UNITED STATES OF AMERICA

NATIONAL TRANSPORTATION SAFETY BOARD

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In the matter of: *

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MARINE BOARD OF INVESTIGATION *

INTO THE SINKING THE SS *EL FARO* *

ON OCTOBER 1, 2015 *

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Prime F. Osborn III Convention Center
Jacksonville, Florida

Wednesday,
February 15, 2017

APPEARANCES:

Marine Board of Investigation

CAPT JASON NEUBAUER, Chairman
KEITH FAWCETT, Member
CDR MATTHEW J. DENNING, Member
LCDR DAMIAN YEMMA, Recorder
CDR JEFF R. BRAY, Legal Counsel

Technical Advisors

CDR MICHAEL ODOM
CDR MICHAEL VENTURELLA
LT MICHAEL COMERFORD
JEFFREY STETTLER, Ph.D.
PAUL WEBB

National Transportation Safety Board

BRIAN YOUNG, Investigator in Charge
MICHAEL J. KUCHARSKI, Marine Accident Investigator
CARRIE BELL, Marine Accident Investigator
JON FURUKAWA, Marine Accident Investigator

Parties in Interest

LUKE M. REID, 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

CAPT. CEZARRY LEUCZYWEK
(Acting as Interpreter for Mr. Pupp)

EVA BENAVIDES, Interpreter
U.S. Coast Guard Auxiliary Interpreter Corps

MICHAEL CANNON, Esq.
(On behalf of Mr. Fitzmaurice)

I N D E X

P R O C E E D I N G S

(9:02 a.m.)

CAPT NEUBAUER: Good morning. This hearing will come to order. Today is February 15th, and the time is 9:02 a.m. We are continuing in the Prime F. Osborn Convention Center at Jacksonville, Florida.

I am Captain Jason Neubauer of the United States Coast Guard, Chief of the Coast Guard of Office of Investigations and Analysis in Washington, D.C. I am the Chairman of the Coast Guard Marine Board of Investigation and the presiding officer over these proceedings. The Commandant of the Coast Guard has convened this Board under the authority of Title 46 United States Code § 6301, and Title 46 Code of Federal Regulations Part 4, to investigate the circumstances surrounding the sinking of the SS *El Faro* with the loss of 33 lives, on October 1st, 2015, while transiting east of the Bahamas.

I am conducting the investigation under the rules in 46 C.F.R. Part 4. The investigation will determine as closely as possible the factors that contributed to the incident so that proper recommendations for the prevention of similar casualties may be made; whether there is evidence of any act of misconduct, inattention to duty, negligence or willful violation of the law on the part of any credentialed merchant mariners contributed to the casualty; and whether there is evidence of any Coast Guard personnel or any representative or employee of any other

government agency, or any other person, caused or contributed to the casualty.

I have previously determined that the following organizations or individuals are parties in interest to this investigation: TOTE Services, represented by Mr. Luke Reid; ABS, represented by Mr. Gerard White; Herbert Engineering Corporation, represented by Mr. Spencer Shilling; and Mrs. Theresa Davidson, as next of kin for Mr. Michael -- or Captain Michael Davidson, master of the SS *El Faro*, represented by Mr. William Bennett.

These parties have a direct interest in the investigation and have demonstrated the potential for contributing significantly to the completeness of the investigation or otherwise enhancing the safety of life and property at sea through participation as a party in interest. All parties in interest have a statutory right to employ counsel to represent them, to cross-examine witnesses, and have witnesses called on their behalf.

I will examine all witnesses at this formal hearing under oath or affirmation, and witnesses will be subject to federal laws and penalties governing false official statements. Witnesses who are not parties in interest may be advised by their counsel concerning their rights; however, such counsel may not examine or cross-examine other witnesses or otherwise participate.

These proceedings are open to the public and to the media. I have asked for the cooperation of all persons present to minimize any disruptive influence on the proceedings in general and on the

witnesses in particular. Please turn your cell phones or other electronic devices off or to silent or vibrate mode. Photography will be permitted during this opening statement and during recess periods.

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

Since the date of the casualty, the National Transportation Safety Board (NTSB) and Coast Guard have conducted substantial evidence collection activities, and some of that previously collected evidence will be considered during these hearings. Should any person have or believe he or she has information not brought forward but which might be of direct significance, that person is urged to bring that information to my attention by emailing elfaro@uscg.mil.

The Coast Guard relies on strong partnerships to execute its missions, and this Marine Board of Investigation is no exception. The NTSB is providing representatives for this hearing. Mr. Brian Young, also seated to my left, is the investigator in charge for the NTSB investigation.

Mr. Young, would you like to make a brief statement?

MR. YOUNG: Yes. Thank you, Captain.

Good morning, Captain. Good morning, all. I am Brian Young,

the investigator in charge for the National Transportation Safety Board's investigation of this accident. The NTSB has joined this hearing to avoid duplicating the development of facts. Nevertheless, I do wish to point out that this does not preclude the NTSB from developing additional information separately from this proceeding if that becomes necessary.

At the conclusion of these hearings, the NTSB will analyze the facts from this accident, determine a probable cause independently of the Coast Guard, issue a report of the NTSB's findings, and, if appropriate, issue recommendations to correct safety problems discovered during this investigation.

Thank you.

CAPT NEUBAUER: Thank you, Mr. Young.

Our first witness for today will be Mr. Marek Pupp from Intec. He is currently in Poland, so we're going to do his testimony via Skype. I'm going to break for 5 minutes as we set up for that and reconvene at 9:10.

(Off the record at 9:06 a.m.)

(On the record at 9:13 a.m.)

CAPT NEUBAUER: The hearing is now back in session.

At this time we will be hearing from Mr. Marek Pupp with Intec. During this interview, which will be conducted by Skype, we will have an interpreter from the Coast Guard Auxiliary Interpreter Corps, Ms. Eva Benavides, is here to help us translate.

As a reminder to the parties in interest, when we do come around to your questioning, if you have a question, it'll be easier if you come up to the front of the podium where Lieutenant Commander Yemma is standing.

At this time, Lieutenant Commander Yemma, can you start the process, please?

LCDR YEMMA: Okay. Good morning, gentleman. Captain Leuczywek and Mr. Pupp, can you hear me okay?

CAPT. LEUCZYWEK: Yes, good morning. We can hear you loud and clear.

LCDR YEMMA: Can you hear him from the speakers?

CAPT NEUBAUER: Yes.

[Whereupon, Captain Leuczywek interpreted for the witness stating the witness's answers in the third person, as indicated below.]

LCDR YEMMA: All right. Mr. Pupp, would you please stand up so I can swear you in? And please raise your right hand. Thank you, sir. Thank you. One second, sir.

(Witness sworn.)

LCDR YEMMA: Thank you, sir. You can be seated please.

Mr. Pupp, can you please state your full name and spell your name?

THE WITNESS: (In English) My name is Marek, M-a-r-e-k, Pupp, P-u-p-p.

LCDR YEMMA: Thank you.

And Captain Leuczywek, can you also state your name and spell

your name?

CAPT. LEUCZYWEK: My name is Cezarry Leuczywek, and that's Charlie-Echo-Zulu-Alpha-Romeo-Romeo-Yankee, and surname is Leuczywek, and it's L-e-u-c-z-Yankee-Whiskey-Echo-Kilo, Leuczywek --

LCDR YEMMA: Thank you, gentlemen.

Mr. Pupp, can you please tell the Board where are you currently employed?

THE WITNESS: He works for the municipal board, which is involved with maintenance of the roads and the park, something like that, here in Poland, in Gdansk.

LCDR YEMMA: Okay. Thank you.

And can you please tell the Board about any prior sailing or maritime experience that you have?

THE WITNESS: Just before *El Faro* voyage he was 8 weeks on board of the passenger ships. It was Mediterranean in Europe. The name of the company was the Holland America Line. And he was paid -- he used to work as the electrician. He was the person that do electrical installation of the WiFi and the CCTV on board of that passenger ships.

LCDR YEMMA: Okay. Thank you, sir. At this time Mr. Fawcett will ask you some questions.

(Whereupon,

MAREK PUPP

was called as a witness and, having been duly sworn, was examined

and testified as follows:)

EXAMINATION OF MAREK PUPP

MR. FAWCETT: Good day, Mr. Pupp and Captain. The members of the Board and the United States Coast Guard would like to express our condolences to you and the families of the Polish crew that were lost on the *El Faro*.

CAPT. LEUCZYWEK: Okay. He said thank you.

MR. FAWCETT: I would like to also thank you, Captain, and the Polish Maritime Commission and your staff for the assistance in preparing for this interview.

CAPT. LEUCZYWEK: Thank you very much. It's our pleasure to cooperate with you.

MR. FAWCETT: Now, the captain with the Polish Maritime Commission has been provided with two exhibits. They are on the table. One is Coast Guard Exhibit 007, which is an outboard profile diagram of the *El Faro*, correct?

CAPT. LEUCZYWEK: Yes. We have a couple of drawings plus one photograph, yes.

MR. FAWCETT: The other exhibit is Coast Guard Exhibit 023, which is a photograph of a cargo hold of the *El Faro* with a photograph of a watertight scuttle; is this correct?

CAPT. LEUCZYWEK: Yeah, that's correct. Yes.

BY MR. FAWCETT:

Q. Mr. Pupp, you boarded the *El Faro* in late August and got off the ship on September 29, 2015; is this correct?

CAPT. LEUCZYWEK: Just a second. He is searching his phone.

He boarded on 18 of August and signed off 29 of September.

MR. FAWCETT: Captain, could you move the telephone closer to Mr. Pupp?

CAPT. LEUCZYWEK: Yes, I will.

BY MR. FAWCETT:

Q. So when you got the job, Mr. Pupp, what were your thoughts as you headed to the job on the *El Faro*?

CAPT. LEUCZYWEK: I don't hear you. You have to repeat that question what kind of information you would like to get, please, again.

BY MR. FAWCETT:

Q. Did he know that it was hurricane season in the Atlantic?

A. No, he doesn't know. He didn't know about this.

MR. FAWCETT: How good is Mr. Pupp's knowledge of the spoken English language? Could you tell us that, sir?

CAPT. LEUCZYWEK: Quite weak. Just the simple, the simplest questions, he is able to give answer. We just talked about it just before this.

MR. FAWCETT: Excuse me, sir.

(Pause.)

MR. FAWCETT: Yes. We would like to ask if Mr. Pupp can speak into the phone and we want to make sure that the Coast Guard Auxiliary translator can hear him well.

Could you speak into the phone, sir?

BY MR. FAWCETT:

Q. Sir, Mr. Pupp, are you able to read the English language?

A. He said no.

MR. FAWCETT: Excuse me.

(Pause.)

MR. FAWCETT: Captain, I am going to ask the Coast Guard interpreter to try to form the translation so that the people in the room can hear better because we have the phone on Mr. Pupp. So please stand by.

CAPT. LEUCZYWEK: Okay. That's not a problem. Just go ahead, please.

[Whereupon, Eva Benavides, a Polish language interpreter, interpreted for the witness, stating the witness's answers in the third person, as indicated below.]

BY MR. FAWCETT:

Q. Mr. Pupp, you arrived in Jacksonville and walked onto the *El Faro*. Can you tell me what happened when you stepped aboard the ship?

A. He went to the captain's quarters the minute he got on the ship.

INTERPRETER: I did not understand the other part what he did in the captain's quarters once he got there.

MR. FAWCETT: Captain, can you fill in on that? He went to the captain's cabin; is that correct?

CAPT. LEUCZYWEK: Yes. He went in the captain's cabin and

fill out some forms.

BY MR. FAWCETT:

Q. Were you given a safety briefing?

A. He was shown where the ship was stocked, and that's it.

Q. Were you shown the lifeboats? Were you shown the life jackets and immersion suits?

A. Well, he was saying that he did see some items in the closets on the ship. Some of them were vests. He saw some emergency boats. But he doesn't know any details more or less.

MR. FAWCETT: Captain, did you hear that translation? Is that a correct translation?

CAPT. LEUCZYWEK: No, I couldn't hear the translator, but I can translate what he said. He said that during the first day he cannot recall that he was informed about it, but he knows -- he knew that time what the immersion suits were on board, where the lifeboats were on board, because when he was walking around he noticed everything what you mentioned.

BY MR. FAWCETT:

Q. Mr. Pupp, did you ever put on a life jacket?

MR. FAWCETT: I saw his head move, but could you tell me that answer was no; is that correct?

CAPT. LEUCZYWEK: That's correct. The answer was no.

BY MR. FAWCETT:

Q. Did he ever put on an immersion suit?

A. He went on the -- he used the immersion suit but not on *El*

Faro, on passenger vessel he tried, but not onboard of the *El Faro*.

Q. On the ship he worked on as a service crew, electrician, did they have him put on an immersion suit for a safety training? Did they ask him to actually put on a suit? This is not *El Faro*, but on other jobs at sea?

A. Yes, the other ship.

Q. Mr. Pupp, did you ever, when they had a drill, did you ever go to the muster station and report as directed?

A. (In English) We will ask the Coast Guard your interpretation.

INTERPRETER: He said once a week, and they did not participate, if I heard him correctly.

MR. FAWCETT: Captain, was -- did he say that they did not participate in drills?

CAPT. LEUCZYWEK: That's correct. That was his answer. That all these, they were not included in the drills -- they, I mean the group of electricians of the technical crew, they were not included drills.

BY MR. FAWCETT:

Q. On board *El Faro*, did they give the Polish crew emergency instructions in the Polish language?

A. (In English) No.

Q. For your group of the Polish workers, who translated instructions to you into Polish?

A. There was two crew members, two Polish crew members who left,

who were also technical on board, two other guys who knew English.
Q. So would I be correct in saying that Mr. Mathias would tell the Polish crew who spoke English what needed to be done and the Polish English-speaking person would tell you what to do?
CAPT. LEUCZYWEK: Okay. But can you please tell us who is Mr. McGuire [sic]?
BY MR. FAWCETT:
Q. Mr. Mathias is the person who was supervising the conversion work that the electricians were doing. He was a TOTE employee.
A. He said that it was a name of Jeffrey. What is the first name of Mr. McGuire? Jeffery?
Q. So your answer is that someone named Jeff; is that correct, was the --
CAPT. LEUCZYWEK: No actually called their boss and he was talking to the English-speaking Polish guys and they are talking among themselves.
BY MR. FAWCETT:
Q. So he would tell the English-speaking Polish worker and he would tell the Polish workers the information they needed to know; is that correct?
A. Yes, that's right. He would discuss it with the chief, and the information came from him and he was talking to the guy -- to the English-speaking Polish guy, and they were to spread the information among themselves.
Q. So for the recorders, the supervisor for TOTE would tell the

Polish crew that spoke English and he would pass the instructions to the Polish workers?

A. Yes, that's correct. It was the way how we communicated.

Q. So he indicates that is correct, that's how that was communicated.

Did anyone take you to the lifeboats or the life raft and show you exactly what you were supposed to do in an emergency?

A. (In English) No.

Not this boat. No one.

Q. His answer was no.

Did you understand what the general alarm was? The general alarm is a electronic signal you could hear that indicated general alarm. Did you know what the general alarm was?

A. No. He says that he cannot recall that during his time on board that a general alarm was sounded.

Q. To be clear, he said on his time aboard, he does not recall if the general alarm was sounded; is that correct?

A. Yes, correct. He cannot recall that such an alarm, a general alarm was sounded.

Q. His answer was he does not recall if a general alarm was sounded.

Does he know on *El Faro* what the abandon ship signal is?

A. No, he doesn't know.

Q. His answer is no.

Does he know what the fire signal is?

A. Same negative answer, sir.
Q. The answer is negative.
MR. BENNETT: Excuse me, Captain. The witness can give the answer, not Mr. Fawcett. And those are only "no" now, but I don't want to get into a pattern where we start to interpret what the witness is saying.
CAPT NEUBAUER: Okay. I understand.
So, Mr. Fawcett, are you clarifying his answer?
MR. FAWCETT: No, sir. For the benefit of the court reporters I am trying to clearly and succinctly give the answer that Captain Leuczywek is giving.
CAPT NEUBAUER: Yeah, I don't think you should be interpreting or clarifying his answer. I mean, we have the interpreter here if we need to do that, or we can confirm it with Captain Leuczywek and have him clearly state it on the record, but I don't think you should be stating it.
MR. FAWCETT: Understood, Captain.
If you will look at Coast Guard Exhibit 023, Captain, that's the photograph of the hold.
CAPT. LEUCZYWEK: Yes, we are ready.
BY MR. FAWCETT:
Q. In the photograph of the hold, in the right corner, you will see a yellow scuttle. Do you see that?
A. Yes, I see this.
Q. Did you go up and down through that scuttle?

A. The answer is no. But he used to go through the same scuttle but it was upstairs on the top, upstairs on the top, on the top of the ship. Not this one (indiscernible).

Q. Did you go through any of those scuttles?

A. Yes. (Indiscernible) move such a scuttle on top of stage one of (indiscernible), which was forward of the ship.

Q. Did the scuttles work? By that I mean could you properly turn the hand wheel and make sure it was closed properly?

A. Yeah, there is a (indiscernible) at the top of, very top sill this, this kind of scuttle only once. But they were familiarized with the ship, that (indiscernible).

Q. Did the scuttle seem to be in good condition?

A. It (indiscernible). Unfortunately, because there was only one, he cannot recall the condition of it.

Q. Did you go through watertight doors?

A. Yes. Yes, the answer is yes.

CAPT NEUBAUER: Mr. Fawcett, one moment, please. We'd like to take a quick recess. We're going to bring our interpreter up to the podium with you. That will help her to listen to the answer and then we can interject any differences within what we're hearing from Captain Leuczywek. So at this time we will recess and reconvene at 9:45.

Captain, we will be back in 5 minutes. Please stand by.

CAPT. LEUCZYWEK: (Indiscernible).

CAPT NEUBAUER: Thank you.

(Off the record at 9:41 a.m.)

(On the record at 9:54 a.m.)

CAPT NEUBAUER: The hearing is now back in session.

For the record, we're going to change the way the testimony is being conducted. Mr. Fawcett or the person asking the question will ask directly to our Coast Guard Auxiliary interpreter who will ask the witness directly and then interpret back to the Marine Board.

Mr. Fawcett, at this time can you continue, please?

MR. FAWCETT: Yes, sir, Captain.

(Whereupon, Eva Benavides interpreted the following questions and answers for Mr. Pupp.)

BY MR. FAWCETT:

Q. Mr. Pupp, I am going to reask a couple of important questions. When you came aboard *El Faro*, did you receive a safety briefing?

A. He can't remember.

Q. Did you or any of the Polish crew put on life jackets aboard *El Faro*?

A. He doesn't remember anything like this will happened or was happen -- did happen.

Q. Did you or any of the Polish crew put immersion suits?

A. No. No, he doesn't remember anything like this happen.

Q. While you were on *El Faro* were there any drills, safety drills?

A. Not for Polish people.
Q. Mr. Pupp, what was your muster station for emergencies? For the benefit of translation, the place where the Polish people would gather in an emergency.
A. He doesn't know of anything on the subject.
Q. On *El Faro* where were the life rafts?
A. He was saying that his quarters were on the level of the lavatory. He thinks that the emergency boats were on higher level where the officer quarters were, but he's not for certain so he doesn't want to be quoted on -- later that he --

He thinks it's on the left, left side of the ship, officer quarters left side of the ship.

Q. What were you doing on *El Faro*? What work were you conducting?
A. He was working with, preparing and working with cables. I guess he was making some kind of cables to prepare the -- the ship was originally working in Alaska and now his job was to prepare the cables to make the ship available to go and go to Alaska. So there are some special kind of cables that need to be redone so the ship can go to Alaska waters.

MR. FAWCETT: Yes, Captain?

CAPT. LEUCZYWEK: He mentioned the ramp, the ramp that the cables were involved ramp of the places where they need to come in or out of the ship.

INTERPRETER: I guess he was talking about ramps that you use

to get things on and off the ship. And I assume that he's talking about the cables that were to make those ramps open and close, but I will double-check with him.

MR. FAWCETT: Certainly.

INTERPRETER: I guess what they working -- were working on cables. The cable is supposed to make the ramps to work in that way that cars and some other utility vehicles can get on the ship. And those ramps used to work and they used to have those ramps, then they didn't have those ramps, and now that the ship want to go back to Alaska, they still were -- they were redoing the electrical work on those ramps so the ship will have ramps so the cars can get on and off the ship.

BY MR. FAWCETT:

Q. Did you ever go into the engine room of *El Faro*?

A. Yes.

Q. What did you do in the engine room?

MR. FAWCETT: Would you ask if he has a long answer, could you break it into pieces?

INTERPRETER: He was only passing through. He didn't stay there. He just was passing through.

He was passing through this because on one side of that room there were tools, tools room, and on the other side there was a toilet and a sink. So when they needed toilet, they were passing by, and when they need tools, they're passing by to get the tools.

To be able to do his job with the cables and the ramps, they

needed to go through this room because of the tools room and the toilet room, so they were just passing back and forth to be able to do the cable and electrical job.

BY MR. FAWCETT:

Q. Was the door that you entered the engine room left open at sea?

A. The door was open.

Q. Was the door a watertight door with handles on it to close and lock the door?

A. Okay. Which door? Are you talking about the door that gets you to this place where you eventually go and get to this room, or are you talking about just this specific door in that specific room?

Q. It would be a door from the cargo hold into the engine room. Was that a watertight door?

A. Well, the door to get to this room, I guess, he thinks is a watertight door.

Well, according to him, he is saying that that special door was above the engine room.

Q. That's fine, sir. I will not follow up on that question. That's fine.

CAPT NEUBAUER: We can always take a recess before your line questioning, TOTE, and we can provide a picture, potentially, on this issue, if that would clear the matter.

BY MR. FAWCETT:

Q. Did TOTE provide you with safe working procedures? By this I mean instructions about wearing goggles, gloves -- not lifeboats, but working safe procedures?
A. He received from TOTE goggles, gloves and headlamps, and all the Polish crew also received those.
Q. Other than equipment, were you told what the shipboard safe work procedures were?
A. No, he didn't receive anything else other than those three things.
Q. Did any of the Polish workers do any work in the engine room?
A. He said not in engine room, per se, but in surrounding, maybe on the same side that the toilet was, the Polish workers were working on some kind of tubing or some kind of piping called high pressure piping. But he doesn't think it was in the engine room itself. It was in the neighborhood of.
Q. Was this hydraulic piping?
A. The only thing he knows is a high pressure. He doesn't know what kind of piping it was supposed to be. He thinks it was some kind of a high pressure piping. That's all he knows. But he doesn't if this was for water, oil or something else.
I think they was repairing this piping while Mr. Pupp was there, but then the rest of the work was after he already left.
Q. Did the piping have pressure on it?
A. From what he heard from these Polish workers and friends, he said that they were only making preparation for this piping and

the only thing they tell him that this is some kind of high pressure pipe. That's all he knows.

Q. Did you and your fellow Polish workers get along with the ship's crew?

A. With the rest of the crew they didn't have any friendship going on or much of a -- even though they didn't speak English or anything, but they didn't have any -- I guess they didn't hang around together.

Q. Were there any problems between the Polish workers and any of the ship's crew?

A. He doesn't know anything on this subject.

Q. I am almost finished, sir. Do you want to take a break for 5 minutes or continue?

A. We continue.

Q. You came aboard *El Faro* and the ship took another route on the voyage to avoid a potential tropical storm. Were your crew asked to secure any of their equipment?

A. Okay. Two things. One, I guess I'm getting that each day, all the tools and all the materials that they were using were always locked and put back in a special kind of box. So that's about equipment and tools. And as far as him knowing about changing on the course, he's not sure because I guess after 3 weeks, then he's aware of changing the course, and I guess the ship was hiding behind some kind of islands or something.

His ship -- talking to commander, 1 week before the hurricane

hit, 1 before, 1 week before, they told them that the hurricane is coming. So 1 week before the hurricane hit, they knew.

Q. Yes. My question was, when you first boarded the *El Faro* did anyone tell you on the first trip to San Juan --

INTERPRETER: On the same day?

MR. FAWCETT: Yes.

BY MR. FAWCETT:

Q. -- that there was a hurricane or tropical storm that may affect the voyage, the very first voyage?

A. I'd rather not -- doesn't remember hearing anything on the moment when he got on the ship.

Q. During that voyage, did anyone tell you or the Polish workers that the ship was taking a course to avoid a potential storm?

A. Well, he's repeating the same thing what he told us before, which means the week prior to, he was told that they might change the course and hide behind some islands.

Q. The week before --

CAPT NEUBAUER: TOTE, do you have a clarification?

MR. REID: Yes. Sir, can we take a break?

CAPT NEUBAUER: Yes. The hearing will recess and reconvene at 10:30.

(Off the record at 10:24 a.m.)

(On the record at 10:36 a.m.)

CAPT NEUBAUER: Okay. The hearing is now back in session.

BY CAPT NEUBAUER:

Q. Mr. Pupp, I would like to clarify what time period he was referring to when he talked about hearing a week before the hurricane.

A. This was not the information about the hurricane that caused the ship to sink. The information they received was not the information about that hurricane that caused that accident.

Q. Does he remember sailing on the *El Faro* through heavy weather from a storm?

A. Yes, there was then when they changed. Three weeks before. This is not the hurricane that caused that devastation of the ship. It was 3 weeks prior to that. Three weeks prior to that, that's when he got the information and the Polish crew about changing the course and hiding behind some islands.

Sometimes the waves were humongous, sometimes were small.

CAPT NEUBAUER: Ms. Benavides, if you could speak a little closer to the microphone when you speak instead over here.

THE WITNESS: It happened once when he was on *El Faro* from Jacksonville to San Juan that because of the weather they changed the course.

BY CAPT NEUBAUER:

Q. Did they still experience heavy weather during that voyage?

A. It was a storm weather, high tide and rain and wind.

Q. Were any extra safety precautions taken during that voyage for the workers?

A. Yes, he was told.

Q. Did work continue during that voyage?
A. Work continue. He said the weather was not as bad that it would stop everybody from working, so their work continue even though there was rain and wind and high tides, and --
Q. Did he personally have any safety concerns?
A. No. He wasn't concerned about his own safety or weather issues.
Q. And just to clarify, when he says high tides, does he mean high seas or high winds?
A. He's talking about waves. There are humongous waves, smaller waves. Some of the humongous waves were going on the part of the ship, but on the part where the cargo containers were.
Q. So just to be clear, some of the waves were coming onto the second deck, which would be the first watertight deck on the vessel?
A. The waves were coming only on the level where the ramp was.
Q. Was that the same level where work was being conducted by the workers?
A. He said the waves, the humongous waves were coming maybe once an hour or something. So the work continue because the waves were just once --
Q. But were the workers in the area of where the waves coming aboard?
A. In the places where the waves were coming to aboard, there was no workers present.

CAPT NEUBAUER: Thank you. At this time the National Transportation Safety Board will have questions.

BY MR. YOUNG:

Q. Good morning, Mr. Pupp. On behalf of the National Transportation Safety Board, we would like to express our condolences to you and the families of the Polish workers that were aboard the *El Faro* during this accident.

A. Thank you.

Q. Sir, I just have a few questions regarding the pipes that you discussed with Mr. Fawcett. Were the pipes newly received on board the vessel or were they pipes that were old and removed from the vessel?

A. He is electrician. The people which -- he doesn't know exactly if this was old pipe was to be cut and replaced by new pipe. He doesn't know the details because he's electrician and the people on board who were plumbers were in charge of that kind of work. So he doesn't -- he cannot tell you details.

Q. Understood. Thank you. As an electrician, was the majority of the work that you performed being conducted on the second day where the cargo and trailers were located?

A. Yes. He was working as electrician to changing those electrical cables.

Q. And my final question. I understand you are not a pipefitter?

A. (In English) Right.

Q. But was there any discussion that you remember hearing that any of the pipes had anything do with a boiler? If any of the pipes had any plans to be used in a boiler?
A. He does not know for sure. He said someplace in the engine room those pipes supposed to be work on, but he cannot tell you more because he doesn't know.
MR. YOUNG: Thank you.
CAPT NEUBAUER: Ms. Bell?
BY MS. BELL:
Q. Good morning, sir. When you first joined the ship and before you started work, do you recall completing an orientation session you would have had to sign off on a form?
A. He remembers signing -- the chief was showing everybody the whole ship. He remembers signing some kind of a document in the captain quarters, but I think -- he thinks this was related to like a medical history and that kind of information.
Q. This orientation would have had information about location of safety equipment, emergency alarms, where they were located, emergency lockers, and things of that nature.
A. He was -- he doesn't remember a major meeting on the minute when he got on board of *El Faro* that would cover all the equipment or safety issues. He said they were all arriving in groups. So first was the Polish workers; there were plumbers. The next week there was two electricians and there was next week somebody else. So they all were arriving in groups. But he doesn't remember one

major meeting when everybody were explained all the safety issues. The chief of the ship did show them around the boat, the ship, but that's all. There was no other meetings with any other details.

Q. Did you know what lifeboat you were assigned to?

A. No. Nobody told him. He doesn't -- he didn't know.

Q. What were your typical work hours?

A. Seven days a week. Roughly, between 7 in the morning and 1900. He said there are some days that they maybe left, finished a little bit earlier or they finished later or earlier. But usually 7 days a week, 7 till 19 hours.

CAPT NEUBAUER: You said 19 hours, but 0700 to 1900, is that how you interpreted that?

THE WITNESS: Yes, from 7 in the morning to 7 in the evening. They did receive two breaks, 15 minutes each, and lunch break, 1 hour for lunch.

BY MS. BELL:

Q. Did they also do overtime, get paid for overtime?

A. He say usually he didn't work overtime. Maybe it happen once, but it was not like on a daily basis.

Q. About how much sleep did he get per night?

A. About 8 hours.

Q. And do you recall if it was easy or difficult to get rest on the ship?

A. Peaceful 8 hours' sleep.

Q. And did you have any communication with the Polish crew after

you got off the ship on September 29th?
A. They did not continue any kind of communication. I guess he was flying from Jacksonville to Washington, and from Washington to Poland cities, a town that's called Gdansk.
Q. And just one last question. How did you communicate with friends and family when you were on the ship?
A. Through Internet. Through using Internet, sometimes Skype. When they were in port they have WiFi. In San Juan they also used the Internet and places that have Internet connections.
Q. Were they using their own personal electronic devices or the ship's computer at all?
A. He just used his own cell phone.
MS. BELL: That's all I have. Thank you.
CAPT NEUBAUER: At this time I'd like to go to the parties in interest for questions. TOTE?
BY MR. REID:
Q. Mr. Pupp, good morning. How are you, sir?
A. (Indiscernible)
Q. My name is Luke Reid and I represent TOTE. And first, I'd like to express condolences to you and your co-workers' families on their loss on the *El Faro*.
A. Thank you.
Q. Mr. Pupp, I just have a few questions for you and most of them are follow-up questions to what you've already testified to.
A. (In English) Okay.

Q. Do you know what the bridge of the ship is and where it is located?
A. Yes, he knows. He was never on the bridge; however, he knows where it is.
Q. Just to clarify something that you said earlier. I think you said that there were two English speakers among the Polish riding crew on the *El Faro*. Is that correct?
A. Yes, two people who spoke well.
Q. During the drills on the *El Faro*, did you hear an alarm go off?
A. I don't remember.
Q. In regard to the piping that you spoke about with Mr. Fawcett, was that piping related to the conversion of the *El Faro* to the Alaska trade?
A. Okay. He says that he doesn't really know. He thinks not, but he doesn't really know.
Q. And did you do this work yourself or did others do it?
A. This work was done by the welders.
Q. Mr. Pupp, you mentioned earlier that the chief took you around when you came aboard the vessel. Was that Mr. Jeff?
A. (In English) Yes, yes.
Q. And where did he take you?
A. He was generally taking us around the ship showing us what we're going to do and where we're going to do it, in order for us not to get lost on the ship.

Q. So was he showing you around the ship so that you were familiar with the ship?
A. Yes.
Q. And who else was with you?
A. The first four people who got here, plus Jeff.
Q. And were any of those Polish workers also English speakers?
A. Yes.
Q. When the *El Faro* conducted drills and exercises, where did you go?
A. We did not participate in those -- we did not participate in those drills because they did not apply to us. But whenever there was a drill, it was posted on the -- at the main table for everybody to see.
Q. And did you go anywhere during those drills? Where did you stand?
A. They were doing their work.

MR. REID: Mr. Pupp, thank you for your time, sir.

THE WITNESS: Thank you.

CAPT NEUBAUER: Mrs. Davidson, any questions?

MR. BENNETT: No questions.

CAPT NEUBAUER: ABS?

MR. WHITE: ABS would further like to extend its condolences to Mr. Pupp and the family members of the crew members lost, but ABS has no questions.

CAPT NEUBAUER: Thank you.

Can we translate that message, please?

And can you say that again, Mr. White?

MR. WHITE: Sure. Mr. Pupp, ABS, the American Bureau of Shipping, would further like to express its condolences to you, your co-workers, and the family members of those lost on *El Faro*, but we have no questions at this time.

THE WITNESS: Thank you.

MR. BENNETT: And, Captain Neubauer, may the interpreter also extend the condolences to Mr. Pupp and his co-workers' families on behalf of Theresa Davidson.

THE WITNESS: Thank you. And he is also saying condolences to her.

CAPT NEUBAUER: Are there any final questions for Mr. Pupp at this time?

UNIDENTIFIED SPEAKER: No questions, sir.

CAPT NEUBAUER: We have a picture of the engine room watertight door that's on the second deck. I'd like to take a recess, confer with the parties in interest and then try to present that to Mr. Pupp, if possible. So at this time the hearing will recess and reconvene at about 11:16.

And, Ms. Benavides, if you could let Mr. Pupp know we are going to try to show him a photograph, and that'll be probably the last question that we ask.

So we're going to take a break for now.

(Interpreter speaks with Mr. Pupp.)

CAPT NEUBAUER: The hearing will now recess and reconvene at 11:16.

(Off the record at 11:11 a.m.)

(On the record at 11:26 a.m.)

CAPT NEUBAUER: The hearing is now back in session.

During the break the MBI produced a photograph of a watertight door that was on the third deck of the *El Yunque*, which is similar in configuration to the *El Faro*. We're going to show this photograph to Mr. Pupp to see if he remembers this door and whether the door was open at sea.

So now, Mike, can you show the photograph to Mr. Pupp, please?

INTERPRETER: He see the pictures.

BY CAPT NEUBAUER:

Q. Mr. Pupp, do you recognize this watertight door that provided entry into the engine room?

INTERPRETER: Can I tell him this is a different ship?

CAPT NEUBAUER: This is a different ship but this is the same door that was on the *El Faro*.

INTERPRETER: He said maybe they were locked at night.

BY CAPT NEUBAUER:

Q. And just to clarify, does he mean secured or locked?

A. If this kind of door was anyplace on the ship, between -- then especially between the hours of 7 in the morning and 7 at night, they were open. But he himself can't say that he remembers

this particular type of door.

Q. And did he actually go through this door?

A. He knows that -- he knows that this kind of doors exist on the ship. He just cannot say that he actually saw this particular door.

Q. Is there anything else Mr. Pupp can add in general to the Marine Board of Investigation that might be helpful?

A. The only thing he remembers that he would like to mention was that when he was leaving the ship it was about 10:00 in the morning, it was already kind of cloudy, cloudy skies and started to rain. So I guess everybody was in, somewhat in a hurry.

Q. I didn't hear the last part of it.

A. He also want to mention that the overall condition of the ship was not in a hundred percent. He says there was a lot of rust, rust on the ship. And this was one of the reasons, he believe, that part of the workers were plumbers, so they could work on the rust condition and replacing, fixing, and making it better.

From what he understand, he said after they did a little bit of work on the ship, not details, major work, just kind of polishing the ship somewhat, the ship supposed to go to port where in the port they supposed to take care of major work.

Q. I just have one final question. When he departed the vessel on September 29th, I believe he said that he noticed that the crew was in a hurry. Is that -- I want to make that clarification.

A. He said there was only two of them because I guess they depart in groups. So it was just him and somebody else, that they were leaving the ship. And he said those two, him and the other person, was leaving nothing major hurry of any kind.

CAPT NEUBAUER: Are there any final questions at this time?

MR. REID: No, sir.

MR. BENNETT: Captain, can I have 2 minutes?

CAPT NEUBAUER: Yes, sir.

MR. BENNETT: Captain Neubauer, I do have one, one question for the witness.

CAPT NEUBAUER: Yes, sir.

INTERPRETER: He was -- Captain was making additional comments, that when they were talking about there was work done on the ship to work with the rust areas and polishing and making things kind of superficially because the ship should go to the port and major work supposed to be done over there, but why they were doing the little superficial work here and there, there were also plumbers but also they were fitters, and those people work with connecting the pipes together and working with rust on the pipes and metal sheets and fixing and correcting and polishing. So he just wants to note that it's not only plumbers but also fitters and other workers.

CAPT NEUBAUER: Understand.

We have one final question from Mrs. Davidson.

BY MR. BENNETT:

Q. Mr. Pupp, thank you for your testimony today. I want to ask you a question. Ms. Davidson reminded me that one of the Polish wives told her at the memorial how kind Captain Davidson was to all the Polish workers and how much they liked him. Did you experience that with Captain Davidson?

A. Yes.

Q. Did you -- did several members of the Polish crew interact with Captain Davidson?

A. Have very rare contact, yes.

MR. BENNETT: Thank you.

INTERPRETER: I just want to ask him if he has any more subjects to --

CAPT NEUBAUER: You're going to ask Mr. Pupp? No. At this time we're complete and Mr. Pupp is released as a witness at this Marine Board of Investigation.

We'd like to express our appreciation to both Mr. Pupp and Captain Leuczywek.

INTERPRETER: He hopes that they helped.

(Witness excused.)

CAPT NEUBAUER: I'd also like to thank you, Ms. Benavides, from the Coast Guard Auxiliary Corps, which is a voluntary service that augments the active duty Coast Guard.

At this time the hearing will adjourn and reconvene at 12:45.

(Whereupon, at 11:39 a.m., a lunch recess was taken.)

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

(12:52 p.m.)

CAPT NEUBAUER: The hearing is now back in session.

At this time we will hear testimony from Mr. Mickey Fitzmaurice and Mr. Chris O'Connor, with NOAA's SARSAT program. The testimony will be telephonic and there is also a video presentation.

Lieutenant Commander Yemma.

LCDR YEMMA: Captain and gentlemen, this is Lieutenant Commander Yemma in Jacksonville. Before we begin, can I ask you each to please state your name and your affiliation and please spell your last name for the record?

MR. FITZMAURICE: Okay. Good afternoon. This is Mickey Fitzmaurice. My real name is Michael Fitzmaurice, Jr. I am an employee of the National Oceanic Atmospheric Administration, which is under the Department of Commerce, and I'm based in Suitland, Maryland in the NOAA Satellite Operations Facility, and I'm the principal SARSAT satellite systems engineer. My last name is spelled F as in Frank, I as in India, T as in Tom, Zulu is a Z, M as in Michael, A as in apple, u-r-i-c-e. Looks like Fitzmaurice. Thank you.

MR. CANNON: This is Michael Cannon with Department of Commerce's General Litigation Division. My last name is spelled C-a-n-n-o-n.

LCDR YEMMA: Okay.

MR. SCHRATWIESER: Hugh Schratwieser. I'm with the NOAA Office of General Counsel. And my last name is spelled S-c-h-r-a-t-w-i-e-s-e-r. Thank you.

MR. HANSON: This is Derek Hanson. Last name is H-a-n-s-o-n, and I'm with NOAA Office of General Counsel.

LCDR YEMMA: Okay. Thank you, gentleman. And I understand that Mr. O'Connor is not joining us on the line today. Is that correct?

MR. CANNON: Right. It was our understanding Mr. O'Connor was requested to be here but he wasn't required, so something came up and he is not in the building.

LCDR YEMMA: Okay. Thank you, gentlemen. That's okay.

So, Mr. Fitzmaurice, I'm going to ask you to please stand and raise your right hand and I'm going to do the same here, and I'll swear you in. Okay?

MR. FITZMAURICE: Okay.

LCDR YEMMA: Let me know when you're ready, please.

MR. FITZMAURICE: I'm ready, sir.

(Witness sworn.)

LCDR YEMMA: Thank you, sir. You can be seated now.

THE WITNESS: Thank you.

LCDR YEMMA: And, Mr. Fitzmaurice, you already told the Board your position at NOAA. Can you please give the Board a little more detail on what you do in that position?

THE WITNESS: Okay. As the lead satellite systems engineer

for the Search and Rescue Satellite Aided Tracking program, my job is to monitor the operational and soon to be operational satellites that are used that have search and rescue payloads on them, and make sure that they accurately and efficiently communicate with the NOAA ground stations located throughout the area of responsibility of the United States.

The ground stations will receive satellite transmissions that are essentially relays of distress beacons to the ground stations, and then from those ground stations to a mission control center co-located with me here at the NOAA Satellite Operations Facility, and distributed to our rescue coordination centers, both the U.S. Coast Guard and the U.S. Air Force.

LCDR YEMMA: Thank you, sir. Can you also tell the Board a little bit about your prior work experience, anything relevant to what it is that you do now?

THE WITNESS: Okay. For 31 years I've been in the satellite business after graduating as a co-op electrical engineering student from the University of Maryland in electrical engineering in 1986. I pursued graduate studies at the Johns Hopkins University Applied Physics Lab, a master's degree in electrical engineering 1990.

I worked at NASA, as I said, during undergrad as a co-op student. And then, upon graduation, worked as a contractor to NASA, working through the Goddard Space Flight Center in Greenbelt, Maryland until 1997. In August of 1997, I came over to

NOAA to run the polar orbiting environmental satellites that are operated by NOAA at their satellite operations and control center here in Suitland. I worked in that capacity until 2006, and in 2006, I came over as the lead satellite systems engineer for the Search and Rescue Satellite Aided Tracking program, in June of 2006. And I've been in this position since that time.

LCDR YEMMA: Okay. Thank you, sir. I'm going to turn the podium over to Mr. Paul Webb, who will conduct your interview. Thank you.

THE WITNESS: Thank you.

(Whereupon,

MICHAEL FITZMAURICE, JR.

was called as a witness and, having been duly sworn, was examined and testified as follows:)

INTERVIEW OF MICHAEL FITZMAURICE

BY MR. WEBB:

Q. Good afternoon, Mr. Fitzmaurice. How are you doing?

A. Good. Thank you, Mr. Webb.

Q. Okay. I want to start out by talking about what was received by SARSAT on the day of the incident. Was there a 406 beacon that was initiated by the *El Faro*?

A. It appears from the data we received in our registration database that the answer is yes. We received transmissions from a beacon identified as registered to the *El Faro* on October 1st, 2015, through our GEOSAR, our geosynchronous search and rescue

satellite.
Q. Okay. And was that information transmitted to the Coast Guard?
A. It was, in a series of messages. Not every single different burst is transmitted, but any of them that's moving around it is transmitted to the rescue coordination centers.
Q. What --
A. And --
Q. Go ahead.
A. I'm sorry. I was just going to say, and I have noted in a presentation the flow of events on the day of October 1st, 2015, if we'd like to bring up an exhibit and walk through the SARSAT system.
Q. Sure. What time was that first signal passed to the Coast Guard.
A. The first time the signal -- it looks like it was passed to Coast Guard District 7, and that decision was made based on the registration home port. And it looks at 406 unlocated burst was sent at 11:39 Z, which is GMT, on October 1st, 2015.
And that was based an initial detection through the GOES-East satellite, and that detection on the GOES-East satellite was 4 minutes earlier, at 11:35, is the Zulu Time.
Q. Okay. We're pulling up the PowerPoint right now.
A. Okay. That's Exhibit 391? I just want to make sure.
Q. Right. 391, Overview of U.S. Guard, U.S. SARSAT program.

MR. WEBB: Yes, sir?

CAPT NEUBAUER: Mr. Webb, for the information of the public, I think we should translate Zulu Time into Eastern Time. Do you know the conversion, sir?

MR. WEBB: 0639. Is that --

CAPT NEUBAUER: Just for the record, that would be -- 11:39 Zulu would be 7:39 Eastern Time, and 11:35 will be 7:35 Eastern. So, 4-hour conversion.

THE WITNESS: Okay. I see you've got the current slide up for this presentation. This presentation is -- was made to summarize a interview I gave to Mr. Furukawa of the National Transportation Safety Board on March 4th of 2016. So this presentation and all the material in this is material that is described or detailed that interview.

So next slide, please. You can go to slide 2.

MR. WEBB: We're there.

THE WITNESS: All right. I forgot I'm looking at delayed screen here.

So this is an overview of Search and Rescue Satellite Aided Tracking system. And you can see that the satellites in the upper left-hand corner are different types of satellites. We have the LEO satellites, what's called Low Earth Orbiting satellites, and we have GEO satellites. Those are Geosynchronous Earth Orbiting and I'll describe those in more detail in a later slide. They are looking down at areas of the Earth for distress signals.

So the distress signals, after they're received, are relayed to something that most people would call satellite ground stations. In SARSAT terminology we call it the local user terminals. We, the United States, have a system of those I'll describe in more detail. Those receive the distress signals. Everything goes to a mission control center, which it automatically sorts and relays and sends data to rescue coordination centers.

So you see the various steps. Step 1 is a distress beacon. Step 2 is the relay through the satellite. Step 3 is the looking down link to the local user terminals. Then going to step 4, that then is relayed to the mission control center of which I'm co-located with the United States Mission Control Center for SARSAT. And then we automatically distribute the data based on a search criteria to various rescue coordination centers, RCCs.

Okay. So next slide.

The next slide is the U.S. SARSAT operational ground system that was in operation on October 1st, 2015, which is the day we received data attributed to beacons assigned according to our database to the *El Faro*.

On this map you'll see, over in Maryland, that NOAA's satellite operations facility, it's also the home of our U.S. Mission Control Center for SARSAT. We have three antennas on our roof looking at geosynchronous Earth orbiting satellites. Those are called GEOLUTs, LUTs being local user terminals. Then we have

one here in Maryland that looks for LEO satellites.

You see down in Miami, we have a -- on the Coast Guard COMMSTA Miami, we have two LEOLUTs. So we can track two satellites do a review. And then we have an experimental system called a MEOLUT that is over in Hawaii. We have two LEOLUTs, which are operational systems, and we have an experimental MEOLUT system.

In California at Vandenberg Air Force Base we had two LEOLUTs. They -- on October 1st, 2015 -- and I see I didn't label in this slide, but there are two there. We also have two LEOLUTs out in Anderson Air Force Base in Guam, and then two more at our NOAA Fairbanks Command Data Acquisition Station up in Fairbanks, Alaska.

So our operational ground system is displayed right there on October 1st, 2015. But you'll notice I have annotated the six antenna MEOLUTs which were experimental. Those are experimental LUTs, and they are based in Hawaii and Miami. And that will become relevant later when you see, but just the -- the MEOLUTs were not an operational system on October 1st. That's a cut and paste on the next slides, going from one slide to another on my part.

All right. The next slide is the operational satellite types. And we have two types of operational satellites on October 1st, 2015. We have low Earth orbiting satellites. These are at altitude of about 850 kilometers above the surface of the Earth.

They're in an orbit inclined at 98 degrees, and that's important for meteorological purposes, that inclination. But the only thing to know is that in any instant they are looking down at about -- because they're so close to the Earth, any individual satellite is looking at about 6 percent of the Earth's surface at any one time. They're traveling in this orbit and they orbit the Earth once every 100 minutes or so; you know, 101, some of them are 102. That's the low Earth orbiting satellites. That's the picture on your left.

The picture on your right is a -- shows a series of geosynchronous Earth orbiting satellites. Those are much farther out. They're -- from the center of the Earth, they're about 40,000 kilometers. From the Earth's surface they're about 35,000 kilometers out. They sit on the equator and their orbit speed is set up such that as they orbit the Earth, the Earth is rotating underneath of it at the same angular velocity. So they appear to be in the same spot on the Earth's surface over a 24-hour period. So there's no relative motion -- or no apparent relative motion in the geosynchronous Earth orbiting satellite relative to a transmission on the ground.

Okay. Next slide. And we go into a little more detail. Talk about the operational payloads between these two types of satellites.

So the LEOSAR, lower Earth orbiting search and rescue packages. Those satellites, because they're lower to the ground,

looking at 6 percent of the Earth's surface at any one time, they're looking down on that 6 percent and taking its footprint as they're traveling around the Earth, and they're looking for detections in the rescue frequency band of 406 MHz to 406.1 MHz. It's a 100 kHz band protected by the ITU, International Telecommunications Union, internationally for search and rescue.

Those LEOSAR payloads look for distress signals. They will save a signal if no ground station is in view for transmission when one is in view. But if there is one in view, it immediately transfers the distress signal to the ground. There is no location processing performed on board the satellite that for this payload.

The next payload that I don't have a picture of because it doesn't do much except show you that it's a bigger area. The GEOSAR payload sits out at 35,000 kilometers above the Earth's surface. It's looking -- it takes, say, about 40 percent of the Earth's surface. It also is looking for detections in the 406 to 406.1 MHz band. It's strictly for relay. And because there's no apparent motion, if the relay signal does not contain location information, all's it doing is relaying information on the beacon. So that particular notification, that'll choose say in the database, oh, that particular distress was a beacon in our database, it's assigned to the *El Faro*.

So that's the description of the two payloads. I'll pause here, if there's any questions. I went through a lot of material quick. I don't know, but I'll give you a couple of seconds to

catch up.

BY MR. WEBB:

Q. Go ahead.

A. Okay. If there's no questions, then I would like to go -- I think you will have it listed -- in the presentation it's going to be slide 6, but as an exhibit, if I can remember right, it was Exhibit 389. So I don't know if it will play out of your PowerPoint, but I've created a video showing, starting at 11:20 UTC on October 1st, and goes until about 12:20. That's the -- that shows the period where the reported position of the *El Faro* was relative to where the LEO satellites were. And I don't know if you want to click that simulation. If you can't do it in the PowerPoint presentation, click on the image and run it, like I said, I think you have it also as Exhibit 389.

Q. Yeah, we -- we're running it now.

A. So when you -- when we click this --

Q. Mickey, can you hold on one second, please?

A. Sure.

MR. CANNON: Just a -- Mike Cannon here, general counsel office. Just so you know there's about a 40-second delay between -- apparently a 40-second delay between what we're seeing in actual time to what you guys are doing.

BY MR. WEBB:

Q. All right. We're going to play the -- if you're on the screen, we'll clear it. So, go ahead.

A. Okay. So what this video shows is, on October 1st, 2015, this is a satellite model of the satellite orbit vectors and their positions on October 1st, 2015, for the time period of 11:20 to 12:20 Zulu. And what the red circles signify is the approximate coverage area, and it contains this coverage on any satellite.

So as the satellite is orbiting the Earth in a polar orbit -- this is a Cartesian projection because it's easy to see and I scaled it down. But you see noted on here, you'll see the satellites, a red circle annotating the approximate -- it's not exact, but it's approximate, and it's very close -- coverage area, instantaneous still view, for search and rescue distress detections.

You'll also see ground stations that the United States SARSAT program operates, you'll see labeled in Florida, California, Hawaii and Alaska. So as you go through this video, you'll notice that at the time period that the GOES, the operational GOES, geosynchronous orbiting satellites, polar orbiting satellites, detected transmissions was 11:35 to 11:59. During that period, I have a light blue circle will show up and show that the *El Faro* was transmitting. But you'll notice during that period that at no time during that period does a red circle from one of our LEOSAR satellite payloads fly over the *El Faro*.

So that's what I'd like you to get out of this picture if you run through the simulation.

(Video played.)

So you'll notice when the blue circle around the reported *El Faro* position goes away, that's when we have no detections through our GEOSAR system.

Okay.

MR. WEBB: We're going to do it one more time.

THE WITNESS: Sure.

(Video played.)

BY MR. WEBB:

Q. So Mr. Fitzmaurice, the information that was received at the RCC in Miami did not contain a position; is that correct?

A. That's correct.

Q. And that was off of what satellite?

A. The information it received at the RCC in Miami was off the GOES, the geosynchronous Earth orbiting satellite. GOES-East, which is located at 75 West along the equator.

Q. And so neither side of the LEO satellites never crossed the signal during that time frame?

A. Right. The reported position of the *El Faro*, it was never -- during the transmissions received by the geosynchronous Earth orbiting system, during that transmission period, from 11:35 to 11:59, there was no LEOSAR satellite in view of that position.

Q. What's the length of time normally a LEO satellite needs to actually pick up a signal?

A. A normal satellite pass for a low Earth orbiting satellite is about 15 minutes. So if you are in view, a normal satellite band,

they'll bump 5 degrees elevation we usually use for meteorological search and rescue, is a 15-minute. So if you are in distress and a satellite is coming in view, you should see it for 15 minutes.

Q. And will that give a position off that one LEO satellite?

A. The way the LEOSAR system works, once you detect a signal burst, you cannot get a position. What you're doing is you're measuring a frequency of arrival and a time of arrival. What you need is, you need three bursts to produce what's called a Doppler curve, because you do have a satellite orbit past the LEO satellite. And from those three bursts, the frequencies and the time, you can mathematically put a Doppler curve and work your way back to a time of closest approach, which means the satellite was at its minimum distance from the alert or a mirror image of the alert. Those are called A/B solutions for the LEO satellites.

I don't know to what level detail you want me to go to, but you cannot, from one single LEO satellite you can have more confidence in one solution than another. But you need more than one. You need at least three bursts. And this is with no coded information. This is strictly using Doppler processing from the LEO satellite and no code location. So you're working your way back.

The way the LEO system works, we would produce a real distress location and a mirror image, called an A and a B solution. It requires someone to map it to determine which of those two solutions at the time of closest approach is the one you

should actually go off and prosecute.

Q. And the other method is normally what?

A. Well, the other operational method is, if the distress beacon has a code location hit, if that beacon has the equipment and say we get a GPS location, it would relay that information up to a LEO satellite and to our GEO satellites and we relay it back down to the ground, and we can decode the encoded position. In this particular case, this beacon did not have GPS encoded location capabilities.

Q. Do you want to go to the next slide?

A. Yes. If we could go to the next slide, I think that will outline the timeline of the distress alerts received by our system. So slide 7, and it's titled, *El Faro* data received by GEOSAR at USMCC on October 1st, 2015.

So what you'll see, on the right-hand side is a chart showing every burst that was detected by our system. Now, the UTC time is listed. You'll see one column on the right labeled Maryland 1 and one labeled Maryland 2. Maryland 1 is looking at the NOAA GOES-East satellite located at 75 West. Maryland 2 is looking at the GOES-West satellite located at 135 West. They both have search and rescue payloads for relaying distress orders.

So you can see, of the 30 alerts, some were only received by one -- through one satellite; some were received by neither; some were received by both. This is an artifact of the radiation path of the distress beacon. And the fact that you're in a highly

dynamic position probably when you're out to sea, so the radiation pattern from the antenna of the EPIRB is probably oscillating and vacillating back and forth. So that would explain why you don't have a continuous series of 1's. I mean, if you're on a nice, flat surface and you're radiating up, these columns would be 1's all the way down. But this is just to signify the bursts that were received through our system, and the time.

And you'll notice that they're about 50 seconds apart. That's an artifact of the beacon. It's supposed to transmit on 50-second intervals with a slight variation on each transmission so that if you had two beacons going off at the same time, they won't jam each other. So --

But this is the only beacon we saw on this particular case. This is a list of the beacons that we received here, and these same bursts were received by other people tracking that same satellite display. Like I say, we only send out new information during RCC. So the first person to take in at 11:35, it was sent out at 11:39 to Coast Guard District 7 based on the registration database information saying that the beacon was registered to a home port Jacksonville, Florida.

Any questions on that slide?

Q. No.

A. Then I'd -- then I'd like go to the next slide.

Q. Okay. We're there.

A. So the next slide is LEOSAR passes over *El Faro* on October

1st. That video I showed you -- the simulation I showed you earlier, this kind of puts it on a piece of paper in front of you. It shows the timeline that the GEOSAR system detected bursts from the *El Faro* registered beacon. And then it shows you when the LEOSAR satellites were in view relative to that time.

So the time scale starting on your left is -- the very first part would be 0900 UTC. There's a slight hash mark. That would be 1000 Z, 11 Z, 12 Z, 13 Z, working its way up.

So this chart you're looking at starts at 10 Z. I'm sorry. 10 Z, goes to 14 Z. So the tic marks are 30-minute marks. So you'll see that the S10 satellite, which is NOAA 18. It's a NOAA low Earth orbiting weather satellite. Came into view, it looks like 10:20 or so -- and the exact times we have -- and then 15 minutes later it went out of view. This is in view of the *El Faro*, is what these viewing times are, the *El Faro*'s reported position.

A little bit later, because those satellites have a very similar orbit plain, S7, which is the NOAA 15 satellite, came into and out of view of the reported *El Faro* position. And then you at 11:35, the green area signifying when the GOES satellites were receiving transmissions from the *El Faro*'s registered beacon.

The last *El Faro* transmission was at 11:59, and that's why you see the green line, the second green line. And then you see that the next orbit of the S10 satellite, which is NOAA 18, it has a shorter duration because relative to the *El Faro* it was very low

elevation to the west of the reported position. The same thing a few minutes later, there was a smaller view time for S7. But it was a very low elevation and very far to the west. Again, this just shows you in a snapshot what that video simulation a few slides ago showed you.

You'll see that later on, S11, which is a European meteorological operation satellite called METOP-A, came into view around 1300 over the *El Faro*, but it had no detections in its system either.

Q. What are the average time of an orbit pass through these latitudes?

A. Again, a normal satellite pass from 5 degree elevation, approximate degree elevation, is approximately 15 minutes. If you get a high elevation match, it went straight over your head, it can be slightly longer. And of course if it's lower than 5 degrees elevation, could be smaller. It could be --

Q. And the next pass, when would it -- how long would it take for it to get around?

A. You're going to have to clarify for me --

Q. So the satellite passes over the area and then it has to go around the Earth again. How long does it take to for --

A. It's an average of about 100 minutes. It can be anywhere from 99 to 102 minutes for polar orbiting sun synchronous satellite, which is what NOAA operates.

Q. Is that at the equator or is that at the latitudes where the

El Faro is?

A. Well, in that two-orbit period it takes to go from crossing the equator, descending, to crossing the equator, descending the next time, and of course in that 100-minute period the Earth has rotated a certain number of degrees. So if it's 15 degrees an hour, then in 100 minutes, you've gone 22½ degrees the Earth has rotated at the equator. So if you cross the equator at 75 degrees, 100 minutes later you're going to cross it at 97½ degrees.

Q. All right. Next slide.

A. So a summary from the operational SARSAT system. I've already stated earlier that the USMCC sent an alert at 1139 to Coast Guard District 7 based on the initial Maryland 1 detection through the GOES-E satellite. That -- again that distribution to Coast Guard District 7 was based on the information in the registration database that listed the *El Faro* and the various other information the home port of Jacksonville.

So there was no location associated with that alert and therefore any additional data that came in, which I showed you earlier every burst, was not also sent out just because there was no new information other than we had the alert from that particular distress beacon.

So our conclusion, forensically looking at our operational system, was that we detected the distress beacon through our geosynchronous environmental orbiting satellites from 11:35 to

11:59, which due to the timing of that transmission period and the lack of any LEOSAR satellites in view of the *El Faro* during that period, we were unable to produce a location of the distress alert. The beacon used lacked the GNSS encoding capabilities and so that would have been the only way in this particular situation that the GEOSAR system could have provided a more exact location.

And with that, I'll pause and ask for questions.

Q. So how many LEOSAR satellites are available right now?

A. There are five LEOSAR satellites. Three are operated by NOAA, National Oceanic and Atmospheric Administration, and two are operated by the European Meteorological Satellite group -- yeah, EUMETSAT.

Q. And of these satellites, what's their age?

A. Okay. The NOAA 15 satellite, which is also called SARSAT 7, was launched in May of 1998. The NOAA 18 satellite, which is called SARSAT 10, was launched in -- let me check my notes. Stand by one second. The NOAA 18 satellite launched in 2004; that's SARSAT 10. The SARSAT 12, which is called NOAA 19, that was launched in February of 2009. The METOP-A satellite, which is S11, was launched in 2006. And the METOP-B satellite -- I'm going to have to look at my notes again -- was launched in 2012.

Q. So with the age of the satellites, are those relatively old or young satellites?

A. I would say, based on historical data, anything older than 7 years is considered an older satellite, but we see no performance

issues in terms of the search and rescue payloads on these satellites. That's why they're still being used.

Q. And what's the future of the LEO satellites? Do you have new satellites going up, or payloads going up on new satellites?

A. At this time there are no scheduled LEO search and rescue satellite packages planned for launch. So this is the LEO system that we currently have is the one that we have. There are no new assets right now being manifested to launch.

Q. So you spoke of the MEO system, which is an experimental system, at least at the time of the *El Faro*. Can you speak to that system and what it's going to provide?

A. Sure. So I produced a -- it's Exhibit 390, and we're going to talk about the MEOSAR. These are medium Earth orbiting search and rescue satellites. These satellites, most people are familiar with them was GPS satellites for the U.S. constellation.

The European Union has a series of satellites, they're the same type of satellites used for global navigation, but they have search and rescue payloads that are called Galileo. And the Russian Federation has a series called GLONASS, which is I guess short for Global Navigation Satellite Services.

So as a system, U.S. Air Force flies the GPS satellites, but the payload that they have aboard enables us to relay distress signals in view of the MEOSAR satellites. There are currently 20 GPS satellites that have a search and rescue payload.

MR. CANNON: Just -- Mike Cannon, Department of Commerce

general counsel. Are you guys still transmitting? Because we just lost your signal.

MR. WEBB: Well, I think this is a good time to take a recess. We'll check that.

CAPT NEUBAUER: Yeah. We're going to take a short recess and get right back.

MR. CANNON: Okay.

CAPT NEUBAUER: The hearing will now recess and reconvene at about 1:40.

(Off the record at 1:32 p.m.)

(On the record at 1:45 p.m.)

CAPT NEUBAUER: The hearing is now back in session.

We'll continue on with questions from Mr. Webb.

BY MR. WEBB:

Q. Okay, Mr. Fitzmaurice, go ahead and continue on with your presentation.

A. Okay. So now we're going to talk about an experimental system that NOAA has been building and testing to work with the medium Earth orbiting satellites that are operated by the U.S. Air Force, the European Union, and the Russian Federation, this MEOSAR, medium Earth orbiting search and rescue system.

NOAA has built two ground stations. Early on, I inadvertently put them on the operational slide. Let me point out that these MEO ground stations, on October 1st, 2015, were just being built and were just being tested and accepting data. But

they were operating, you know, to the degree where they were taking data from MEO satellites.

So this presentation, I guess you listed as Exhibit 390, up on the first slide which you are showing. And again, I point out that NOAA had two MEOLUTs under test, one in Hawaii and one in Florida. And then the European Union at Larnaca, Cyprus, had a MEOLUT under test at the same time.

So going to the next slide, there's a pictorial view of just a few MEOSAR satellites that -- I'm hearing an echo. So what it shows is a pictorial view of how many MEOSAR satellites are in view of a MEOLUT. And you'll see on this particular picture -- this is not a picture of the *El Faro* incident, but we have experimental MEOLUT also at Goddard Space Flight Center. And so, if you look on this particular picture, this is not a picture representing the MEOSAR configuration on October 1st, 2015. This is just to show you fields of view and how many MEOSAR satellites are in view of a particular MEOLUT at any one time.

In this particular case, you see lines going to four. That's just to show you that there's more than one satellite in view and their coverage areas different colors. Again, this is just to demonstrate visually what the MEOSAR system is.

We have two ground stations that I note on the right-hand side at Coast Guard Communication Station Miami and Coast Guard Communication Station Honolulu. They were undergoing a demonstration and evaluation testing, and their data was not being

routed to the MCC for operational use, one, because we didn't know the accuracy of it at the time, and also these systems weren't manned 24/7/365.

With that said, if we go to the next slide, now I'm going to show you pictorially what data we received from that MEOSAR system for the distress beacon that was registered to the *El Faro* that we picked up on our operational GEOSAR system. So we went after the fact, many days after the fact, we went after the incident occurred on our operational system, we said, let's go get all the data that we possibly saw from our MEOLUTs.

The Florida MEOLUT from a reported position of the *El Faro* beacon distress signal was about 900 miles away. Hawaii, of course, is another 5,000 miles on top of that, so it's almost 6,000 miles away. Larnaca, Cyprus, my geography's pretty good, but I'm guessing that's about 4,000 miles away from the reported position of the *El Faro*.

What you see on this slide annotated by -- or essentially the pin-tacks, the colored pin-tacks, you'll see a -- the second from the right-hand side, it says reported location. That location was received by us through the Coast Guard and against their incident history database report. And that location, I think, came out of an INMARSAT report location from an INMARSAT beacon.

The beacon on the right is a Hawaii MEOLUT calculated position. And you see it only got one position and it got at 11:39. What that essentially means is there were three satellites

in view of the *El Faro* and/or MEOLUT simultaneously. And Hawaii, at 6,000 miles away, tried to compute a location. And again, it was -- this system was under test. So, you know, at the time we don't know if we are optimizing the best satellite for Hawaii or anything. We're just taking matches.

On the left-hand side, the two green thumbtacks, you see that the Cyprus -- the Larnaca, Cyprus MEOLUT, it actually computed two positions, one at 11:39 and 11:44. What to note on these locations, even though their accuracy is off and these systems were under test and experimental, the time fits within the time that our operational system saw distress bursts from the *El Faro* registered beacon.

So then we see the closest MEOLUT we had is the Florida MEOLUT. And those are the two yellow thumbtacks. And again, those positions -- the reported location, I can't say how accurate that reported location was at the time that we generated this particular. I can just testify that the paces as computed by these experimental MEOLUTs, that's accurate. That reported location was just given to me. It's not of my own doing or from any data I had other than what was provided to me.

Okay. The data that backs up this pictorial presentation is on the next slide. So when you get to the next slide, you're going to see a list of every burst that came through our experimental system from the *El Faro* registered beacon. The MEOLUT ID will be on the left-hand side. So our four MEOLUT in

the International COSPAS-SARSAT system has an ID of 3669. That represents our Florida MEOLUT. Our Hawaii MEOLUT is 3385, and then the foreign MEOLUT for Cyprus, because it was experimental, ends up given a number 7106. And then you'll see another foreign on there, and that was Turkey. And the only reason I know that is because it was data that we did receive.

But now when you read across each row, you start with row 1, you'll see number of packets, which means the number of bursts received through an individual satellite link. The satellite link in the next column will tell you how many different satellites were relaying data. Because there was only two satellites, you're not able to compute a lat-long altitude and time. So at that time, 11:35, we received hits, just like the GOES, operational GOES system did, but we weren't able to produce an independent location.

Again, you see our foreign MEOLUT and our Hawaiian MEOLUT both did the same thing, both got two satellites both at the same time. The foreign MEOLUT, 50 seconds later, got the next burst, but it was only through the one satellite, no way to do anything, to compute a location.

We keep going down, and you'll see -- we eventually get to Florida where there are three packets received through three satellites, and that was at 11:39:17. And we computed a location based on satellite geometry, and we produced a lat-long. And then there's a quality factor with it. That quality factor goes from

000 to 999, being the best. So that was a quality factor of 773. At the time, that quality factor, we were trying to correlate quality factor with our test beacons and it -- so in this particular case, because I don't have an actual location of where the distress beacon went off, I can't correlate that number. But I can tell you, since then, we've done that kind of mapping. So in the future, essentially now, 1½ years later, we have an expected horizontal error, not a quality factor.

You see Hawaii also, on that same burst, it had four packets but it obviously was tracking the same satellite twice because it's only through three independent satellites. And it produced a location and its location was slightly different, and that's depicted pictorially on the slide that I had previously up.

You'll see if we keep going down, that Florida again tried at 11:43:26 to produce another location. It was a little higher quality factor, so have a lot more confidence. And then the data from Hawaii, after that, even more confidence.

So slowly but surely based on this experimental data, that we zoomed in on a location and we became much more confident. Like I said, this was experimental at the time. This is the data. This is all the data that we received for that particular beacon. And the time of the data was received to the time that the location was computed, all fits in within what the operational system saw. So it's -- we have high confidence that the distress beacon registered to the *El Faro* only was going off during this time

period.

And with that said, I'll go to the last slide. And the reason this slide is relevant, because it showed you which satellites the burst came through better, that the Hawaii and Florida MEOLUTs -- it's a little tough to see, but at the top of the chart on the right, you'll see Hawaii and then to the right of it you'll see Florida. And we have the satellites that they were tracking during this time period. So when you see a 1, it annotates that burst came through that satellite.

So these satellites, if you look at them, because Hawaii was operating by itself and Florida was operating by itself, you had two satellites; you don't have the required three so no location could be done. We have since, to this day, and presently today, February 15th of 2017, these are early operational assets. They are networked together.

So I don't know if we should go down this path, but going back, if we had this situation, we would've been able to produce a location at 11:35:55 with the MEOSAR system. We could not do that when these experimental systems were under test on October 1st, 2015.

You'll see highlighted in yellow the first time each LUT was able to get three bursts, independent bursts through three satellite links and produce an independent location. And you'll see that happened at 11:39:15, 11:43:25, 11:47:35, 11:50:05, and again at 11:58:25, and 11:59:15. So that's all of the data that

the experimental MEOSAR system that the United States operates received on October 1st, 2015, for the beacon registered to the *El Faro*.

Q. And all these times are in Zulu time that you gave. The time on Eastern Daylight Time is 0700, the hour 0700.

So with that, what is the status of the MEOSAR system today?

A. Today the Hawaii and Florida MEOLUT systems, in Hawaii and Florida, are in their operational capability. They are networked together so they share data. So one MEOLUT just tracking a single satellite, and the other one's tracking two satellites, and they're all independent, we're able to produce a location off of a single burst. That data is being shipped to the Coast Guard now under the signals that the operational LEO and GEOSAR data is. And we're, like I said, early operational capability, and since December 12, 2016.

Q. Has there been --

A. I stand corrected. December 13, 2016.

Q. Has there been any cases that MEOSAR has played a role since that time?

A. I didn't hear that question clearly.

Q. I said has there been any cases that MEOSAR has played a role in since it's been put in initial operation?

A. Yes. There are numerous cases since that day. MEOSAR, because of the sheer multitude of satellites, provides a early detection capability. And because of multiple satellites and the

view -- they hit, take a still view of each of those satellites is about 33 percent of the world. And every beacon that goes off now, whether under a test scenario or an actual distress or just an inadvertent activation, we have many, many more detections than we do over the previous operational system of only LEO and GEO.

If you remember, a LEO satellite at any instant only sees 6 percent of the Earth and it only see that area for a certain period of time, a few times a day. These MEOSAR and the number of satellites and the field of view of each satellite, detection and processing of locations has gone up dramatically since December 13th, 2016.

Q. How many satellites are now operational?

A. We're using 20 of the United States Air Force's GPS satellites and we are using, as of today, 8 of the Galileo satellites operated by EUMETSAT, or not -- EC. I'm sorry. They're not EUMETSAT satellites. They're operated by the European Commission -- or European Space Agency, European Commission. And we don't have any Russian satellites in our schedule right now due to performance issues with their payloads on their satellites.

Q. Okay.

A. So to answer your question, 28 satellites are being tracked by our Hawaii and Florida MEOLUTs now.

Q. What's the ultimate goal for the number satellites that will be operational, when it's fully operational?

A. With the constellation of those fully populated, we expect 24

GPS satellites, 28 Galileo satellites, and then the Russian Federation should have 24 satellites.

Q. And what's the estimated year of that?

A. For all those satellites? I think, looking out -- now you've got me answering off the top of my head. Give me one second to get it. I don't know the answer. I'd only be speculating, but it's going to be in the mid to late 2020s. I can't give you an exact answer because I don't know launch manifest and stuff like that. I do know 20 of the 24 GPS slots right now are populated with search and rescue payloads in them.

Q. And those search and rescue payloads are independent from the other payloads on it; is that correct?

A. They are independent -- well, no, I stand corrected. The payloads that are currently flying on the GPS satellites are a shared payload with another government agency. So we do not have control in search and rescue, so that could become an issue. We expect to start putting our own dedicated payloads in on GPS satellites in 2022.

MR. WEBB: That's all the questions I have. I'm going to turn it over to Mr. Jon Furukawa for the NTSB. Thank you.

Mr. Furukawa.

BY MR. FURUKAWA:

Q. Good afternoon, Mr. Fitzmaurice.

A. Good afternoon, sir.

Q. The *El Faro*'s EPIRB transmitted for about 24 minutes, from

11:35 Zulu to 11:59 Zulu, and it had one unlocated first alert. How long until the second unlocated alert was transmitted?

A. So just to clarify what you're really asking. We received all kinds of alerts in, it just -- what we send down to the RCC, are you asking me what data we received in the mission control center or what data that we sent out to the rescue coordination center?

Q. No, this is for the LEO satellites to the Earth for the *El Faro* at the time. The *El Faro* --

A. There was no LEO-received transmissions in the USMCC Miami ground stations. There was no -- the only transmissions we had received into the mission control center were from our GEO satellites, our GOES-East and GOES-West satellite. That was at 11:35 Zulu.

Q. And how long does the EPIRB have to transmit to get a position or to get a second located alert?

A. It gives a second unlocated alert -- the next burst in a normal, a nominally operating beacon would be 50 seconds later. But it appears we didn't receive that burst from either GOES-East or GOES-West satellite. Then 50-seconds subsequent to that missed burst, we did receive a burst through our GOES-East and GOES-West satellite at 11:36:45. So the first two bursts received by the USMCC were 11:35:05 -- it looks like we have seconds here -- from the GOES-East satellite. And then at 11:36:45, we received it through the GOES-East and GOES-West satellites. So essentially

100 seconds later.

Q. Okay. But would the MCC, would they get a second unlocated alert message after about 30 minutes or so of no position?

A. The only time they would send out an update is if new information came in. This would be an open case -- I'm going to let the Coast Guard RCC's comment on that. I sit here at the MCC. Our rules are if new information comes in -- and there is a timer. We will let you know the beacon's still going off. But the timer for this particular case of 30 minutes wasn't reached.

I mean, we stopped receiving at 11:59. So we had 24 minutes into an essentially a 30-minute window with no additional data. We got much more data in, but none of it was any better than the previous. It was -- the failure rates on the data received, it was all good quality data, good transmission. They matched. We know it was the beacon registered to the *El Faro*, each one of these bursts. So we interpolated that there was probably 30 bursts during that period. Chart number 7 of Exhibit 391, my very first presentation, that lists the timeline of the beacon -- the bursts that were detected by our GEOSAR system.

Q. Okay. Let's see. You said earlier that an EPIRB that was not GPS enabled to getting a position, best case was about 15 minutes?

A. Okay. Now I want to clarify that. If you have an EPIRB that does not have GPS encoded location, what has to happen is, it has to get off three bursts to a LEOSAR payload satellite. If you get

three bursts off over a 15-minute view of a nominal window -- 15 minutes is -- if the EPIRB is bouncing up and down in high seas, of the 15 minutes that the satellite's in view of that EPIRB, if you can get three bursts, those three bursts enable you to produce a curve, a Doppler curve that can allow a mathematical determination of the time of closest approach to a possible location and a mirror location.

So the satellite track will be overhead. There will be a location on the left side of the track and the right side of that satellite track. This called an A/B solution. One of them is real, one of them is a mirror image. That's all you can get from our current LEOSAR system.

If you need -- so you need the -- the beacon has to go off three times to even have a chance to give you the location. And you also need those three bursts to be detected by a satellite in view. So you're hoping that that goes off during one of these 15-minute viewing windows.

With five satellites, the LEO satellites at the time, you're probably, over the course of 24 hours, if they were all separated perfectly, you'd see one every few hours.

Q. Okay. And that leads me to my next question, is what's the worst case for an EPIRB that's not GPS enabled to produce a position? A few hours, is that 2 hours, 3 hours?

A. The worst case?

Q. Correct.

A. If the beacon is continuously operating -- if it's continuously operating, the worst case could -- at the equator, the worst case scenario, based on our calculations of our average wait times, it could be up to 4 hours. That's a worst-case scenario.

Q. Okay. And with the *El Faro* about 23 degrees north, what's the worst-case scenario for that one?

A. In the mid-latitude? I'm going to have look up some notes here because I don't have that. You know, we have charts and I can go grab those, but I wasn't prepared to go down this path. But I can easily do that.

At the poles, of course, you got five satellites operating every 100 minutes and, you know, so at the poles you're constantly looking over the same area, so your wait time at the higher latitudes is going to be very small. Your wait time at the equator could be very large, worst case. But your worst case at the poles is going to be not too bad. Your worst case at the equator is going to be your worst case. Mid-latitudes like this is somewhere in between the two.

Q. Something less than 4 hours?

A. Yes.

Q. Okay. Let's see. And the LEO -- or correction -- the GEO satellites, they would have picked up a personal locator beacon, correct?

A. Yes. They will if they're not obstructed by -- their antenna

radiation pack is not obstructed in view of -- from the beacon to the satellite. There are times when you have obstructions in your radiation pack. If you're down in the Grand Canyon or if you're next to the housing, the ship's housing on a boat, or in an airplane in a side of a mountain, you could be on the side -- the opposite side, and you have your radiation pack obstructed by the local landscape. Usually a maritime environment, the only obstruction would be the local obstruction of the ship or the boat.

Q. Okay. The *El Faro*'s EPIRB was transmitting for about 24 minutes, and the MEOSAR picked up 13 transmissions and the transmissions are spaced apart about every 50 seconds. Shouldn't the MEOSARs, theoretically, over that 24-minute period have picked up something like around 28 transmissions?

A. Okay. Let's clarify. The experimental system is using -- was using experimental satellites tracking many satellites that had co-visibility with the *El Faro* area. So the fact that you got more transmissions, those are the same transmissions that some were picked up by the GOES. I didn't do a line of which ones were picked up by MEO and weren't picked up by the operational GEOs and LEO. I did not do that. But the point is the transmissions picked up by the experimental MEOSAR system were all in the timeline of the GEOSAR system.

Q. Okay. And getting on with the question about two or three questions ago, what would have interfered with the EPIRB

transmissions from the *El Faro*'s EPIRB?

A. The possible interference sources -- I may have missed one, but there's local terrain mask. That's when there's infrastructure, super-structure of a ship. You could have another beacon transmitting at the same time and, you know, these are half-second bursts of digital transmissions. Should they overlap and one of them is trying to send a 1 and another's trying to send a 0, it's sends a signal received by the satellite and down to the ground would be garbled and there might be data errors and you would not clean reception of the distress beacon. You wouldn't know -- you wouldn't be able to associate it with something in the registration database. We have -- the beacons are coded very strictly with an error correction codes so that if there are minor errors, we can detect those and correct them. And that's a standard -- the PCH code used in a lot of communication, digital communication channels.

Q. Okay. And what would have caused the *El Faro*'s EPIRB to stop transmitting after 24 minutes?

A. I don't know. I can't answer what happens on the *El Faro* after 24 minutes. I can tell you, I can just -- I don't know what would cause the *El Faro* to stop transmitting.

Q. What's the accuracy of the MEOSAR satellite system for positioning?

A. The experimental MEOSAR system on October 1st or the experimental -- the operational system now?

Q. How about both?

MR. CANNON: Excuse me. This is Mike Cannon here, general counsel's office. Just curious as to the relevancy of the questions on the experimental system at the time that the *El Faro* went down as to -- you know, as far as what we're looking at here.

BY MR. FURUKAWA:

Q. We're going to go from the LEO system to the MEO. What I think the MEOSAR eventually was going to be about, what, 5 kilometers or so?

A. The specification is to be able to locate from a single distress beacon burst without any coded location, just a distress beacon. The specification is to locate from a single burst anywhere on the surface of the Earth within 5 kilometers.

Q. Within 5 kilometers. Okay.

A. Yes, a 5-kilometer radius. That's from a single, from a single burst.

Q. Single burst with a fully operational system?

A. On any encoded location.

Q. And that's a full MEOSAR system?

A. That is. That's a fully, fully populated ground segment and fully populated space segment.

Q. Okay. And you said earlier that a footprint of a LEO satellite is about 6 percent of the Earth's surface. What would be the footprint of a MEO satellite?

A. A MEO satellite is approximately 33 percent of the Earth's

surface based on its altitude from the center of the Earth.
Q. And a GEO satellite, what kind of footprint?
A. It's closer to 40 percent.
Q. A LEO goes around every -- averages every 100 minutes and --
A. That's a single LEO satellite orbits around once every 100 minutes, that's right. But we have five LEO satellites and two of them are in the same orbit plain. The other three are just -- actually two of them are in two orbit plains and a third was in a distinct orbit plain. So we have three different orbit plains with one satellite in one and two satellites in the other, and the orbit period is about 100 minutes.
Q. Okay. What's the orbit period of a MEO satellite?
A. About 12 hours over a particular spot. And an orbit period for a MEOSAR satellite -- a GPS, I should say.
Q. Okay.
A. I should say -- let me try to clarify. Off the top of my head, I don't know what the orbit period is. They're very similar but they're slightly different. But a GPS satellite is about 12 hours.
Q. Okay. So the MEOs, that satellite, its primary purpose is a GPS satellite?
A. Can you repeat the question? I didn't hear the end of it?
Q. For a MEO satellite, the satellite itself, its primary purpose is GPS and secondary purpose is SAR?
A. It's not even a secondary purpose. It was an experimental

payload, Data Force Research Lab. We worked with them in the early 2000s and with NASA, and we decided, hey, this is the way of the future. This payload that we're using on the current GPS satellites is an experimental payload. It is not designed solely for search and rescue. It just has a search and rescue channel on it.

Q. Okay. So --

MR. CANNON: Mike Cannon here. We need about 10 seconds. Just one moment please.

MR. FURUKAWA: Roger.

(Pause.)

THE WITNESS: Okay, sir. We're back. Thank you.

BY MR. FURUKAWA:

Q. Okay. So for the MEO, its main purpose is -- GPS and SAR are all kind of rolled into one; is that correct?

A. The MEOSAR system is essentially the search and rescue program, the International COSPAS-SARSAT program's goal. GPS is made to teach -- to tell you where you are; the MEOSAR is made to use the GPS system to tell us where you are in distress. So it's in the reverse direction.

You know, when you hold a GPS receiver, you're looking at -- instantaneously right now there's probably 11 GPS satellites in view of where you're standing right now. And your GPS receiver is looking at all of them and it's picking the best four to determine the lat-long altitude and time you're sitting there. Well, that's

great. That's tells you where you are. We're doing the opposite effect. If you transmit, we are doing location, you know, based on frequency and time in the reverse direction to tell us where you are located, off of one single burst.

Q. Okay. Let's see. Two more questions. For the LEO satellites --

A. Go ahead.

Q. The main purpose of the LEO satellites, is it for location or is it for something else?

A. The LEOSAR satellites were the first search and rescue satellites derived from a joint NASA, back then Soviet Union joint venture, back in the late '70s, early '80s. It uses a Doppler principle of if you have a transmitter on the ground continuously transmitting a distress and your satellite flew over it, you could do a location algorithm on the received frequency and calculate a location, a possible location with some accuracy.

It started out in using a 121 MHz frequency. The military uses a 243, and a civilian -- actually the digital communication channel is the current 406 MHz. So it's evolved over the years. But LEOSAR is the heritage emergency distress location SARSAT system.

Q. Okay. And how about for the GEO satellites, is it also SAR or is it communications or -- primary purpose?

A. The GEO satellites are NOAA's GEO stationary Earth orbiting satellites, that you see -- you can usually -- used mostly for

meteorological purposes and for relaying environmental data. Or in the early '90s it was -- we would put search and rescue payloads on there as we went to the digital 406 MHz frequency because we could relay integral data distress and possibly start prosecuting a rescue early.

And that's what happened in this case. The GEOSAR system evolved, and started in the'90s, we picked a distress location from a beacon, a digital beacon in the 406 MHz frequency band from -- that was registered to the *El Faro*, and so we were able to look it up. But there were no LEOSAR satellites in view while that transmission was occurring so no independent location was possible.

What did happen with the experimental system is while that distress beacon was transmitting, and this is -- you know, like I say, this was after the fact, we go back and look at what data the experimental system had, because it wasn't -- it was still being accepted by the U.S. government. We found data during that time period that the GEOSAR system received alerts, the MEOSAR system tried to calculate location. And that happened -- I forget the exact number, but they're listed in one of the presentations. There are 1, 2, 3, 4, 5, 6, maybe -- 7, 8, 9 -- maybe 8 or 9 MEOSAR locations produced by a U.S. MEOLUTS. And then there's a few sent in by Laranca, Cyprus.

Q. Okay. And last question. Mr. Webb asked you this, but as the LEOSAR -- or the LEO satellites degrade, is there a plan to

replace them?
A. At this time I don't know what the plans are in terms of launch manifests for the LEOSAR payloads. I currently don't know of any.
MR. FURUKAWA: Okay. Thank you very much. That's all I have, Mr. Fitzmaurice.
THE WITNESS: Thank you, sir.
CAPT NEUBAUER: Mr. Fawcett.
BY MR. FAWCETT:
Q. Good afternoon, Mr. Fitzmaurice and counsel. My name is Steve Fawcett. I am a Coast Guard investigator. I appreciate your report and the very technical nature of your report.
The first question I had for you was, looking at the data coming up to the satellites, was the *El Faro* EPIRB the type that would actually send GPS-encoded information in the transmissions?
A. No, sir. This particular device did not have a GPS-encoded capability.
Q. Do you know what vessels are required to have GPS-encoded EPIRBs aboard?
A. I do not know that answer. That's I think somebody in the Coast Guard.
Q. All right. We've heard about the duration of the transmissions that you captured from the EPIRB. Can you tell me what the expected transmission time would be? In other words, is it a number of hours or a number of days?

A. I can tell you the beacon specifications for certification to be usable in our system, to be certified to be usable and sold worldwide, that they should be able to go off for 48 hours at 50-second intervals. So a normal beacon in storage, just sitting and without any issues, has been tested and certified reliable to transmit from the initial activation to 48 hours, every 50 seconds.

Q. At the time of the accident, as an expert in EPIRBs and those systems, was there an EPIRB available that in combination with a voyage data recorder would float free and provide not only the voyage data recorder information but send the satellite encoded GPS signals?

A. They have available in the marketplace an EPIRB to do that. This particular beacon was not one that had GPS signals encoded.

Q. Okay. But the question is, a great deal of expense was expended three voyages out to recover the voyage data recorder of the *El Faro*, which was located on the bottom at 15,000 feet. And I guess the core of my question, do you know if there is a device that incorporates the VDR and the EPIRB at the time of the accident that would float free from the vessel as it sunk?

A. To my knowledge here in the control center, no. That's somebody the Coast Guard could probably answer that. I cannot.

Q. My last question to you is, once you learned of the loss of the *El Faro*, could you please talk about the influence the loss of the *El Faro* had on you and your colleagues as they did their work

in the EPIRB area and the satellite area?

MR. CANNON: Excuse me. Mike Cannon here, general counsel's office. Just curious as to the relevance of the question. Mr. Fitzmaurice said that his colleagues consistently on a daily basis do their jobs. Again, with all due respect to the question, what is the relevance, quite frankly, of the question?

CAPT NEUBAUER: Mr. Fawcett, I recommend -- I recommend we just withdraw that question.

MR. FAWCETT: The question is withdrawn. Thank you, sir.

BY MR. FAWCETT:

Q. Did you receive at the ground stations any other EPIRB alerts on the 1st of October 2015?

A. We received numerous alerts from other agents set off in the viewing areas of the GOES-East, GOES-West, and from LEOSAR satellites over Alaska, Hawaii, California.

Q. Do you recall --

A. So the answer is yes.

Q. Thank you, sir. Do you recall if there was an EPIRB hit from a Motor Vessel *Minouche*?

A. Not off the top of my head, no. I can go look that up, but I don't know.

Q. If you could do that, that would be appreciated.

A. Oh, right now?

Q. No --

A. You're going to have send the information.

Q. Yes, sir. We will.

MR. FAWCETT: All right. Thank you very much. That's all I have, sir. Appreciate your time.

CAPT NEUBAUER: At this time I'd like to go to the parties in interest for any questions.

TOTE?

MR. REID: No questions, sir.

CAPT NEUBAUER: Mrs. Davidson?

MR. BENNETT: No questions.

CAPT NEUBAUER: ABS?

MR. WHITE: No questions, sir.

CAPT NEUBAUER: Are there any final questions for Mr. Fitzmaurice at that time?

Mr. Fitzmaurice, you are now released as a witness at this Marine Board of Investigation. Thank you for your testimony and cooperation and for compiling the presentation.

If it is determined that this Board needs additional information from you, I will contact you through your counsel. If you have any question about this investigation, you may contact the Marine Board recorder, Lieutenant Commander Damien Yemma.

THE WITNESS: Understood. Thank you very much.

(Witness excused.)

CAPT NEUBAUER: The hearing will now recess and reconvene at 2:45.

(Off the record at 2:32 p.m.)

(On the record at 2:50 p.m.)

CAPT NEUBAUER: The hearing is now back in session.

At this time we'll hear testimony from Mr. Devaney, Harding Lifeboat Services.

LCDR YEMMA: Sir, would you please stand and raise your right hand.

(Witness sworn.)

LCDR YEMMA: Sir, would you please start by stating your full name and spelling your last name for the record?

THE WITNESS: My full name is Tio Devaney. My last name is spelled Delta-Echo-Victor-Alpha-November-Echo-Yankee.

LCDR YEMMA: And can you please tell the Board where you're currently employed and what your position is?

THE WITNESS: I'm currently employed with Palfinger Marine as the operations director for the Americas.

LCDR YEMMA: And can you also tell the Board a little bit about your responsibility in that position?

THE WITNESS: I'm the operations director for the Americas region. I have complete oversight for all the operations. That includes service as well as after-sales support to owners of Palfinger marine equipment, which encompasses a number of different makers that have been bought or acquired over time.

Q. And can you also tell the Board a little bit about your prior work experience related to your current position?

A. I think what I'll do is I'll just give a brief summary of my

overall experience. Okay. I've been involved in marine safety since the early '90s, having sailed initially as a naval officer. And then having completed a naval architect and marine degree program at the U.S. Coast Guard Academy, graduated in 2001. At which time I returned to the Bahamas government, was working as a port state control officer at first. Then eventually transferred to the Berlin office where I was a technical officer directly involved in a lot of other maritime safety-related matters.

I was then recruited by the Lloyd's Register as a surveyor initially. I worked my way up through the ranks to a senior surveyor and principal surveyor, where I was the global lead for lifesaving appliances within the group. I later transferred with Lloyd's back to Florida in 2007, where I was the development manager for the passenger ship support group.

Then in 2012, I started a company up the Americas region. It was a global company, but I started in the Americas region, office up for survival factor inspections, which is a competitor to Harding Safety. I did that for 3 years, and then I was recruited by Harding Safety, at the time initially as a sales director. And then after 1 year, I transferred and I came to the operations role as the operations director.

In addition to my role as an operations director of Harding Safety, I'm also a flag state inspector and I represent a number of different administrations that include all the Red Ensigns, Red Ensigns being Isle of Man, Bermuda, Cayman Islands. I'm also a

nautical inspector for Bahamas Maritime Authority. I represent Malta as well as a number of other flags for maritime safety related things.

CAPT NEUBAUER: Mr. Devaney, I think -- could you pull the microphone closer and then speak a little slower. They're just having trouble, the court reporters.

THE WITNESS: Roger that. Where would you like me to start over again?

CAPT NEUBAUER: I think we can get that. If you just pull the microphone closer for the remaining -- you need to move the whole system -- yes, sir. Thank you.

THE WITNESS: I was just avoiding the feedback.

LCDR YEMMA: And, sir, do you hold any professional licenses or certifications?

THE WITNESS: I do. I'm a chartered marine engineer within Europe. I hold a master's degree in maritime operations and management. And I'm also -- with Lloyd's Register management program, which is a new category within Lloyd's Register group that recognizes technical talent.

LCDR YEMMA: Thank you, Mr. Devaney.

Mr. Furukawa from the NTSB will start your interview.

(Whereupon,

TIO DEVANEY

was called as a witness and, after having been duly sworn, was examined and testified as follows:)

INTERVIEW OF TIO DEVANEY

BY MR. FURUKAWA:

Q. Good afternoon, Mr. Devaney. So a port state control inspector for the Bahamas, Isle of Man, Cayman Islands, Malta and who else?

A. Currently I think -- I'm not acting currently as a port state control inspector. I have worked as a control inspector previously. Currently, I'm an authorized flag state inspector for a number of administrations, them being the Red Ensigns, which would be Isle of Man, Cayman, Bermuda. I also represent the Bahamas. I hold authorizations for Malta as well. As well as other administrations on an ad-hoc basis.

Q. Please describe your lifeboat expertise. You said that you're lifesaving aid for Lloyd's?

A. Yes. During my time working at Lloyd's Register in the UK, I was directly employed in the technical department. And while in the technical department, the discipline which I had oversight for was LSA and FFE, which is firefighting equipment and lifesaving appliances. So at that time I was directly involved with a lot of new designs as it pertained to lifeboat designs, complete systems, including davits and winches as it relates to rescue boats and lifeboats.

Q. Please describe the evolution from open side-launched lifeboats to enclosed side-launched lifeboats, and finally to stern freefall enclosed lifeboat capsules.

A. Okay. In summary, depending on a ship's design, owners/operators can have a selection of type of equipment that they wish to use, being a lifeboat that would be launched over the side, which is typically known as a conventional lifeboat launched by two davit arms and fall lines, or they will have the option of using a freefall lifeboat, which is typically launched at the stern and is just launched once the release of -- releases a lifeboat so that it can slide down the trackway and into the water. Those are the two primary lifeboat types of systems.

And over time the systems have evolved, the most notable date being 1986. Pre-1986, there was -- there were open type lifeboats, the type of lifeboat that was found on the *El Faro*. Now what happened in 1986, there was a change to the regulation that included open lifeboats on certain types of ships. And the revisions then permitted the use of partially enclosed lifeboats but only on vessels that were non-tankers or non-cargo ships, in other words, passenger ships. But they still had to have some degree of survivability features to them, which is one of the main features lacked in open lifeboats.

Q. And then can you go on, from 1986 with enclosed lifeboats and how it relates conventional launched and the freefall?

A. One of the changes in the regulations specifically in 1986, it didn't -- the regulations actually came into force in '86, but they were approved sometime in the early '80s, I think '82 or somewhere about. It changed the requirements from on-load hooks

-- from off-load hooks to on-load hooks. And if I can explain in layman terms. An off-load hook is a hook that can only be released when there is no load on it. So in other words, in order for the boat to release with an off-load hook, the boat would have to be physically in the water, all of the boat would have to be removed from the hook so that the boat can be launched.

Now over time, there was some inherent design flaws that were acknowledged at it relates to off-load hooks. Again, there was inherent design challenges that were observed as they related to off-load hooks, in that if a vessel or rescue boat was to be launched in heavy seas where the load may be on one hook and not on the other, then it may make it extremely difficult for that rescue boat to be launched. And that was the reason, the primary reason for changing the design requirements from being off-load hooks to on-load hooks.

With on-load hooks, if for whatever reason there is load still on one hook, there was an override mechanism that could be used to release the lifeboat. Unfortunately, that type of technology was not employed on board the *El Faro*.

Q. Okay. In 1986 the launch requirements changed for list from 15 degrees to 20 degrees, correct?

A. It was about that time. That was a design requirement specifically related to the stability of the ship itself. So it was a design criteria involved with the design of a ship, and that was then translated down to survival systems, which meant that a

ship, even if it was in damaged condition listing up to 15 degrees, pre-'86, would still be able to launch its survival systems. That was a design requirement. The design requirement changed from a 15-degree list to 20-degree list post-1986.

Q. Do you know why there was no change in the design requirement for trim from 10 degrees; it stayed at 10 degrees?

A. It would seem that the worst-case scenario for a ship would be what would be more related to the list and trim condition, as opposed to -- would be more related to the listing of the ship as opposed to the trim of the ship.

Q. And the design requirements for a freefall lifeboat, is it also the same as the conventional launched; 20 degrees of list and 10 degrees of trim?

A. The design requirements for a freefall lifeboat are somewhat different, insomuch as the freefall lifeboat has more to a height launching requirement and significant wave height as well, and it is -- the design takes into consideration the vessel itself. So, in essence, a sister ship, being a ship that is of similar type, each vessel that installs a freefall lifeboat will almost have to have a unique system designed for it based on the installation height of that lifeboat.

Q. So there's no angle of list and angle trim and height?

A. So, yeah, there are angles that would be considered, and there are angles at which the lifeboat itself will safely proceed down the trackway. So there are angles, but, again, it is mainly

related to -- it is ship, it's more so ship specific, ship design specific, more so than to do specifically with the lifeboat itself.

Q. So the IMO or SOLAS, they haven't put an angle there? It's all ship specific?

A. I've got an LSA code in here. I can refer to it quickly and -- one second.

What I have in front of me is the latest edition to the LSA code. And I can confirm that the performance requirements, as specified in the code, currently requires that the launching angles of trim are up to 10 degrees and a list of 20 degrees either way from certification height. Again, certification height is a key factor when fully equipped and filled with occupants. And that is as it pertains to freefall lifeboats.

Q. Okay, 20 degrees list, 10 degrees trim, and certification height for falls. Okay.

In your experience as a flag state inspector and a surveyor, have you witnessed crews launch lifeboats?

A. That is correct.

Q. And how long would you give them to launch a lifeboat?

A. Well, given that historically accidents typically happen during drills, I would never want to impose a rush factor on them, as it is a training exercise. But there are evacuation requirements for a ship. It differs depending on type of ship. But in general, from the time we -- from the time the general

alarm is sounded to the complete evacuation of the ship, the vessel, typically in the case of a passenger ship would have 30 minutes. But 5 minutes is normally a good marker for the time it should take to launch safely a rescue boat or a lifeboat, rather.

Q. Okay. That's all -- not passenger ships, but for a cargo vessel such as the *El Faro*, 5 minutes?

A. From the time that the crew is mustered at the muster station, once the call is given to board the lifeboat and lower the lifeboat, that evolution should be able to take place within 5 minutes.

Q. And what about for life rafts, how long would you, as an inspector or surveyor, want them to be able to launch a life raft?

A. My experience in witnessing the launching of life rafts is not as much as with the launching of lifeboats or rescue boats. The main reason that is because life rafts are typically packed and ready for use. Some ships carry training rafts, but then once you use it, they have to go through the exercise of re-packing it and so forth.

But yes, the same conditions apply. Depending on size of the raft, you have -- a set amount of time would be allocated to board the raft. And in the case of a system -- again, it's related to ships. Okay. So we're speaking about a cargo ship where there was one raft that would be maybe thrown overboard and open. Then passengers would then board by virtue of a boarding lever. In the case of a large type of raft that may be launched by a davit, then

there would be a boarding exercise. So, again, it's really ship specific.

Q. How did MASCO -- or MASECO, Marine Safety Equipment Company, of New Jersey come under the umbrella of Palfinger?

A. This is an interesting one because over time, Harding, which was also known as Schat-Harding, and at one point Schat -- the name has changed so many times over history. And that's primarily because in the last 30 to 40 years there have been numerous acquisitions, and MASECO Lifeboats was one of those acquisitions in the late '90s, at which time it came under the Harding umbrella.

I'm reluctant to use the name Harding anymore because just last year we were acquired by Palfinger, and the name Harding Safety has gone away. So we're only to be referred to as Palfinger or also known as Harding Safety.

Q. And now you also investigate lifeboat accidents?

A. Unfortunately, more than I care to, but I do. Yes.

Q. Can you tell me about the rate of incidents and accidents of conventional side-launched enclosed lifeboats compared to freefall lifeboats on cargo ships?

A. Two words: Night and day. In the case of conventional systems they tend to have significantly more accidents and incidents that particularly occur around training exercises. In the case of freefall lifeboats, injuries that have been sustained have been more related to angle of entry into the water or because

the boats are launched at significantly high heights on many occasions and the significant forces on impact that may be experienced to occupants of the lifeboat. That's where you typically find injuries, if any, on freefall lifeboats. But not at the same rate that you find in conventional systems launched by quick falls, and mainly the on-board release systems.

Q. So out of 100 accidents and instances that you've done, how many would be conventional lifeboats and how many would be on freefall?

A. To date, I've only done one investigation on a freefall lifeboat, and that didn't result in injuries but it was more related to damage in the system, where because of the high height from which it was launched, they experienced some stress fractures on the forward section, and we drilled down to determine the cause of those fractures. And in the case of freefall -- I mean, the case of conventionally launched lifeboats, since October of last year, I've been involved, I want to say, four investigations. I know we had at least two conventional lifeboats.

Q. So it would be for every five investigations you do, four are conventional and one is freefall?

A. In my entire career, I've only done one as it relates to freefall. The rest have been conventional systems. And since October of last year, I've done four conventional system investigations, been involved in four investigations as it relates to conventional systems. That's only since October of last year.

Q. And about how many conventional lifeboat accidents have you -- accidents and incidences have you investigated over your career?
A. In terms of accidents, directly conducting the investigation or being a part of it, I would say at least 30.
Q. Can you describe your experiences, your experience with them launching from a freefall lifeboat?
A. My personal experience launching, it's a pretty frightening experience. I've done it once in my life and that was more than enough for me, in terms of being physically in the lifeboat itself. The conventional systems, I've gone up and down those quite a few times, obviously, with great anxiety, knowing how serious of an evolution it is.
Q. As a surveyor were you told not to launch a freefall lifeboat later on in your career?
A. I was aware. It must have been me that changed that rule. No, but in seriousness. Yes, as a surveyor, when I was a surveyor, I was -- surveyors were specifically told not to go down in the lifeboats, especially freefall lifeboats. That's just in operations. When you are going through design phase, oftentimes the OEM in a controlled environment would say he will have go. I'm sure that occasionally a surveyor will use their professional judgment and make a determination whether or not to do so. But as a general rule of thumb, surveyors typically won't participate in the launching of lifeboats other than to just oversee the

evolution.
Q. Okay. And that's pretty much all classification societies that have stopped participating in --
A. Well, I can't speak for all classification societies. But I know certainly when I was with Lloyd's Register I did support the decision in my role that surveyors were not to do it. I'd be surprised if any of the IACS members, or International Association of Classification Society members, actually participated in those evolutions. Unless, of course, they were doing a close-up survey on a particular aspect of lifeboats. And even in those cases, I think they would put the boat into the water and then maybe board the boat once it's in the water, type of examination.
Q. If you were in hurricane conditions and forced to abandon ship in about 96 to 112 knots of wind, would you recommend abandoning ship in an open lifeboat or a life raft? Why and why not?
A. Well, my first choice would be to stay with the ship. In recent years, there's been a lot of studies done within the IMO and the industry alike to design ships so that they would become their own best lifeboat. That's, that's the push. If I didn't have that option, I would not want to be into an open lifeboat, simply because those types of conditions would be -- you have a higher risk of falling out of the lifeboat. Whereas, if you're in a life raft, the life raft stays -- they have an upper canvass that can possibly prevent you from falling out of the life raft.

However, I'm sure that the experience would be one of -- one that you'd probably never forget.

Q. Same question for an open lifeboat or a conventional side-launched enclosed lifeboat?

A. Well, one of the new design requirements for the conventional lifeboats of today is they are self-righting, which means that even if they were inverted, they would have to be self-righting or have the ability to self-right. So they would have inherent buoyancy built in. With an open lifeboat, when it capsizes, that's pretty much it. There is no reserve buoyancy to right that system.

So in the case of an open lifeboat versus a conventional system of today, I would much prefer being in a conventional system. Again, the ride would probably be one you'd never forget.

Q. And then pretty much the same question, a conventional side-launched closed lifeboat or a stern launched freefall lifeboat?

A. In hurricane conditions, I would want to be in a stern launched lifeboat. The main reason for that is because I believe that ability for the lifeboat to launch would probably be greater insomuch as once you would board it, as long as you can get the securing hook to release, it will go down the slide, maybe in an awkward fashion, but you would be able to launch.

In a boat that would be launched sideway -- on the ship's side in heavy seas, heavy weather condition, you run the risk of slamming, whereas the lifeboat while still dangling in the fall

wires can bang against the side of the ship. It can make a difficult boarding process, not to mention the launching process. So there are a lot more complications and the evolution is certainly more, much more complex with a conventional system. Just the boarding process alone, as opposed to a freefall system.

Q. I have some times from the transcripts. At 0713, the distress messages were sent. Fourteen minutes later, at 0727, the emergency signal sounded. Two minutes after that, at 0729, the abandon ship signal was sounded over the public address system to use the life rafts and also on the ship's radio. Three minutes after that, 0732, the helmsman was having problems with footing and being able to evacuate the bridge. And 7 minutes after that, at 0739, the VDR stopped recording.

From the time the distress message was sent out at 0713 to the VDR stopped recording at 0739 was about 26 minutes. And this is an open-ended question. Would the crew have enough time to abandon ship by the conventional open lifeboat? The abandon ship signal was 0729, and I guess 10 minutes later, 0739, is when the VDR stopped recording.

Q. There's a couple processes that happen that a master has to go through before he gives the abandon ship. Obviously he has to give careful consideration to the environment and the situation which he is presented with. Once he -- and before giving the abandon ship signal, he would raise the general alarm. That general alarm would basically call for all persons to muster.

It's only after those parties have been mustered that an order to abandon ship probably followed.

So -- I know you said that abandon ship was given at 0729. I have not heard the VDR, so I can't comment on that. And the VDR stopped recording at 039. So that's a 10-minute window. Again, once the order is -- from a surveyor's perspective, once you receive the order to abandon ship, typically you should be able to launch the system within 5 minutes.

Q. And I guess the wrench in the system was at 0732, the helmsman was having difficulties with his footing to try to egress the bridge, so -- that was 3 minutes after abandon ship. So that would have played a part with the list of the ship and maybe trim, because we heard it was -- the vessel was down by the head, down by the bow. Would the crew have enough time to abandon ship by the life rafts, throwing them in the water?

A. Well, by the time the ship -- even if the crew members are not able to effectively launch a life raft, the life raft should self-inflate once the vessel goes down, but then that means persons would be in the water. I can't in my professional opinion see how crew members would be able to board a life raft while the vessel is going down in hurricane conditions. Because in the case of cargo vessels, typically once a life raft is deployed in the water, they would go down by a ladder and then blow up the life raft in that fashion. But again, given those conditions, I can't see that.

In the case of passenger ships or larger ships that have larger life rafts that are launched by a davit, then you would board on an embarkation platform, board into the life raft and then the life raft would be lowered. But in the case of cargo ships where the raft is typically thrown over -- some of them may be launched by davits, but, you know -- yeah, I just struggle to see that.

If I may add, the launching of survival systems, careful consideration has to be done when doing that. As a surveyor, when I'm in the field, there is a requirement as part of the inspection process to witness the launching of systems. All right. But surveyors are given a degree of flexibility to use their professional judgment. When the wind conditions are unfavorable, I will not carry out that drill. When the sea conditions are unfavorable, I won't carry out that drill. And those are normal conditions. So definitely, I mean, careful consideration has to be given to do that in hurricane conditions.

Q. When the helmsman started having problems with the footing and asked for a ladder to egress the bridge, in your experience as a naval architect and a surveyor and an inspector, about what angle of list or trim do people start having problems being able to walk on the deck?

A. It's nice to stand in front of a panel of Coast Guard personnel, who I'm sure most, if not all, of them have sailed on board the *Barque Eagle*, and under nice heeling conditions, you

know, walking can be quite a challenge. Now to add to that complex-ability -- to add to that complexity, just throw in a little water and you can see how difficult it will be. It would be extremely difficult. And that's just on a sailing ship where there's some water.

Q. So it's possible by then it was already over 20 degrees of list and 10 degrees of trim?

A. Well, certainly at 20-degree list it becomes extremely difficult, and you can see that even from simulated conditions. And again, given the environmental conditions with possible driving rains and seawater, it would have been extremely difficult. So it's not surprising to hear that coming back from a VDR report, the helmsman had difficulty moving.

Q. Okay. Now I'm going to ask you some questions in your previous life when you were an inspector. As a flag state inspector, if a ship such as the *El Faro* was extended by 90 feet, had a spar deck removed and the ship type was changed from a RO-RO to a Con-Ro, would the flag state consider that a major or a minor configuration change, and would that affect the lifeboats, whether they stay the same or get, quote, to "current standards."

A. In my professional opinion, that would be considered a major modification, when you start doing an extension of that type. Now the regulations typically -- when the regulations apply, they apply it to the ship based on the keel laid date of that ship. And there are provisions in the regulations to make changes on

occasions as one would see fit. When those changes are considered to be of a major characteristic change or a major addition -- and there's some thresholds in the regulations that speak to that -- then the regulation is clear: Unless the administration gives a waiver to comply with the new requirements, then that ship would have to be brought into compliance with the latest regulations approved at the time of that modification.

This is actually quite common. In the case of passenger ships, for example, oftentimes they wish to add additional balconies so that they can take more passengers. When that is the case, once it was completed at the design change, they had to increase their LSA capacity to comply with the regulations applicable at that time. So I would see the same being applied in this case.

Q. So you're saying that with modifications, even as a major modification, that the flag state would -- if both reasonable and practicable, can grant ships waivers?

Q. Yes. Administrations on occasion provided the operator can put forward a case, a feasible case, may grant dispensation to the operator, do not need to comply with the latest requirements.

I can think of a case right now where the vessel has lifeboats that are pre-'86, which have open lifeboats and off-load release gear. During their last survey it was identified that there was significant wastage on the floor of the release gear. This particular ship has maybe 20 sets and 4 of them were

significantly wasted. But these are hooks that are pre-'86 compliance, no longer manufactured, and they just happen to have a few spares on board.

The regulations also say that all of the release systems on a ship need to be of the same type. So when doing the feasibility study, the question has to be asked, is it reasonable to expect this operator who may keep the ship for another year or two, to change out all systems? And if we were to quantify the cost of that you could be looking upwards of $1 million. Or grant that dispensation to that requirement and allow them to change out maybe just a few. As a surveyor, we make the recommendations, but the flag state makes the decision.

Q. Again, speaking to your past life as inspector, do any other countries have a program such as the Alternate Compliance Program?

A. Not really. The reason I say not really is, when the IMO develops regulations, and the IMO being the International Maritime Organization, develops regulations, they like to use the terminology is recommended that flag states administer this.

The administrations, being the flag states that have to interpret that regulation as it comes out in the form of making a circular and then put that in their own language to the ships flying their flag. In the case of the U.S., the C.F.R. takes precedent. And to align it with some of the IMO regulations, we have alternative compliance, which provides somewhat of a bridge to allow that to happen. So again, that's why I say it depends.

But yes. Each administration may have specific requirements that will apply to their ships. So they don't interpret all of the regulations the same.

Q. And now I'm going to your past life as a surveyor. The extension, the spar deck removed, the ship type change, as a surveyor would you call that a major or a minor? And how much does a surveyor have to do with making that recommendation to the flag state?

A. If my memory serves me correct, there was a kind of steel requirement as well that's linked in that regulation. I don't remember or recall it off the top of my head. But that's the first step to whether or not it would be considered a major conversion. They need to look at the features. They need to look at whether or not there is an increase in -- whether they're just doing this to account for more cargo or whether they're doing this to account for more persons. If it's going to directly impact the passenger or souls counts on board, then you can see it possibly having an impact on the LSA. If it's only going to have an impact on cargo, then a case may need to be made to leave or exempt the lifesaving appliances from having to meet this requirement.

So there are several different factors that would have to be considered. You know, are you increasing the soul count or are you increasing the cargo capacity? But that would be the starting point.

Q. So the modifications, putting on your surveyor hat and your

former inspector hat, should the open lifeboats have been upgraded to enclosed?

A. If it were increasing the soul count, that would have been an excellent opportunity to build a case that they should change out the LSA to meet the new requirements. If they were only changing or increasing the cargo capacity, then it would have been an opportunity for the operator to build the case that -- for the opposite; in other words, to leave as is if they're only changing the cargo. But again, the final decision would rest with the administration, and that would be based on some risk assessment or evaluation done at that time.

Q. Okay. So not reasonable or practical. Maybe there is an upgrade, but would it be reasonable and practical?

A. I guess, put some numbers on that for you. A complete system, being a lifeboat, a davit, a winch, one system would run an operator about a half a million dollars. And that's when you're looking at from install, classification, certification, design assessment, the whole -- a half a million dollars for one system.

So when you put it in context, operators can build a case based on the age of the vessel, the cost, the risk assessment associated with other similar ships, and the grandfather clause which is often used. They needed the case to say why, if they're not changing the soul count, not be permitted to continue using the systems, the LSA systems as is.

Q. And pretty much your answer to my next question was, what would be involved changing an open lifeboat into an enclosed lifeboat system? A half of million dollars per system, so that would be $1 million for port and starboard lifeboats, correct?
A. Correct. If they were to purchase entirely new lifeboats, and again, to have a like-like match on a lifeboat is not always very easy so you have to then replace the davit system. So then you now look at different wind speed combinations, so why oftentimes the price adds up quite quickly.
Q. And what would be involved changing from an open lifeboat system, conventional system, to the a stern launched freefall lifeboat?
A. Well, completely different type of studies would be involved there. But again, the main determining factor would be the launching appliance. A completely unique launching appliance dependent on the ship's install height, that certification height, would have to be developed. And I think the last time I checked, the certification height was about 30 meters. It may have changed, but -- for the install height.
Q. Have you ever heard of any vessels that have changed from a conventional launched open lifeboats to a stern launched freefall system?
A. To date, no. But I have been involved in a few vessels that considered the cost, and once the numbers came back, they changed their minds quite quickly.

MR. FURUKAWA: Commander Yemma, can you put up the photos, please? It's going to take a little long for them. I'll time them.

CAPT NEUBAUER: Sir, we've gone for about an hour. Would you like to take a break while we get that presentation?

THE WITNESS: I'm happy to keep going if everybody else is.

CAPT NEUBAUER: Okay. Thank you.

LCDR YEMMA: Is there a particular exhibit you're --

MR. FURUKAWA: Just the first. It's -- yeah, I believe it's Exhibit No. 343. Okay. There you go.

This is the starboard lifeboat with the Coast Guard rescue swimmer in the water. I believe the cutter was the swimmer, not a helicopter rescue swimmer. And that's how it was found, floating bow up.

Can you -- Commander Yemma, can we go to the next --

BY MR. FURUKAWA:

Q. Okay. And there's the same lifeboat in Miami at the Coast Guard Air Station Miami. And I wanted to have you look at these on photos and describe the damage, whether it was from wave damage or from containers or being dropped, and if there's any possibility that the lifeboat was launched.

And so the first one is going to be the -- those first two pictures, the way you saw it floating bow up, just, you know, what kind of damage would cause it to float bow up? And this one here.

A. Okay. This lifeboat is the starboard lifeboat, you said,

correct?

Q. Correct.

A. Okay. Well, first of all, it appears as though damage is quite extensive on the sides. That to me could be one of two things: Either it's impact damage from the lifeboat possibly smashing against the shell plate on the ship or possibly from the davit structure itself; it could also be from impact from green seas.

And also, if you look at the uniformity of the damage, it could even be from what is known as gripes, which would be straps to hold the lifeboat in place. So if there's significant dynamic forces acting on the fiberglass with the gripes, you could end up with shearing taking place.

It's interesting that the propeller is quite damaged as well, which leads me to believe that -- and I've seen similar photos like this from other boats that are just dropped into the water, where you have impact damage from the lifeboat hitting the water. And believe it or not, the force of impact can result in the damage that you see there on the propeller.

The photo on the screen is not that clear. But right there, the prop is actually deformed. Right here is typically where you'd find gripes. There and there. And you see this entire section is basically chewed up. If this is the starboard boat, you would tend to see damage on this side from shell plating. But the gripes would come over here, and that's what's keeping it

strapped into the hull of the ship.

But the propeller itself is what's telling insomuch as that damage, it's unlikely that you would have that impact with the ship. So that's probably from impact with water.

Q. With the starboard lifeboat, the boat hook pole was found fouled in the forward hook or -- the mechanism that would be connected to the forward hook. And the sea anchor was fouled with the sea painter. Can you discuss how something like that would have happened, the fouling of the sea anchor and sea painter, and the boat hook being stuck in the release mechanism?

A. Well, just using my professional judgement trying to put myself in the scenario on the day in question, again, this type of lifeboat, if my memory serves me correct, were off-load hooks. And remember I said that off-load hooks, unless you're in a flat, calm position where the load can be taken off the hook completely, you won't be able to release that hook. It could be possible that if there was an attempt to release this boat, given the sea conditions, one hook would have probably still had a load on it and every effort could have been used using whatever means available to try and release that hook.

Q. Does this look -- does this boat look like it was launched?

A. Looking at the boat, it appears more so -- it might have been -- I don't think this boat was launched for several reasons. The way the shearing has taken place on the hull, it would appear as though it was stowed in its stow position and it's just dynamic

forces that sheared through the outer structure. When the boat probably finally did break free from the ship and fell into the water, the impact with the green seas onto the propeller resulted in some additional damage.

MR. FURUKAWA: Next picture please.

Okay. I didn't expect this one. But I'll go through this one. This is, I believe, the starboard lifeboat on the *El Faro*. I don't think it's the *El Yunque*.

BY MR. FURUKAWA:

Q. Notice the life rafts. And how would you launch that life raft? Because if you --

MR. FURUKAWA: Well, go ahead.

MR. WHITE: Could we have an exhibit number, please?

LCDR YEMMA: 343, page 3.

MR. WHITE: Thank you.

THE WITNESS: This is a typical arrangement. The life raft was typically located not too far from the lifeboat. This arrangement, one would typically throw this overboard, secure a painter line, and then boat would -- the life raft would then open up once in the water, and then they could board using a boarding ladder of some sort. I don't see a davit next to it that could be used for launching that raft, so that would be the method of launch.

BY MR. FURUKAWA:

Q. Okay. I think when I put this photo, I enlarged it. You

can't see the deck below it. But directly off port of the life raft capsule, you have another deck that extends outward. So again, how would you be able to launch the lifeboat or the life raft if directly below it is another deck?

A. Well, a method of securing the life raft to the deck is typically with the use of a hydrostatic release unit which would cut the painter line in any event and allow the capsule to float free if that vessel went down. So there is an alternative method of launching. I can't see the deck below, so I really cannot comment on that aspect of it.

Q. It just extends, you know, outboard. It's wider than a catwalk. If you tried to roll it over the side, it would go directly onto the deck below. Have you ever seen skids or tracks to help a life raft capsule clear the side of the ship?

A. I've seen skids on top of a life raft. So, for example, if there is a covering over the life raft, that may result in the life raft floating free, but floating free into the cover. There would be a design that would prevent it from launching itself into the cover and the skid will, for lack of a better expression, would allow a raft to basically float free.

Depending on the size of the raft, some rafts should be able to be moved by two persons. I don't know the details of this one. I don't know enough in order to provide a comment, a reasonable comment on that.

Q. So when you see skids, it's to help the life raft not be

fouled when it automatically launches itself, not to clear the side of the vessel when you're trying to launch it into the water?
A. That is correct. The skids I'm familiar with are more to help it floating free from an overhead obstruction, as opposed to one below.

MR. FURUKAWA: Next photo please. That's just the starboard lifeboat on the *El Yunque*. The next one please.

THE WITNESS: Can we pause at this photo?

The gripes I'm referring to -- again this photo is not that clear, but you can see the wires -- the wire that goes from here across the hull, and that one here across the hull.

Once that boat starts to lower, if you are in dynamic forces there, you can quickly get some shearing on that fiberglass.

MR. REID: Sir, just to clear up the record, I think that's the port lifeboat, not the starboard lifeboat, on the *El Yunque*. It's labeled *El Yunque* port lifeboat.

CAPT NEUBAUER: Thank you, sir.

BY MR. FURUKAWA:

Q. And this photo is a mosaic at the bottom of the ocean of the *El Faro*'s port lifeboat. And can you give us a description of the damage and the possibility if it was launched?
A. Looking this photo, it would appear as though this boat may have been hanging in the falls. And when you consider the sea state on the day of, it's quite possible that while hanging in the falls, the green seas, the effects from the green seas could have

given such a force to completely destroy -- I suspect that's the aft end of the boat. And once that would have been destroyed, then you will have to just remain on the ship hanging in place, then you can have this type of construct to damage.

Q. Any other causes of damage and possibly launched?

A. It depends, just from the photograph, you know, that's in looking at the damage, I'm not sure -- these wires here, but the damage in going up the sides appear to be quite similar to that of the other boat, which leads me, again, to believe that dynamic forces while it was still in the stow position resulted in shearing, shearing of the GRP.

Q. And what's GOP [sic]?

A. The fiberglass; GRP, correct.

MR. FURUKAWA: Next photo, please.

BY MR. FURUKAWA:

Q. Can you read that? Does that say starboard, the starboard davits?

A. (No audible response.)

Q. So your assessment of damage and if there's any launching?

A. Again, just looking at the davit, I mean, it looks like that suffered heavy sea damage, just looking at the state of the rails and where the davit supporting structure. I mean, clearly the wave impact appears to be quite significant. If you look at -- the upper davit arms are completely missing.

So in my mind, in my mind, just looking at this photo, it

could be concluded that the lifeboats weren't launched, but rather ripped away from the ship given heavy sea conditions. In addition to the davit arms also being ripped away given heavy sea conditions. So what we're looking at there is just the davit frame. The arms are completely missing.

Q. And next photo, which I believe is the last photo. Can you read that? I think it's the starboard, the other slide. It's the port? Okay, this is the port side.

A. Yeah, in the case of this photograph, it seems as though this is the davit arm just here. So the davit structure is there and the davit arm you can see -- it appears to be the davit arm just hanging there. Again, completely mangled. So when you consider the sea state and the impact of heavy seas, this type of damage is not uncommon. But again, that's not reflective of a system that would have been able to be launched. So it's unlikely that a lifeboat would have been able to be launched in that condition.

MR. FURUKAWA: Just to check, is that the last photo?

You can't see the deck below that. Is there a slide for that?

THE WITNESS: If you can pause on this photo for a minute? What you can see from this photo is the HRU, which is this device right here. That device, once subjected to hydrostatic pressures will cut the painter line and release this black band, allowing this life raft to float free once the vessel would have gone under. And the same applies for the other life raft, a similar

arrangement would have been on the opposite side.

MR. FURUKAWA: And is there any other photos? That's it?

BY MR. FURUKAWA:

Q. Okay. In your 20 years in the maritime industry, do you know of any other -- of any instances of a successful abandoning ship in hurricane conditions in an open lifeboat?

A. No.

Q. Same question for in a life raft?

A. No. Again, not in hurricane conditions. I can't think of any scenario where that has been the case.

Q. Same conditions, in a conventionally launched enclosed lifeboat?

A. Again, no. But, you know, I have witnessed the damage testing of totally enclosed lifeboats. One of the tests that they do with those lifeboats is called a flooded stability test, where they've opened the doors of that lifeboat and completely fill it with water until the water comes to the sill, and it still remains in a survivable mode. That's not the case with open lifeboats. So there is quite a difference in the design requirements.

Q. And have you ever heard of a freefall lifeboat surviving in hurricane conditions?

A. Again, no, not hurricane conditions. I can't think of any scenario of surviving under hurricane conditions.

MR. FURUKAWA: Does anybody have any questions? I have two last questions, but if anybody else has something?

CAPT NEUBAUER: I'll go around after you complete your last one.

MR. FURUKAWA: Okay.

BY MR. FURUKAWA:

Q. Mr. Devaney, was there something that I should have asked you?

A. Not that I can think of.

Q. Is there anything that could've helped the crew survive this accident?

A. That's an interesting question. And again, you know, the IMO in its work is really challenged and tasked with trying to prevent incidents like this from happening. You know, we look at so many different aspects of what could have been done differently, but -- you know, in my professional judgment, there are several things that could have been done differently to me.

First, it could have been the vessel maybe not being there. But, you know, if we want to take that approach, then all global trade would stop. I mean, the life of a seafarer is a challenging one. I've spent a lot of time on ships with seafarers and it's not easy. It is not easy by any means, but the work that they do is important. It's kind of like asking me if a fireman who succumbed to injuries fighting a fire, is there anything that he could have done differently? Well, yes, not fight that fire. But that's probably not the answer you're looking for.

MR. FURUKAWA: Thank you very much, Mr. Devaney. That's all

my questions.

CAPT NEUBAUER: At this time I recommend that we take a break. So the hearing will recess and reconvene at 4:20.

(Off the record at 4:09 p.m.)

(On the record at 4:23 p.m.)

CAPT NEUBAUER: The hearing is now back in session.

At this time we'll have questions from the NTSB continuing with Mr. Young.

BY MR. YOUNG:

Q. Thank you, Mr. Devaney, for your time today. We appreciate it. In your experience and your work are there any statistics as to how enclosed lifeboats have improved survivability over open lifeboats?

A. I can't recall any raw statistics. But, I mean, in terms of open lifeboats, you're not protected from the elements of the weather. So that's one of the features that has been captured by totally enclosed lifeboats. So as a start, that's one.

In terms of open lifeboats, you're restricted in your ability to launch under a loaded condition on the hooks. So the ability to move freely from the ship is another improvement in the design feature with totally enclosed lifeboats in addition to the onload V systems. The flooded stability. If an open lifeboat was filled with water, it would probably float, but it would be completely submerged. In the case of a totally enclosed lifeboat there is a sill height to which the boat would still be able to float. So

there are a number of different design parameters that you can have a direct measure of to see and compare the improvements in terms of design features.

Q. So based on that response and based on your professional opinion, in the heavy weather experienced by the *El Faro* crew, do you believe it would have made a difference if they were to use enclosed lifeboats?

A. Well, looking at the damage sustained to the lifeboats and try and put myself in the mind of the master at the time, knowing the limitations of an open lifeboat in those sea conditions -- if you think about it like this: Lifeboats on cargo ships are typically around the 9 meter length. That's probably 38 feet.

When there are 4-foot waves in the gulf, there's typically a small craft warning issued not to go out. In a totally enclosed lifeboat that's a completely different beast. That is a survivable system. That can capsize and right itself, has a motor to propel. The motor has to go through design and testing requirements to ensure that it can be inverted and still operate. Those simple design requirements were not imposed on lifeboats.

So we have to first step back and ask what were the options to the individuals at that time? Because that's going to play a factor on when they would've decided to abandon ship. The order to give abandon ship is not one that's taken lightly. It's only taken after careful consideration of all factors. And so it's hard to ask the question if that would have made a difference

because it could mean at which point was the abandon ship order given.

Q. And speaking of design considerations, what parameters are there when life rafts are being designed as to how much weather those units can handle?

A. Well, with life rafts, the sea state is not really a given factor in terms of weather, and that's why the life rafts are supposed to be, in other words, a backup to the lifeboats. If in the event the crew are unable to make it to the lifeboat safely or the vessel goes down too quickly, then the life rafts should still float free. And in fair weather conditions, the crew should still be able to possibly swim to the life raft and seek shelter or refuge. That's not the case here. In this occasion it's not reasonable to expect anybody to be able to swim given those sea conditions.

So life rafts will be seen more so as a backup to an eventuality when you cannot launch safely your lifeboats, other than the case of passenger ships where life rafts are seen as a supplement to compliment lifeboat capacity.

Q. We've heard a lot of discussions about the side-mounted gravity davit lifeboats. There's a hesitancy to board them. There's a reluctance to get surveyors in, lowering them.

What is happening within the industry to improve launching of these, to improve survivability? And over time we have had tremendous increase in the ability to communicate; how can these

boats communicate using satellite communication to assist those who are using these boats?

A. Well, as we heard the previous person that was being interviewed speak about EPIRB technology or position location -- located beacons. As far as the abandon ship drill, one of the last things the ship is required to do as part of the abandon ship procedure protocol, someone on the bridge will grab that emergency bag and grab that search and rescue transponder. That's part of their abandon ship protocol.

If that person isn't able to bring that to the ship, then you won't have that position locating beacon. Some ships actually have it built in to the vessel itself as part of the design requirement, but you find that more so the case with newer designs. So that is one improvement.

In terms of what the industry is doing today, I go back to 2007, I participated in several studies. One was called Safe Door, one was called Safe Craft, and these were funded by the European Union at the time. And it was all geared around looking at survivability of systems, looking at new technology, means of evacuation with respect to the ships, but then also looking at the ship itself. And they concluded that the best thing would be for the ship to be its own lifeboat. So if persons never had to leave the ship, then that would be the best scenario. But in order to do that, you have to have design systems built with redundancy. That brings the cost up of construction, and then it became a

feasibility question; is it feasible?

So when we factor all these things in, and knowing -- unfortunately trying to get all the maritime nations to agree to regulations, we come back to the famous phrase "minimum requirements." So then it places a lot of responsibility on the operators to go above and beyond those minimum requirements, but again that translates to cost. So I think it's something that's shared between the entire industry from the designers to the regulators to the operators. And unfortunately, you know, the seafarers have been stuck in the middle because they're just the end user.

MR. YOUNG: Thank you very much.

CAPT NEUBAUER: Mr. Fawcett.

BY MR. FAWCETT:

Q. Yes, sir. Good afternoon. If you'll just glance back at Exhibit 343, which is the Harding exhibit, on page 8. Commander Yemma will show you that.

Do you see the twin life rafts in the canisters in the cradles? My question is, is that a proper authorized installation?

A. By just looking at the photo, it would be difficult for me to conclude whether or not it's a proper installation. There are several factors that are considered when installing life rafts. The first thing that is looked at is evacuation route of the ship. The other thing that's looked at is access or means of egress.

Then we come to the actual installation itself -- and it's not on the screen there, but the method to which the hydrostatic release is connected to the securing point. There's another key in the installation factor. If that's not installed correctly, then it won't float free.

I can see there's a painter line, from this photo appears to be connected to the HRU, but I cannot confirm that to be the case. I cannot see the arrangements at all for the life raft closest to the side over there, so I can't provide comments on that. But just looking at the photo in the current manner, it's reasonable to conclude that this arrangement would have been acceptable.

Q. And there's no issue with the closeness of the two canisters with the hydrostatic release in between them?

A. No, sir. I think -- and unfortunately I don't have a photo now, but I can probably show you a photo with maybe five or six of these cradles in the same type of arrangement. You typically find that to be the case on passenger ships.

The arrangement has no bearing on the hydrostatic unit or hydrostatic release unit. It works on water pressure. So once that release, all of the canopies will float free.

MR. FAWCETT: Thank you, sir.

BY CAPT NEUBAUER:

Q. Sir, I just had one follow-up question. Are you aware of a parameter of wind speed or sea state where it becomes unlikely that the person in an uncovered situation would survive?

Including maybe just floating in a survival suit or in an uncovered lifeboat?

A. As far as I recall, I don't think that one's made it to the regulation debates yet. I know that the wind speed criteria applies for ships, and heat and warming effects and all the rest. But in terms of survivability to a person, I couldn't comment on that one.

Q. I think you mentioned the covered lifeboat is to help keep the people inside, but isn't it also for the sea spray that occurs at high windress rates at the surface?

A. As far as I can recall, when the regulations were drafted it took into account the environmental conditions more so to do with the sun and exposure of the sun to persons in those types of conditions, as opposed to wind spray from sea or water. It was more to do with the heat.

CAPT NEUBAUER: Thank you. At this time I'd like to go to the parties in interest. TOTE?

MR. REID: No questions, sir.

CAPT NEUBAUER: Mrs. Davidson?

MR. BENNETT: No questions, sir.

CAPT NEUBAUER: ABS?

MR. WHITE: Yes.

BY MR. WHITE:

Q. Good afternoon, Mr. Devaney. My name is Gerry White and I represent ABS. I'm just going to follow up on a couple comments

you provided in your testimony earlier today.

You were asked about a major modification and what effect, if any, that has on lifeboat arrangement. More specific to *El Faro*, were you provided with any of the correspondence or documents related to the Coast Guard's determination for the 2006 conversion, the conversion from RO-RO to LO-LO, Lift on/Lift off? Were you provided with any of those documents in connection with that conversion?

A. Negative. And if I was provided with documents, I can say with a certain surety that I didn't review them to provide comments. But in today's environment where you can see the chain of emails on the Internet, I don't want to say that I've not received it. But certainly I don't recall receiving that.

Now I was made aware that some changes had been made, but with regards to specific changes, no.

Q. And you don't have any specific knowledge or personal knowledge as to why the Coast Guard in 2004 changed its initial determination that from -- for the conversion, and it changed its determination that it was a major modification, and then advised TOTE to the extent that your proposal to modify the subject vessels to accommodate a greater proportion of containers is not being treated as a major conversion. You don't have specific knowledge of that, do you?

A. This is the first time I've actually heard about it actually being a cargo -- that's why I was very clear in my explanation at

first, it could have been one of two things. And based on it being cargo, I can understand the basis for which the Coast Guard may have made that decision. Because, again, it's more seen as cargo as opposed to souls.

Q. And then, similarly, in 1993 when they characterized a lengthening of the vessel to be a major modification, do you have any specific knowledge as to what the Coast Guard considered and with regard to the lifeboats at that time?

A. Again negative. I'm not aware of the modifications in '93. My comments today were based on my professional opinion and experience having dealt with other cases where I did for a waiver of the modification rule.

MR. WHITE: Thank you.

Captain, I have nothing further.

CAPT NEUBAUER: Are there any final questions at this time?

Mr. Devaney, you are now released as a witness to this Marine Board of Investigation. Thank you for your testimony and cooperation. If I later determine that this Board needs additional information from you, I will contact you directly. If you have any questions about this investigation, you may contact the Marine Board recorder, Lieutenant Commander Damien Yemma.

(Witness excused.)

CAPT NEUBAUER: The hearing is now adjourned and will reconvene --

MR. REID: Sir, just one thing if I could before we close.

CAPT NEUBAUER: Yes, sir.

MR. REID: We submitted for the Board's consideration as exhibits two things. One is a follow-up from yesterday's testimony for Mr. Hearman, which is the decision of the Florida Commission on Human Relations, and we ask that to be admitted as an exhibit. We also today, we also, as a follow-up to Mr. -- as a follow-up to the testimony this morning, we are submitting various company procedures that TOTE has in place regarding indoctrination of crew members. And it's part of the safety management system -- I don't think it's been an exhibit -- which sets forth the procedures for which contractors are indoctrinated on board the vessel. And we're also submitting some sample records for compliance with those standards for the *El Faro*.

CAPT NEUBAUER: Lieutenant Commander Yemma, do you have those documents?

LCDR YEMMA: Yes, I do. The decision for Mr. Hearman is number 396 and the indoctrination guidance and logs is 400.

CAPT NEUBAUER: Is 400?

LCDR YEMMA: Yes.

CAPT NEUBAUER: Those have been entered.

MR. REID; Thank you, sir.

CAPT NEUBAUER: At this time the hearing will adjourn and reconvene at 9 a.m. tomorrow morning.

(Whereupon, at 4:41 p.m., the hearing was recessed, to reconvene, Thursday, February 16, 2017.)

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.

[redacted]
U.S. Coast Guard
Official Reporter

[redacted]
Transcriber