.

12 So what I did here is I basically looked at moments. So I
13 looked at a few moments, just to kind of visualize the impacts of
14 a series of weight shifts. So something like a number of
15 containers maybe breaking free and shifting to one side. So they
16 would have a, you know, somewhat -- I wouldn't call it marginal,
17 but a relatively small effect on the righting arm curve, at least
18 in small numbers.

19 Q. So the ship -- I just want to be clear, was it Ro-Ro cargo
20 that you looked at, or did you look at a combination of both, a
21 possible crushing of containers and shipping items. I'm sure
22 you've seen pictures, container ships with the crush-holding
23 forms. Did you look at any of that?

24 A. It's the same effect. So I believe in my report I just
25 discussed a general weight shift, you know. In this case, just to

1 visualize it, I discuss it in terms of shifting trailers, but the
2 same thing would apply to, you know, leaning of stacks of
3 containers. And the effect of that would be a transverse shift in
4 the center of gravity of that weight. So the effect on the
5 righting arm should be essentially the same, depending on what
6 that moment shift was.

7 Q. But you would agree that if containers was up a lot higher,
8 that same weight would have a lot more effect than something down
9 low. Would that be a fair generalization?

10 A. Not in terms of a transverse weight shift. So as long as the
11 height was the same -- as long as the height remained the same,
12 that were, you know, and they shifted transversely, the effect
13 would be the same as if you shifted weight low transversely, in
14 terms of the righting arm curve.

15 Now if you shifted that weight high and shifted it over, now
16 that would be a different effect. So if the trailers -- or excuse
17 me -- if the containers fell overboard, that would be a different
18 consideration. So that would be a combined weight removal
19 problem, as opposed to a weight shift problem.

20 Q. Okay. So what you're saying is that it really doesn't matter
21 that that shift occurred in a container at the third tier, or way
22 outboard, as it would to something a lot lower; is that what you
23 said? Is that correct?

24 A. In terms of the -- if the transverse moment produced by that
25 weight shift were the same, the effect on the righting arm curve

1 would be the same.

2 Q. Did you -- there was a comparison of your model, or the MSC
3 model, with the CargoMax values for GM margin, was it? Is that
4 correct?

5 A. That's correct. We assessed -- for those eight benchmark
6 conditions, we did those calculations using our model and with
7 their table, where we compared the results.

8 Q. And was the margin less with the MSC model or was it greater?

9 A. In general, it was a little less. For most of the
10 conditions, it was about 0.2 feet less.

11 Q. About 0.2 feet, and that's -- the vessel left with the bow
12 half a foot, or 4/10, or somewhere between 4/10 and half a foot?

13 A. I believe for the accident voyage it was 0.64.

14 MR. KUCHARSKI: Okay. Thank you, Doctor.

15 Captain.

16 CAPT NEUBAUER: We're starting to run a little late. Are
17 there any -- do we need to do final questions for Dr. Stettler?

18 Commander Venturella. How many -- how long do you think you
19 have?

20 CDR VENTURELLA: Just a few minutes, Captain.

21 CAPT NEUBAUER: Okay. Please proceed.

22 BY CDR VENTURELLA:

23 Q. Good evening, Dr. Stettler. Some of my follow-ups are
24 already covered, so I think I can be pretty quick. I'd like to
25 start with page 5 of the Exhibit 353, your presentation. On page

1 5, you provided an uncertainty analysis which indicated that the
2 GM had an uncertainty of plus or minus 0.7 feet; do you recall
3 that?

4 A. Yeah. That's the -- so that's the accumulated uncertainty
5 for the departure condition based on the inclining and then the
6 added uncertainty associated with the volumes and weights and the
7 loading condition.

8 Q. What was the approximate GM margin during the department
9 voyage that the *El Faro* crew would have been aware of?

10 A. It was on that order, so roughly the same, 0.6, 0.64.

11 Q. Based on that GM that the *El Faro* crew was aware of, and the
12 uncertainty you calculated, is it possible that *El Faro* left
13 Jacksonville with a GM that needed its required GM?

14 A. The way the uncertainty principle works is, the statement
15 would be that the true value of GM -- there is a 95 percent
16 confidence that the true value of GM is within 0.7 feet of the
17 calculated value. So the GM, the true value of GM is 4.3 plus or
18 minus 0.7, with a 95 percent confidence, based on the uncertainty
19 analysis.

20 Q. Dr. Stettler, so a clarification on that. During previous
21 questioning from the parties in interest, you mentioned you had
22 revised that uncertainty. Did I understand that that 0.7 would go
23 down to 0.2 feet; is that correct?

24 A. No. I believe Mr. White clarified. So the -- there's
25 different levels here. So the experiment itself, the inclining

1 experiment itself, actually had a relatively small uncertainty of
2 about 0.2 feet. So that's based on the inclining experiment
3 itself. And then there is, as you then use that GM value, you
4 calculate a KG, and then you change that to the lightship
5 condition. So each time you do that, you're basically adding and
6 removing weights. There's uncertainty associated with that weight
7 that you add or remove. So that -- basically that uncertainty
8 starts to grow.

9 And so the 0.7 is the accumulation, if you will, of the
10 uncertainty from the inclining, which is maybe on the order of
11 0.2, adding up the other uncertainty associated with the
12 hydrostatic volume calculation and of the actual how well you know
13 where the weights are on the vessel.

14 Q. So based on what we heard today, do you expect that that 0.7
15 will reduce or it will remain about the same?

16 A. I think that will remain. This is the revised, so, you know,
17 yes, so that should be about where we're going to end up.

18 Q. Okay. Thank you for that clarification. Just a couple more
19 on that topic, Dr. Stettler. As far as earlier testimony on that,
20 you mentioned that the Marine Safety Center and ABS don't
21 traditionally calculate this uncertainty. It's not a requirement.

22 Do you think that making it a requirement as something that
23 could be put into the trim and stability booklet instruction would
24 be useful to establish a confidence level?

25 A. I don't think so. I mean, one, it's a really complicated

1 process and it's not well defined. You know, so just in general,
2 it's a difficult thing to do for, really, for any experiment.

3 But I think, you know, the lesson here really is just that
4 there is some uncertainty in terms of how well we know those
5 values. And so I think that's probably the bigger takeaway,
6 rather than, you know, having to calculate it for every condition.

7 Q. One more on that topic, Dr. Stettler. When you did your own
8 analysis of the departure voyage GM, did you find with the MSC
9 computer model that it was less than that calculated by CargoMax?

10 A. The uncertainty analysis is actually somewhat independent of
11 which model. It's really based on the inclining experiment.
12 There is calculation of actual volume, for example, for the full
13 load displacement, for example, water-plane area and some of those
14 hydrostatic properties that require calculation.

15 So they come in there, and in general we use what was
16 included in the inclining experiment report for those values. And
17 in a couple of cases where that information wasn't available, we
18 used what was in the Marine Safety Center model. But, you know,
19 and actually found mostly, those values, hydrostatic properties
20 were very, very close between what was in the inclining experiment
21 report and even what was in CargoMax versus what's the Marine
22 Safety Center model.

23 Q. And I'd like to refer to page 13 of the exhibit. This is an
24 intact stability GM criteria figure. Dr. Stettler, based on this
25 figure, the T&S booklet, trim and stability booklet, is more

1 conservative in calculation of required GM than CargoMax. Does
2 the Coast Guard review CargoMax software?

3 A. No.

4 Q. Which of these options is the one required by regulation for
5 the *El Faro*?

6 A. And we actually discussed this in previous hearing testimony.
7 What's required by regulation is the calculation of the minimum
8 required GM. So I think the argument for using the direct wind
9 heel calculation, what's -- which is what's in CargoMax, is that
10 meets the requirement in the CFR for calculating the minimum
11 required GM.

12 The question of whether or not, you know, you're using a
13 calculation which is -- provides slightly different results than
14 the trim and stability book, maybe, is another matter.

15 I think that -- my impression, and I think maybe we could
16 defer this to Mr. Sirkar tomorrow, but -- you know, it's not
17 really clear on where that line is. But it seems reasonable that
18 if you can make a more precise calculation, then that should be
19 acceptable.

20 Q. Did the crew of *El Faro*, to the best of your knowledge, use
21 the trim and stability booklet or did they rely on CargoMax?

22 A. I can only answer that question based on the previous hearing
23 testimony. And it's -- it was fairly clear that they did not use
24 the trim and stability book very often. They typically depended
25 on the CargoMax calculation.

1 Q. And one last question. If the *El Faro* crew had used their
2 trim and stability booklet instead of CargoMax to calculate the
3 required GM, would they have been beneath their informally
4 implemented half-foot GM margin on departure?

5 A. Could you repeat that question, please?

6 Q. Sure. I'll try to elaborate a little. This figure neatly
7 shows that the trim and stability booklet requires a greater GM;
8 do you see that?

9 A. It requires it in that the GM curve, which is being selected,
10 is based on an integer number of tier heights. So I think, you
11 know, you could argue that the curve, the GM, required GM curve
12 for three tiers is conservative because there were a number of
13 tiers that were only two high, on that.

14 So, you know, I guess what I'm saying is, you could kind of
15 argue that both ways, is that the, you know, the curves in the
16 trim and stability book could be considered conservative in that
17 way.

18 Q. Well, just solely relying on numbers, though, here, 3.9 for
19 -- approximately, at least, for the trim and stability booklet,
20 and for CargoMax, about 3.65. Is that about in the right
21 approximation?

22 A. That's correct.

23 Q. And what was the GM margin calculated by CargoMax again?

24 A. It was 0.64 for the departure condition.

25 Q. So, if you take the 0.64 and you subtract the difference

1 between those two numbers, the 3.9 and the 3.65 we just discussed,
2 do you see that that could potentially put them beneath that half-
3 foot margin?

4 A. You know, I can only say that yes, if you apply the
5 calculation as shown here, you would have a required GM of 3.9
6 feet and they would have a different GM margin.

7 CDR VENTURELLA: Okay, thank you. No further questions.

8 CAPT NEUBAUER: We need to stop the hearing at this point due
9 to the late hour. But before we do, I want to ask any of the
10 parties in interest or anybody on the Board, do we need to bring
11 Dr. Stettler back tomorrow for follow-up questions?

12 MR. REID: I have one question, sir.

13 CAPT NEUBAUER: Okay, if you have one question, you can ask
14 that one.

15 BY MR. REID:

16 Q. So, Dr. Stettler, the -- when CargoMax calculates a center of
17 gravity of a vessel, it assumes that the weight of containers are
18 one-half of the height of the container; is that right?

19 A. No. It assumes that the weight of the container is located
20 wherever the user inputs the center of gravity for that container.

21 Q. But you understand the default values in CargoMax, the
22 version that was being used on the *El Faro*, was essentially one-
23 half of the container height?

24 A. Yeah. I don't know if those are default values, versus
25 values that existed in the initial file application. So I guess

1 you could call those default values.

2 Q. And is it fair to say that a container, let's say, filled
3 with bowling balls, three high bowling balls, but only let's say,
4 half the height of the container -- the center of gravity then
5 would be lower than half the height of the container; is that
6 right?

7 A. I would say, if I know bowling balls, that would be true,
8 yes.

9 Q. And so the assumption is that the weight is distributed
10 throughout the container, when in fact, most containers, the
11 weight is somewhat lower than one-half the container height?

12 A. Yeah. I should not comment on what's loaded in the
13 container. So I can't comment on that.

14 Q. Can you go back to your slide on the error rate, please? I
15 know I said question, but -- I apologize.

16 Slide 5, I believe it is. So is it fair to say, though, that
17 each individual container, if you're using a default value of one-
18 half the container height, that the center of gravity for each
19 individual container is likely something less than one-half?

20 A. Certainly, if you have three high bowling balls. But other
21 than that, I don't know that I could say that.

22 Q. So the question is, if you take that into account when you
23 calculated the error rate -- because some of the error rate is
24 known error, that is, the GM is higher than is assumed. So the
25 actual GM of the vessel may be on the higher side?

1 A. And that is correct. And the answer is, this is not an
2 uncertainty in terms of where you place that weight. It's an
3 uncertainty of when you place that weight, is that center of
4 gravity higher or lower than that. So the bottom line is, that
5 no, it's not included in there. So it's assuming that whatever is
6 in there, there's an uncertainty. And I think I used a 2-foot
7 band in this, for the height.

8 MR. REID: Thank you.

9 CAPT NEUBAUER: Are there any other follow-up questions? If
10 so, we'll probably bring back Dr. Stettler tomorrow morning.

11 ABS?

12 MR. WHITE: I really have one more question.

13 CAPT NEUBAUER: Just one question, sir.

14 BY MR. WHITE:

15 Q. Dr. Stettler, can you tell us how your uncertainty analysis
16 in this case compares to the rest of the U.S. fleet?

17 A. I have found very little documentation of uncertainty
18 analyses performed based on stability tests. So I don't have a
19 good way to measure how it compares to the fleet.

20 Q. So this particular data may not be any different or any
21 greater than any other ship in any fleet?

22 A. That's correct. I mean, I might add that, you know, that
23 last -- between the lightship and Mr. -- I just blanked out --
24 Mr. Reid just asked about, you know, the container locations, that
25 that would come in, in the difference between the lightship

1 condition and the accident voyage KG. So that actually is a
2 relatively small difference of maybe a tenth of a foot associated
3 with that whole difference.

4 MR. WHITE: Thank you. Nothing further.

5 CAPT NEUBAUER: Thank you. Just because there may be
6 additional questions, I'm going to have the witness subject to
7 recall.

8 At this time, Dr. Stettler, we are now complete for your
9 testimony for today. However, I suspect that you may be recalled
10 to provide additional testimony on another date. Therefore, I'm
11 not releasing you from your testimony at this time, and you remain
12 under oath.

13 Please do not discuss your testimony or this case with anyone
14 other than your counsel, the National Transportation Safety Board,
15 or members of this Coast Guard Marine Board of Investigation. If
16 you have any questions about this hearing, contact my legal
17 adviser, Mr. Jeff Bray.

18 The hearing is now recessed. We will reconvene at 9 a.m.
19 tomorrow morning.

20 (Whereupon, at 6:37 p.m., the hearing was recessed, to
21 reconvene Tuesday, February 7, 2017, at 9 a.m.)

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CERTIFICATE

This is to certify that the attached proceeding before the


NATIONAL TRANSPORTATION SAFETY BOARD

IN THE MATTER OF: MARINE BOARD OF INVESTIGATION
INTO THE SINKING OF THE EL FARO
ON OCTOBER 1, 2015


PLACE: Jacksonville, Florida

DATE: February 6, 2017

was held according to the record, and that this is the original, complete, true and accurate transcript which has been compared to the recording accomplished at the hearing.



U.S. Coast Guard
Official Reporter



Transcriber