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 *EL FARO* *

ON OCTOBER 1, 2015 *

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Prime F. Osborn III Convention Center
Jacksonville, Florida

Wednesday,
February 8, 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

Parties in Interest

LUKE M. REID, Esq.
TOTE Services

GERARD W. WHITE, Esq.
American Bureau of Shipping

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)

I N D E X

I N D E X (Cont.)

P R O C E E D I N G S

(9:00 a.m.)

CAPT NEUBAUER: Good morning. This hearing will come to order. Today is Wednesday, February 8th, and the time is 9:00. We are continuing at the Prime F. Osborn Convention Center in Jacksonville, Florida.

I am Captain Jason Neubauer of the United States Coast Guard, Chief of the Coast Guard Office of Investigations and Analysis, Washington, D.C. I am the Chairman of the Coast Guard Marine Board of Investigations and presiding officer over these proceedings. The Commandant of the Coast Guard has convened this Board under the authority of Title 46, United States Code, Section 6301, and Title 46, Code of Federal Regulations, Part 4, to investigate circumstances surrounding the sinking of the S.S. *El Faro* with the loss of 33 lives on October 1, 2016 while transiting east of the Bahamas.

I am conducting the investigation under the rules of 46 C.F.R. Part 4. The investigation will determine as closely as possible the factors that contributed to the incident, so the proper recommendations for the prevention of similar casualties may be made; whether there's evidence of any act of misconduct, inattention to duty, negligence or willful violation of the law on the part of any licensed or certificated personnel contributed to the casualty; and whether there is evidence that 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 in this investigation: TOTE Services is represented by Mr. Luke Reid; ABS is represented by Mr. Gerard White; Herbert Engineering Corporation is represented by Mr. Spencer Shilling; and Mrs. Theresa Davidson, who is next of kin for Captain Michael Davidson, master of the *S.S. El* Faro, is represented by Mr. William Bennett.

These parties have a direct interest in the investigation and 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 parties in interest. All parties in interest have a statutory right to employ counsel to represent them, to cross-examine witnesses, and to 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 of 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 ask 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 the silent 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 that they have given after I release them from these proceedings. I ask that such interviews be conducted outside 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 may 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 to this hearing, and 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. Good morning, Captain. Good morning all.

I am Brian Young, Investigator in Charge for the National

Safety Transportation 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 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 of this accident and determine the probable cause independent from the Coast Guard, issue a separate report of the NTSB findings, and, if appropriate, issue recommendations to correct safety problems discovered during this investigation.

Thank you, Captain.

CAPT NEUBAUER: Thank you, Mr. Young.

We will now begin with our first witness of the day, Captain David Flaherty, who is the Chief of the Traveling Inspectors at Coast Guard Headquarters, and he is continuing from yesterday.

And, Captain Flaherty, just want to remind you that you remain under oath at this time.

CAPT FLAHERTY: Understood.

CAPT NEUBAUER: And we will continue on with line of questioning from ABS, Mr. White.

MR. WHITE: Thank you.

(Whereupon,

DAVID FLAHERTY

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

EXAMINATION OF DAVID FLAHERTY

BY MR. WHITE:

Q. Captain, thank you for making yourself available today. And I know we traded some exhibits overnight and that should help narrow the issues.

Yesterday we discussed several topics. I know we sort of left on the issue of corrosion. And to the extent that the Coast Guard trains marine inspectors for corrosions, you talked about which spaces may be susceptible to localized or accelerated corrosion. We discussed the conditions, the access to saltwater, the heat, the stress, fatigue of steel that may exacerbate corrosion on steel.

Based on the pictures you provided or were provided by various parties aboard the vessel, we've got pictures over a range of 2014, 2015, and 2016. Yesterday we discussed, and I believe you agreed with me, that vessels do not corrode on a linear basis. As a vessel approaches its wear period, whether it's 30 years or something more than that, renewals and maintenance needed to maintain the vessel in Class are subject to maintenance in order to keep the vessel straight; is that correct?

A. I would agree that as a vessel's age and exposure to the elements increases during the time of its service, but I also would like to state that if there is specific areas on board the vessel where water would pocket or that have more interaction with the wind and weather, that those areas may corrode at a faster

rate than other parts of the vessel would.
Q. Understood. And to the extent that there's a survey regime in place by Classification Society, by the Coast Guard, you would agree that the survey regime becomes more stringent as the vessel ages and requires the taking of gaugings at special and intermediate surveys. Is that correct?
A. Well, that would be up to the Class Rules related to their steel repairs and maintenance and oversight. But generally what I've found is vessels that are increasing in age, that they do require a greater attention to detail concerning their structural integrity.
Q. So as far as aging are you familiar with whether gaugings are required for a vessel at special or intermediate surveys based on your experience as a marine inspector?
A. With Class Rules there are gauging requirements. And if an area is identified as having increase of corrosion area or is suspect, then that area, as a means to determine the extent of the corrosion, would undergo some form of gauging.
Q. I missed the end of your answer. Under what?
A. If an area is identified potentially as, for whatever reason, being a suspect area, it isn't uncommon for that area to be gauged to further determine if, one, the suspect area is correct and if -- to determine the extent of the corrosion.
Q. Okay. So to the extent that they have a special or intermediate survey for whenever they detect suspect areas, it's

your understanding that gaugings are performed?
A. Yes. Gaugings are performed.
Q. Yesterday we talked about a specific time frame. We discussed the *El Yunque* and some events and some of the pictures taken by the marine inspectors. The time frame we discussed included March 20 -- correction, March 10, 2014, during the period in which the *El Yunque* was at the Grand Bahama Shipyard for dry dock. In addition, that was a special survey. Are you aware that was a special survey at Grand Bahama Shipyard?
A. Yes, I am.
Q. And the Coast Guard was in attendance at the special survey at Grand Bahama Shipyard in 2014, correct?
A. They attended the dry dock due to the fact that the vessel was on the risk assessment list.
Q. So they were there, and they issued a report, correct?
A. That is correct. They were there. They attended. As I understand it, from my recollection of the report, they did look at some ballast tanks, and they probably did a hull walk. They did, in the report, mention that the TOTE was conducting some steel replacement around one of the vent trunks, but that was it.
Q. And was their presence in the Grand Bahama Shipyard, the presence of the marine inspectors, dictated by you as a traveling inspector because the vessel was on a risk assessment list?
A. No. That was -- their attendance was a requirement per the Coast Guard policy as it relates to vessels who are placed on that

list.

Q. And another time frame we discussed yesterday was November 2015, and we talked about the team of inspectors, marine inspectors that attended the vessel while it was in Jacksonville. And there were six personnel sent to inspect the vessel, and one of those was a trainee, correct?

A. From the discussions we had yesterday, yes, that's correct.

Q. And in October 2015, are you aware -- withdrawn.

Can you tell me who Captain Zamperini?

A. Currently or at some time period?

Q. In October 2015, you sent a letter to Mr. Tim Nolan at TOTE Maritime, Puerto Rico. You signed it as the acting officer in charge of marine inspection. So I'm trying to see is he assigned on the technical office? Does he report to you? What's his affiliation with your office, if any?

A. I believe at the time Captain Zamperini was serving as the Deputy Sector Commander at Sector Puerto Rico -- or Sector San Juan. Excuse me.

Q. And did he report to you at that time?

A. He did not report to me at that time. I'm not in his chain of command.

Q. Understood. And to the extent that Captain Zamperini advised TOTE that there was going to be an internal inspection conducted on the *El Yunque* in November 2015, he indicated that this internal structural exam will focus on the area of the mid-body extension,

comma, all available voids, comma, cofferdams, comma, and ballast tanks possible in order to get a sound assessment of the vessel's condition. Were you aware of that?

A. I was aware of that, and as I understand it, it was part of the investigation into better understanding the construction of the vessel due to -- as I understand, there was a -- one of the other vessels had a plate failure or a structural failure, and it was also as part of the investigation. And I think that question actually probably would be better addressed to Captain Neubauer who was directing that at the time. But it was again part of -- my understanding, it was part of the investigation to better assess the internal structure specific to that area of that vessel.

Q. That correlates with the words sound assessment of the vessel condition, correct?

A. Specific to the areas that were listed in the letter and the double-bottom tank, again it was to assess if there were any plate deformation or structural issues. One of the vessels that was similar to the *El Yunque* and the *El Faro*, the *Lurline*, had documentation of plate deformation.

Q. And then inspection in Jacksonville in November 2015 with the five Coast Guard inspectors and the trainee took place with the knowledge that the *El Faro* had been lost, correct?

A. That is correct.

Q. So sitting here today, did you direct any or provide any

instructions to those travel inspectors when they attended the vessel in Jacksonville in November 2015?

A. At that time they were essentially working for the Marine Board of Investigation, and their role and responsibility was associated to whatever their assignment was provided from Captain Neubauer.

Q. And sitting here today with the qualifications you just provided, are you familiar with what they inspected in November 2015 aboard the *El Yunque*?

In order to speed this along, I'll represent to you that the bottom tanks were inspected; is that familiar to you? Are you aware of that?

A. Yes, I'm aware of that. And that was the intent for them to go down as part of the investigation.

Q. And so yesterday when we discussed this, I don't think you necessarily understood whether or not the Coast Guard inspectors crawled through the tanks. Sitting here today, do you have an understanding as to whether the traveling inspectors crawled through the tanks?

A. As I understand it, they entered the tanks that they could enter, and they examined as much as they could the tanks that were accessible.

Q. And I'll represent to you that that included double-ballast Number 2A, and double-bottom -- excuse me -- double-bottom ballast 2A; I guess, P-I is probably the port side.

A. As it's listed, it was double-bottom saltwater ballast 2A, port and starboard.
Q. And based on the inspection of those tanks by the Coast Guard inspectors, is it your understanding that they crawled through the tanks with the ABS inspectors?
A. I believe that, as I understand it, all parties involved at some point did take an examination or a look into the tanks that were listed.
Q. And that's why you sent two travel inspectors, right?
A. The reason why we assigned two traveling inspectors to assist with the Marine Board of Investigation, again, at the time when they were going down there, they were traveling as part of the investigation team.
Q. And were you aware that according to Commander Venturella, one of those traveling inspectors, that he concluded in his report, on page 6, that "Our examination confirmed that the vessel's hull was in excellent condition with minimal corrosion, and I devised some questions that will help ensure that structural questions can be fully closed." Were you aware of that? I didn't hear that on your direct testimony yesterday.
A. Again, they were there to initially check that area because, based on information that the Coast Guard had at the time referencing back to the *Lurline*, and just trying to get a better understanding of the structure of this type of vessel, that at the time when we did not know why the *El Faro* went down, we were

double-checking to ensure -- and at the same time we did know of another vessel that had structural issues that were similar in class or type of construction. The goal of that internal exam was, one, to have a better understanding of the internal construction and how it was laid out; and, two, to confirm that the remaining vessel, the *El Yunque*, did not have any potential structural issues. So, again, the whole focus of that exam was only on that particular part of the vessel.

Q. Again, the charge from Captain Zamperini in his letter dated October 28, 2015, when he wrote to Mr. Tim Nolan at TOTE was that this internal structural exam will focus on the area of mid-body extension, all available voids, cofferdams, and ballast tanks possible, in order to get a sound assessment of the vessel's condition. So based on Captain -- Commander Venturella's assessment then the hull was in excellent condition, is it your opinion that they found that the -- did they provide a sound assessment of the vessel's condition? Isn't that what they were there for?

A. As I understand it, Captain Zamperini's letter referenced structures. And, again, this was to focus on a particular area as it -- subjects to the evaluation of the Motor Vessel *Lurline*'s buckling.

Q. So sitting here today, you have no opinion as to whether the Coast Guard determined a sound assessment of the vessel's condition when they visited it in November of 2015?

A. Essentially this was not, as I would consider it, an inspection of the entire vessel because of the direction from the Marine Board of Investigation to specifically look at a specific part of the vessel due to the fact that a vessel of similar type and construction had a documented failure of -- and which caused a buckling situation on a vessel. So I would look at this more of that the intent of the exam was to confirm that there was not another vessel in operation that had potentially a situation that would result in another buckling of the plate.

Q. So when the five inspectors and trainee went aboard the vessel in November 2015, it's your opinion sitting here today that they only looked at the ballast tanks in order to evaluate whether there was a possibility of buckling?

A. It is my understanding that that's the direction that Captain Neubauer gave to them as part of the evaluation of the last remaining vessel of that construction that was still in operation, and that was to ensure that there was no potential that that vessel would come into the same type of situation.

Q. So when Commander Venturella commented in his report the hull was in excellent condition, that wasn't a sound assessment of the vessel's condition?

A. I would derive the fact that due to Commander Venturella's entry and examination of a specific area, he is only referencing that specific area in his report.

Q. So sitting here today you wouldn't expect the team of five

Coast Guard marine inspectors and the trainee to look at anything aboard the *El Yunque* but for those ballast tanks?

A. Under the circumstances, due to the fact that they're acting on the directions of the Marine Board of Investigation, Captain Neubauer, they are fulfilling those directions by specifically going into that area based on information related to another vessel that was similar in type and construction.

Q. Yesterday you discussed some of the repairs and photographs related to the ventilation ducts. Do you recall that testimony?

A. Yes, sir.

Q. I had asked you based on your reports from the marine inspectors that attended the vessel at the special survey, the Grand Bahama Shipyard in March 2014, whether or not they went into tanks or what the scope of their inspection was. I understood based on your report that you couldn't tell me what the scope of their inspection was. Is that accurate?

A. I'm sorry. That I could or could not?

Q. Could not.

A. And, again, I'd have to examine the activity report for the vessel if it's available. My understanding from discussions with -- in an oversight of that exam, that they did enter tanks and they did do a walk-around. But keep in mind that when they're there as part of the policy for the Alternate Compliance Program, they're overseeing the Authorized Class Society in its operation, not so much as they're there to do an in-depth hull exam that

would be done if the vessel is not enrolled in the Alternate Compliance Program.

Q. In connection with the work done in the shipyard, we produced Exhibit 369. If I could turn your attention to page 4 of that exhibit, the first paragraph, I'd like you to review it, sir.

A. Before we engage on this, I'd like to give this a review, please.

Q. Please do.

CAPT NEUBAUER: Would you like to take a brief recess?

THE WITNESS: I'd appreciate that, yes.

CAPT NEUBAUER: The hearing will recess, and reconvene at 9:35.

(Off the record at 9:29 a.m.)

(On the record at 9:38 a.m.)

CAPT NEUBAUER: The hearing is now back in session. We're continuing with the line of questioning from Mr. White.

Mr. White, there will be an opportunity for final round of questions, just so you know.

MR. WHITE: Thank you.

BY MR. WHITE:

Q. During the break you took a look at Exhibit 369, correct?

A. That is correct.

Q. And this is a Class survey report from Jacksonville on the inspection in Jacksonville. Withdrawn.

This is the inspection report for Grand Bahama Shipyard in

March 2014, right?

A. That is correct.

Q. I directed your attention to page 4, Exhibit 369, for two reasons. Yesterday we discussed the vents, and I had asked you whether or not the vents were inspected by the Coast Guard marine inspectors in the Grand Bahama Shipyard. And it seems that according to the ABS Class Survey Report, Frame 159, port side second deck, found over 250 millimeters in four vertical angle stiffeners wastage/hold inside ventilation trunk; four 460-millimeter inserts were cropped out and renewed as original with approved materials, survey of progress, and tested as necessary, and found satisfactory. Do you see that?

A. Yes, I see it.

Q. In addition, the second to last entry under that statement/observation number 624 is an entry number 5 hold -- located on second deck port side found missing two securing dogs. Securing dogs were replaced as original and found satisfactory.

Do you see that?

A. Yes, I do.

Q. And looking at those entries and the repairs that were made specifically to the ventilation trunks, is there any mention of those repairs in the Coast Guard Report of Inspection for Grand Bahama Shipyard.

A. There was a brief mentioning that they did see repair work being done in those areas -- or in a area. I don't think they

specifically listed the ventilation trunk number.
Q. And to the extent that they observed work being done under the ACP's system or the decision to send marine inspectors to the Grand Bahama Shipyard, do you think they made any assessment of the repairs or the ventilators at all?
A. Since they were in an oversight role, I assume they're seeing that the work was being done on the vessel and that, from their perspective -- and, again, you'd have to ask them directly -- but from their perspective, in my opinion, they were assuming that the whole vessel had been examined and checked, and if areas of concern were identified that potentially could exist in other areas, I would assume that they were thinking that maybe, further on, inspections of similar type areas associated with this wastage may have occurred.
Q. And just to be clear, your response to that said you assume or your interpretation of understanding of the marine inspection -- inspector's role in the Grand Bahama Shipyard was to assume that all of the vessel's spaces and repairs were being properly made, or to make sure that was being done?
A. In the oversight role, the Coast Guard marine inspector in attendance would be, again, conducting an oversight role. Unless something jumped out at them to say that they saw an area of the vessel that was not being addressed or had knowledge of a different part of the area of the vessel that was not being addressed, then that might have expanded their inspection or exam,

depending on the terminology you want to use. But the purpose for them to be there is in the oversight role, where the Authorized Class Society is actually conducting the dry dock exam on behalf of the Coast Guard.

Q. If we could go back to that communication theme for a minute. Based on the experience of those marine inspectors that attended the Grand Bahama Shipyard, do you think they -- while they walked through the vessel observing whatever they observed, if they saw a problem or sought greater inspection of an area, that they would communicate that to ABS?

A. And again, as their role when they're on board, if they did see something. But again if -- observation role versus conducting the actual inspection; the actual dry dock inspection was being conducted by ABS.

Q. I understand that. But I -- what I'm trying to see is what your understanding is as to what they found. And to the extent you've indicated and testified that if they saw a problem they would bring it to the attention of the ABS surveyor, was any problem specifically brought to the attention of the Coast Guard based on the report that they provided?

A. Again, I'm not aware of any additional items that were brought to the Coast Guard's attention based on the inspection. But they were there and they did see work being done by the approved -- or the Authorized Class Society, and they were -- as I understand it, they did enter some of the tanks to do their

oversight of the vessel and of what was going on board -- going on, on board.

Q. So no complaints were made to the Coast Guard by the marine inspectors that attended the vessel in Grand Bahama Shipyard, correct?

A. In my understanding, there were none.

Q. If we get back to the time frame again. We talked about the Grand Bahama Shipyard in March 2014. We talked about the inspection by the Coast Guard team in Jacksonville in November 2015. Let's go to February 2016 for a minute, all right?

A. Well, I think to have a better understanding, I think we need to also include the information from Coast Guard inspection from 15 December 2015.

Q. I'll get to that in a minute. Let's go to February 2016 for a minute.

A. Well, I appreciate that timeline, but I don't know if -- I think we might be missing some valuable information in there, if we do, do that.

BY CAPT NEUBAUER:

Q. To keep the chronology, what point would you like to make about the December 2015 exam?

A. The Activity Discovery Summary Report for the *El Yunque*, the starting date 15 December 2015. Exhibit 363, page 1.

During the inspection they found several missing and corroded pipes areas of lower cargo deck sprinkler systems. In addition,

they found other damage and -- to the vessel's, not only the sprinkler system, but as well as to the CO_2, their carbon dioxide smothering system for the cargo deck fire suppression.

Q. Can you give some background of what type of exam was being conducted?

A. As listed on the Activity Summary Report, the title and description is an ACP Periodic Oversight Inspection.

Q. Would that be ABS and Coast Guard combined?

A. My understanding, this would be just Coast Guard.

Q. Thank you. Any other points to make from that oversight exam or periodic exam?

A. From this, both for the marine inspectors when they were on board as they were conducting a general walk-through of the vessel, identified piping systems that were damaged or corroded or missing. They conducted an operational test of the sprinkler system and found several of the sprinkler systems, which is critical for the suppression of fire within a Ro-Ro car carrier or vehicle carrier, were not operating, meaning that there are parts where the sprinkler system could not reach. In addition, they found that the CO_2 system, the nozzles and piping systems were damaged.

And, again, the situation resulted in 835s, and the vessel -- an internal audit was requested by the Coast Guard, and then later on an external audit was requested by the Coast Guard. The deficiencies were cleared up sometime in February of 2016.

Q. It's my understanding that the Coast Guard 835 requirement is not the preferred method to use for an ACP vessel. Do you have any knowledge why that was used in this case?

A. As per the guidance provided in the *Marine Safety Manual*, the officer in charge of marine inspection when issuing a Coast Guard 835, that is to be utilized as a last resort if they feel at the time that the vessel represents a significant threat to the safety of the crew and threat to the marine environment. In addition, that they feel generally that the Authorized Class Society that is involved in the vessel interaction may not have caught this particular item and they want to have direct oversight of this area.

Q. Are there any additional points to make from that December 2015 exam?

A. Well, as the chief traveler, my concern would have been -- overall concern is with a company, or any company with a document of compliance, a commercial vessel operating with a safety management system, and an Authorized Class Society involved in conducting inspections on behalf of the Coast Guard, as well as the Coast Guard oversight, this kind of condition or similar conditions on other vessels that we found is concerning.

CAPT NEUBAUER: Are we ready to move on to the next exam in that series?

THE WITNESS: Yes.

CAPT NEUBAUER: Mr. White?

BY MR. WHITE:

Q. So the problems detected by the Coast Guard in December 2015, were any of those noted in the Grand Bahama Shipyard report in March 2014?

A. As far as I can see from the ABS Class surveyor report, that is not noted. I didn't see it on that one. So I would assume that it was not caught by -- during that dry dock exam.

Q. Well, there's a time frame for surveys, correct? And so either it wasn't caught or it didn't exist at the time of the survey, correct?

A. Well, I would have to say that the fact that the pipe was corroded in less than -- let's see -- a little over a year, I would say that the condition that was identified in December 2015 was not something that occurred in a short period of time.

Q. And thereafter, as far as the survey cycle and in taking of gaugings, the next -- after the special survey is taken in 2014, an intermediate survey would be due in late 2016, correct?

A. I -- actually I wouldn't -- I'm not knowledgeable of the time period of the special surveys that ABS has.

Q. So are you aware of the survey cycle, that there's a -- withdrawn.

So you're not aware of what gaugings are taken in a special survey, and whether or not gaugings are taken in the intermediate survey 2½ years from the special survey?

A. Well, as I understand it, ABS has a survey process based on

the condition of the vessel and other items that they find in the vessel. I understand that some of it is timed, as some of our inspections have certain time periods that they're done at. So what date that would be reference to this 2½ years, to be honest, I -- my understanding was -- I didn't know the specific timeline, but I do know that does occur.

Q. So if there was going to be an intermediate survey or gaugings, and Class surveys were performed in 2½ years from the March survey, that's not something you have an understanding of?

A. I have an understanding that they do special surveys based on ABS's Class rules. Again, I'm not -- I'm only saying that I'm not aware that it was for this vessel specifically a 2½ time period, or if that's the consistent time period for those surveys. I know those surveys are taking place over a certain time period.

Q. Do you think that would assist the Coast Guard, that level of communications, to have an understanding of that survey process going forward?

A. Again, I emphasize that any relationship between the local Coast Guard unit and the local ABS surveyor, it's important to have a level of communications for that, yes.

Q. Do you think it's bigger than that, though? Do you think it's bigger than the local level? Do you think it's something that the Coast Guard, from the traveling inspectors on down, should have an understanding of the survey protocol for vessels as they remain in service and what's required as far as gaugings and

inspections?
A. Well, understanding that we have four Authorized Class Societies, and that the personnel who are overseeing that program, the Commercial Vessel Compliance Program, I am sure they're well aware of that and that is fully understood.
Q. What do you think? Do you think it would be helpful if the traveling inspectors on down in the Coast Guard had an understanding of the survey protocol for Class rules as vessel proceed in age and proceed from one special survey to an intermediate survey to their next special survey?
A. Well, I think it's based on the fact that I'm not aware of the specific timeline of a special survey, but aware that special surveys do occur with ABS. It's not an indicator of the knowledge and the capability of other marine inspectors. I am sure that marine inspectors who do hull repair and vessel inspections out in the field working with other Authorized Class Societies are knowledgeable of that information, as well as the Commercial Vessel Compliance Office, that the personnel in the Domestic Division are well aware of that information.
And I know when Commander Venturella went out in the field to conduct the vessel exams, that he was up to speed on that information as well. I just have to say that I'm just -- my lack of recalling the specific timeline is just associated with myself.
Q. Understood. But is that part of any specific training at the Coast Guard, an understanding of what the Class survey protocol

would be? Isn't there a coordinated effort to survey and inspect a vessel?

A. The Coast Guard conducts an oversight of the inspection, generally not at a time when the Authorized Class Society is conducting theirs. And so in addition, our requirement to be at dry dock is only -- we're only required to be there is if the vessel is on a risk assessment list. So to say that we are -- again, we are serving as an oversight of the vessel inspection for the program.

Q. But to oversight, don't you have to have an understanding -- doesn't a Coast Guard marine inspector and the traveling inspectors and the Coast Guard in general have to have an understanding of what those surveys and oversight, what they're looking at?

A. Again, if you're focusing on my recollection of a specific time period for a special survey by ABS, is not the measurement you should be utilizing. Marine inspectors out in the field directly involved with the Authorized Class Societies, are engaged with them and would be evaluating the condition of the vessel.

Q. To move a little more along in the timeline. In April of 2006, the *El Yunque* was visited by Class in -- I'm sorry -- April 2016 in Seattle, Washington. That's Exhibit 317.

And to the extent that the vessel was in Washington in April 2016, so 2 years after she had a special survey, do you have an understanding that the vessel visited Seattle for a survey, and

that it was intended to assess the structural repairs and modifications necessary to convert the vessel to pure Ro-Ro? Gaugings of structure were taken and a repair list developed. Subsequently, the vessel owner elected to halt these surveys and scrap the vessel. And that's under Observation Number 869.

And my question there, is that your understanding, that the vessel was proceeding towards its intermediate survey, and based on your understanding or a marine inspectors understanding, that they would know that gaugings were going to be taken and an assessment of the vessel's condition and any needed repairs were going to be made?

A. It is also my understanding that the Coast Guard marine inspectors from Sector Puget Sound attended the vessel and also required gaugings in certain areas.

Q. Understood. But, you know, getting back to the communications, were they working together with ABS? Is that what you're recommending and fostering, based on your September 2016 report on the ACP program?

A. I'd have to have the Activity Summary Report for that to see what the narrative says. But -- so I'd have to review that before I can answer the question.

Q. Well, in general, is it your understanding, getting back to the theme of communications, that when the *El Yunque* or any other vessel in the ACP program is attended by ABS and the Coast Guard, that they are working together to ensure the safety of the vessel?

A. The Coast Guard is -- if attending the vessel, is attending as oversight for the work that is being done by the Authorized Class Society. In this case, I believe, if my recollection is correct, that the Coast Guard marine inspectors from Sector Puget Sound attended due to their understanding that the vessel was going to go through an extensive addition. The vessel was on the list, so they were required to attend it. And that they were going to be there to evaluate the condition of the vessel.

Q. Understood. And maybe I'm missing something here. When you say that the marine inspectors are there for oversight, is there a specific Coast Guard NVIC, Coast Guard instruction defining what oversight is on any vessel or at any inspection?

A. The NVIC for the Alternate Compliance Program gives some guidance.

Q. And sitting here today, do you recall what that NVIC or guidance may provide?

A. I also -- just to add, I understand the areas that the vessel was looking at were those -- included the vent trunks that was previously identified during the document compliance audit.

CAPT NEUBAUER: Captain Flaherty, for the record, can you give the dates of that document compliance audit that first identified wastage in the -- in one vent trunk?

THE WITNESS: February 1, 2016. And I would assume that the oversight that was conducted later on was, the engagement was with TOTE. And we also, based on the fact that we had that indication

there, I would assume that the marine inspectors at Sector Puget Sound were just expanding upon it due to the previous history of the vessel.

CAPT NEUBAUER: Did your office have any conversations with Sector Puget Sound?

THE WITNESS: Yes. Commander Venturella attended the vessel when it was over in Seattle with Commander Odom.

CAPT NEUBAUER: Are you -- are going to continue on with the line from Mr. White.

THE WITNESS: Yes.

BY MR. WHITE:

Q. Captain, I'm just bringing you back, just as a reminder. We're just looking for what written material there is in the NVIC or anywhere else concerning what, quote/unquote, "oversight" is.

A. It is listed on page 5 of the Navigation and Vessel Inspection Circular 292-95, Change 2: Coast Guard inspectors may attend all surveys of enrolled vessels based on risk factors such as vessel type, age, route, service, deficiency record, pollution casualty history, or as recommended by the periodic risk assessment.

Q. Thank you. To the extent that the oversight provides that the Coast Guard may attend, I'm trying to find out what they're supposed to do when they do attend.

A. As listed on page 7, Paragraph G, Oversight: Coast Guard oversight activities have been designed to identify and correct

program -- I'm sorry -- discrepancies, while minimizing duplication of effort and avoiding interrupting vessel schedules. Less material inspections of the vessel by Coast Guard occurs under the ACP, since the Coast Guard annual exam focuses on the assessment of human factors and the capabilities of crew.

Q. Thank you. I'm a little out of sequence today, but yesterday you had mentioned that there were certain 835s that were issued with regard to ventilation trunks. And I think later in your testimony you indicated there weren't 835s issued.

Could you just give us what written or any other instructions were provided by the Coast Guard to ABS, and when those were provided and what was said?

A. On the date that the corrosion was discovered on the vent trunk in question, the information was directly passed to Mike Millar of ABS.

Q. Could you just help me with the date there?

A. Again, I'd probably have to see the -- as I recall it was -- it happened on February 1, 2016. As the traveling inspector, Commander Odom evaluated that vent trunk after discovering the corrosion. And keeping in mind that ABS was also in attendance. It was -- again, I was reading this, I saw there was a 835 listed after the paragraph. That 835 was related to the sprinkler system, not the vent trunk corrosion. But Mike Millar was informed by the Coast Guard at the time to conduct an evaluation of the vent trunks on the ship.

Q. And so that to the best of your understanding, that instruction was given by Commander Odom to Mike Millar on February 1, 2016?
A. My understanding it was either Commander Odom or Commander Venturella. I do believe it was Commander Odom.
Q. To the extent that the 835s were issued with regard to the survey of the fire system, would you anticipate, on the level of communications, that the Coast Guard may want to put something in writing on that?
A. As per the guidance of verbal passing of information -- again keeping in mind that the traveling marine inspectors do not have officer in charge of marine inspection authority. Because of that, they cannot issue 835s. The only entity that can issue an 835 would be the officer in charge of inspection at Jacksonville, and they issued 835s for the sprinkler and the CO_2 system.
Q. Can they write an email? Well, I know the marine inspector can't issue an 835, I understood your testimony. But could they draft an email, could they send a fax, or are they precluded from providing that kind of written communication?
A. They're not precluded from requiring that written information, but as documented in the testimony of the ABS surveyor, who was on -- who stated that they did examine the rest of the trunks, and that the trunks were found in satisfactory condition, then that would indicate to me that the communication was properly passed.

Q. But sitting here today, you're not aware of any written communications to that effect? Just to be clear.
A. In the ABS report attached to the Coast Guard's Activity Summary Report, they do list number 4, that they looked at number 4, which I think they're referencing number 3, and that repairs were done to it. But, again, based on the testimony of the ABS surveyor, I would assume that the communication was passed, seeing that she addressed it.
Q. But no written communications, correct?
A. Again, there is no requirement for a written communication. Verbal communication is satisfactory.
Q. Understood. But, again, in response to my question, there is no written communication, correct?
A. To answer your question, there was no written communication. However, verbal communication was passed. And from the information I received, it was also passed to an ABS surveyor to conduct the work.
MR. WHITE: Thank you.
Captain Neubauer, if I could just take a minute. I don't think I have anything further at this time.
CAPT NEUBAUER: Mr. White, can we continue on with other questions, and you'll have a chance to ask any final questions?
MR. WHITE: Sure. Thank you.
CAPT NEUBAUER: Does Herbert Engineering have any questions?
MR. SHILLING: No questions.

CAPT NEUBAUER: Does TOTE have any additional questions?

MR. REID: No, sir.

CAPT NEUBAUER: Does Mrs. Davidson have any questions?

MR. BENNETT: No, sir.

CAPT NEUBAUER: Captain, I want to ask you, do you know the title of Mr. Millar for ABS?

THE WITNESS: I'm sorry. I don't recall his specific title.

CAPT NEUBAUER: I want to pass the questioning to the NTSB at this time. Mr. Young.

MR. YOUNG: Thank you, Captain.

BY MR. YOUNG:

Q. Captain Flaherty, just two follow-up questions based on a review of our notes, and it's not very well in order.

But during the review or Coast Guard oversight of ACP vessels, do you know if any of the Coast Guard marine inspectors reviewed the trim and stability booklets for these vessels?

A. Based on the guidance of the -- contained in the *Marine Safety Manual* and within the NVIC, that would not be an item that they would be reviewing in their oversight role.

Q. Do you know who within the Coast Guard would review these stability booklets?

A. Again, I would -- it would be, if I remember correctly, it would be the Marine Safety Center.

Q. Thank you. And during an oversight exam by the Coast Guard on an annual basis, is it typical for the Coast Guard marine

inspectors to enter the ventilation trunks for each annual inspection?

A. No. Again, as per the direction, and other guidance that's provided in the *Marine Safety Manual* and NVIC, they would be there to conduct firefighting, abandon ship drills, check the associated documents, conduct a security overview, safe manning certificate, and do a what's called a general walk-around of the vessel. And unless something is visible to them that becomes a suspect area for further investigation or examination, they would just continue on in and then complete the inspection.

MR. YOUNG: Thank you.

BY CAPT NEUBAUER:

Q. Captain Flaherty, I'd like to get your opinion on an issue involving an exhaust trunk found on the *El Yunque*.

CAPT NEUBAUER: Lieutenant Commander Yemma, if you could call up Exhibit 371, page 1.

BY CAPT NEUBAUER:

Q. This is a photograph of the *El Yunque's* exhaust, a dual exhaust trunk on the *El Yunque*. But if you can see, there are small grab holds near the deck on the external bulkhead of the trunk. Do you see those, sir?

A. Yes, I do.

Q. From your knowledge, would that allow water on the second deck to enter the ventilation trunks?

A. Based on how low it is on the deck, I would assume that's a

possibility.

Q. Did you -- have you examined the plans for the ventilation trunks? Were they okay?

A. I've looked them over, yes.

Q. Do you know if these drainage holes on the bottom of the bulkhead would be included on those plans?

A. I don't recall seeing those holes on the plans that I examined.

Q. Can you think of any reason there would be a hole on the bottom by a bulkhead?

A. No, I cannot.

CAPT NEUBAUER: I have no further questions at this time. I'd like to do one round of questions with the parties in interest, and this will be the final round of questions for Captain Flaherty.

MR. REID: Sir, could we take a short break, please?

CAPT NEUBAUER: The hearing will recess and reconvene at 10:25.

(Off the record at 10:18 a.m.)

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

CAPT NEUBAUER: The hearing is now back in session.

BY CAPT NEUBAUER:

Q. Captain Flaherty, before the break, I asked you about some questions on Exhibit 371. Now that you've had some time to look at the plan, can you make any clarifications about that exhaust

trunk?
A. Well, within the exhaust trunk there is a baffler, which would prevent the water from entering down into the ventilation system.
Q. And why is that placed? And do you know high that baffler plate would be?
A. Again, the baffler plate is to prevent water from entering below decks through the ventilation system. It's my understanding that the baffler design requires it be 12 feet in height.
Q. Thank you. I'd like to call your attention now to Exhibit 370. 370 is internal pictures taken of the starboard exhaust vent on the *El Yunque* between Frame 159 and 162. And this is a single vent trunk assembly for the hold number 3. If you look at the first photo, can you see the -- can you describe what is seen there?
A. It looks like looking directly at it is the dampener right above, and it's on its rod. And then before the dampener is most likely the baffler.
Q. And do you know how tall that baffler plate would be approximately?
A. The highlighted areas -- on the screen?
Q. Yes.
A. I believe it was 36 inches in height when it was measured.
Q. And if I can draw your attention to the second picture on that exhibit, can you describe what that picture shows?

A. Again it shows the deck, the interior area of the ventilation duct. Of note, I see on the -- kind of the corner, if you just highlight -- yeah, right there. Right about there is a hole, and I believe that goes out to the main -- or the deck area in the cargo hold.

Q. When you say the deck area, the second deck, that is exposed to water; is that correct?

A. That's correct.

Q. Would it be your understanding that if water entered through that hole that it would have to go over the 36-inch baffle plate before going into the exhaust valve? Would that be a correct assumption?

A. That's correct.

CAPT NEUBAUER: I have no further questions at this time. I would like to go to the parties in interest. TOTE.

MR. REID: No questions, sir.

CAPT NEUBAUER: Mrs. Davidson?

MR. KUCHARSKI: No questions.

CAPT NEUBAUER: ABS?

MR. WHITE: Just one point of clarification.

BY MR. WHITE:

Q. Exhibit 370, did you describe that as the 3 port or 3 starboard?

A. The 3 starboard on the aft side.

MR. WHITE: Thank you. No questions.

CAPT NEUBAUER: Herbert Engineering.

MR. SHILLING: No questions.

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

CDR DENNING: Captain, I have one question, sir.

CAPT NEUBAUER: Commander Denning.

BY CDR DENNING:

Q. Captain, if you would please refer to Exhibit 82, page 25 of that exhibit. This is the Coast Guard NVIC 2-95, Change 2, regarding the Alternate Compliance Program. Paragraph 3.8 on that page. If you could read for us the last sentence of that page and tell us your interpretation of what that is trying to communicate.

A. The last sentence is: Coast Guard-issued CG 835s should be a last resort after all other corrective measures have been proven impractical or if the Classification Society surveyor is not immediately available to attend the vessel.

Q. Can you expand upon that, sir, and tell us what that's intended to communicate?

A. Well, since the -- under the Alternate Compliance Program the Authorized Class Societies are responsible for conducting the inspection, it's one way of reducing the duplicity of the Coast Guard role -- or removing the duplicity of both the Coast Guard and the Authorized Class Society on the vessel owner or operator. So in a sense, it's recommending that if a issue is discovered that they first try to communicate that issue to the Authorized

Class Society so they can resolve and address it. And if, again, if it's not -- if the surveyor is not available or if the material condition is such that it represents a significant threat to the safety of the crew, that in only those significant situations should an 835 be issued.

CDR DENNING: Thank you, sir. No further questions.

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

Captain Flaherty, we are now complete with your testimony for today. However, I anticipate that you may be recalled to provide additional testimony at a later date. Therefore, I am not releasing you from your testimony at this time, and you remain under oath. Please do not discuss your testimony or this case with anyone other than your counsel, the NTSB, or members of this Coast Guard Marine Board of Investigation. If you have any questions about this, you may contact my legal advisor, Mr. Jeff Bray. Thank you for your testimony, sir.

At this time, do any of the PII's have any issues with the testimony that we just received?

MR. BENNETT: No, sir.

MR. WHITE: No, sir.

CAPT NEUBAUER: The hearing will now recess and reconvene at 10:50.

(Off the record at 10:43 a.m.)

(On the record 10:57 a.m.)

CAPT NEUBAUER: The hearing is now back in session.

At this time we've made a change to the hearing schedule. Next witness will be Mr. Mark Gay, former chief engineer on the *El Faro*. And this afternoon we will have Captain Phil Anderson and Captain Edward Walker testifying for the National Cargo Bureau.

Mr. Gay, if you could approach the witness table.

LCDR YEMMA: Please raise your right hand.

BY LCDR YEMMA:

Q. Sir, can you start by stating your full name and spelling your last name for the record?

A. Yes. My name is Mark Gay, G-a-y.

Q. And where are you currently employed and what is your position?

A. I am currently employed with Noble Drilling as a first assistant engineer.

Q. And can you describe some of your responsibilities in that position?

A. Mainly, I'm a supervisor of the engine department, and maintaining and operating the equipment on that vessel.

Q. Can you also tell the Board a little bit about your background, some of your prior relevant work experience?

A. Graduated from Maine Maritime Academy in '92. After that, I did work at a paper mill running boilers, and then I moved on to tugboats. And after that started with Sea Star Lines in '98. I worked for Sea Star Lines for almost 15 years. And I worked from

the *El Yunque* to the *El Faro* and the *El Morro* throughout that time.

Q. And what is your highest level of education completed?

A. Bachelor of Science Degree.

Q. Do you hold any licenses or certifications?

A. Yes. I have chief engineer of motor, steam and gas turbine.

LCDR YEMMA: Thank you, sir. Commander Odom will start the questioning.

(Whereupon,

MARK GAY

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

EXAMINATION OF MARK GAY

BY CDR ODOM:

Q. Good morning, Chief. Today I have four lines of questions I would like to complete. The four lines will cover the *El Faro* lube oil system; the bilge, ballast and emergency fire pump systems; some general questions about operations; and then the final line of questions for you regarding your interpretations of some specific comments from the VDR.

In between topics, I will stop and open it up to other Marine Board Members to ask you questions in line with our discussion. Prior to moving on to the next topic, if at any time you feel like you need a break, just ask, and Captain Neubauer will consider your request. Do you understand or have any questions before we

begin?

A. No. I'm all set.

Q. Can you please start by giving us a little bit more of a detailed description of your service on the *El Faro* and the other Ponce class vessels that you served on, to include the time frames and the position that you served on those vessels?

A. Yes. I started on the *El Yunque* back in '98 as a third engineer. I worked as a third for about a year and a half, almost 2 years, where then I got promoted to second engineer and moved into that position. I then worked for another 2 years on the *El Yunque* at that position. Upgraded my license to first engineer, and moved up to that position, and sailed for almost 7 years as a first engineer on the *El Yunque*.

I did get my chief engineer's license while there, but my first true assignment was on the *El Faro* as chief engineer in -- that would have been 2008. At 2008, the *El Faro* was in and out of lay-ups. So depending on the service of the *El Faro*, I sometimes got used as a chief on both the *El Yunque* and the *El Morro*.

Basically, the last year with Sea Star Lines, TOTE Services, was on the *El Morro.* And then I finished with them in April of 2013.

Q. Thank you. So I would like to get started on my first topic, which is the lube oil system, and I would like to discuss each component of the system. For your reference, I have provided a diagram, which is Exhibit 320, page 1.

CDR ODOM: If you can get that up on the screen, I'd appreciate it.

BY CDR ODOM:

Q. This exhibit is from the machinery manual of the *El Yunque*. With that in mind, if there are any notable differences between what you see on this diagram and what is on the *El Faro*, please bring them to our attention.

First, I'd like to start with -- do you see the diagram?

A. Yes, I do.

CDR ODOM: Can we get that up on the -- there you go. Thank you.

BY CDR ODOM:

Q. So first I'd like to start with the lube oil pumps. It is my understanding the *El Faro* was equipped with two oil service pumps that were positive displacement vertical screw type pumps. One pump was considered primary service and the other was standby service. Could you please describe for us how these two pumps work together to provide lube oil pressure to the lube oil system?

A. Yes. We would usually run one pump at a time, as you said; having one pump in lead and the other one lag. One pump would supply all the pressure to the -- so, yeah, it -- one pump would be supplying all the pressure to the system, and then, as it fed throughout the whole system, whatever leftover oil wasn't being used in the turbines would get pushed up to the gravity feed tank and then recirculated back down.

Q. Thank you for that. So with a positive displacement pump, can you explain to us what that means?
A. Yes. Basically on a positive displacement pump whatever comes in has to go out. That's exactly the description of it. So you cannot dead end or close a value on the discharge side of the pump without basically destroying it or the piping.
Q. Thank you. And with the seals on those pumps, can you explain to us how the shafts were sealed with the mechanical seals? Can you explain to us what that is?
A. Yeah. It was a typical mechanical seal, where you had a carbon side and a ceramic side, one rotating and one stationary, with O-rings that sealed the mechanical seal against the shaft itself. So that way there's no oil being -- or liquid being out of the -- let out of the pump through the shaft. That seal was usually cooled by the -- from the discharge side back into the seal to keep it from overheating.
Q. What happens to the pump performance if a seal fails?
A. If a seal fails, you will usually get oil out the top of the pump on these particular pumps, and it would start collecting. Also you would start losing efficiency of that pump.
Q. Would the pump have completely failed at any point and stop pumping or moving fluid?
A. I never saw that happen on these pumps, no. Theoretically, I believe it could happen, but I don't believe -- these seals are more on the discharge side, so the only way you would lose it is

if you couldn't pick up suction. Otherwise, when these seals fail it would be just pushing oil out of the top of it.

Q. And typically how would an engineer know when a pump performance is in decline?

A. Just by loss of discharge pressure over time. You would slowly see that losing -- you know, its operating pressure would slowly start to decline.

Q. And what was the driver for the pumps?

A. An electric motor.

Q. And do you recall if for the two pumps, if they were on independent circuits? Were they completely independent of each other?

A. They were. I believe the aft pump was on the emergency circuit board.

Q. So my next question is, could they be powered by the emergency generator, if necessary? When you say the aft pump, would that be the pump that's generally in standby or is one designated standby and one primary, or is it just whichever one they decide?

A. When I was on board, standing operating procedure would be for one month we would run the forward pump and leave the aft one in standby, and the following month we would run the aft pump and leave the forward one on standby. So that way they get equal wear, and that way we knew both pumps would be working at all times.

Q. Can you explain what the automatic changeover process is if a pump is in standby, it's in the standby mode? And, you know, what mechanism is there to bring that pump online if the primary pump is to fail?

A. How that is regulated is there's a pressure switch on the discharge piping of the lube oil system itself. If that -- if there's not enough discharge pressure, that electric pressure switch will then trip the off-line pump, the lag pump, and actually put it online. And once that pressure starts building back up, and the off-line pump -- or the lead pump would have been tripped off so you're only running one pump at a time. So it's all based on discharge pressure in a pressure switch.

Q. Typically when that pressure switch initiates that changeover, is it a seamless changeover or is it an interruption of service at any time in the lube oil system?

A. Usually we -- whenever we switched over pumps, we would test that relay, the pressure switch, but we'd be in port when we did it. And it usually went seamless. It would -- so as we would shut the power off to one and let the pump pressure slowly drop down, once that pressure switch indicated low pressure, the other one kicked right on and built pressure right back up.

Q. So it would provide seamless operation of the system with no interruption in service to the vessel?

A. Correct.

Q. Thank you. So if this happened while at sea, how would an

engineer on watch know that there was a changeover that just took place between the pumps?

A. First, he would have gotten an indication of low lube oil pressure in the system, and then there was another indicating light to tell you that the lag pump was on, now online.

Q. Would it initiate any type of a audio alarm to get the engineers attention?

A. It was both audio and visual.

Q. And would the bridge know that that changeover took place? Is there any indication on the bridge to make them aware of?

A. Not that I'm aware of, no.

Q. Would it be required for the engineer on watch to notify the bridge if that happened, or the chief engineer?

A. Usually if any major interruption would happen, and depending on the speed and condition of the vessel, your first call would probably be to the chief, and then the second call would be to the bridge to let them know what was going on.

Q. So would you consider that a major interruption of service, the changeover?

A. Yes, I would.

Q. In your time on the *El Faro* or any of the other vessels, do you recall any issue with the pumps?

A. I do believe on one of the vessels, and I think it was the *El Yunque*, at one point we did have to send out one pump rubber element to be renewed and reinstalled, but that was the only time

that we ever had an issue with one of the pumps.
Q. Do you ever recall the lube oil system having an issue with loss of suction?
A. I believe once or twice when doing it in port there were times where the lag pump wouldn't pick up as fast as we would like. And so we would try to -- we'd probably go back to the lead pump to make -- and then double-check to make sure everything is okay with the pump that we're trying to get online. And when we'd try it again, it usually picked right back up.
Q. And typically what was needed to prime a pump to get the suction going on it?
A. On these particular pumps -- I don't see that in this drawing, but there was a line for the discharge side of the pumps that led back to both suction sides of the pumps so you could -- you would have the online pump valve shut with the offline pump would be open, usually cracked about a half to three-quarters of a turn, just enough to keep positive pressure on the suction side of the offline lube oil pump, which would keep that pressure primed up ready to go.
Q. And also with these pumps, did you ever experience any circuitry issues with fuses or breakers or load issues?
A. Over the course of the years, I believe we had to change out probably maybe two, maybe three fuses on the starting system of a lube oil pump while trying to change them over. But as a whole, they work pretty seamless.

Q. With the priming of a positive displacement pump when there's air introduced into the suction side of the pump, does that generally stop the pump from working, cause it to lose its prime, and then does it require intervention of some type to regain that prime?

A. With a positive displacement pump that all depends on how much air you actually displaced of the liquid that was in the actual pump itself. But if that's the case, what you end up trying to do is get another -- get the suction side some positive pressure, and you would try to bleed that air out through some means to make sure you've got plenty of liquids so that you could start pumping again.

Q. In this particular system, what would be the means to bleed that air out?

A. We usually would use the sealing -- the mechanical seal cooling line, lubricating line, and we'd crack that, and then we would get all the air out of that, and then we'd close it back up and start it back -- the pump back up, and it would work fine.

Q. So it's a well-known and common practice for the engineers to do that?

A. Yeah, with this pump or any other type of positive displacement pump, yes, that would -- you need to find a way to get the air out, and that's usually your best way.

Q. Thank you. I'd like to move on to the strainers in the system. In the diagram there's two sets of strainers, one set on

the suction side and one set on the discharge side of the pumps. Can you give us a description of the types of strainers they are and the differences between the suction and the discharge strainers?

A. They're both duplex strainers, where you can -- you run one side at a time. If one side gets fouled, you switch over to the other side, pull the basket out, clean it, and that way -- and then put it back in service ready, so you can always switch back when the side you changed to got dirty. The suction strainer physically was a little bit bigger with the baskets having a little bit -- the holes in that were a little bit smaller than on the discharge side.

Q. So the basket mesh was tighter on the discharge side than on the suction side? Or I've got it backwards?

A. I believe it was smaller on the discharge side, correct.

Q. And the dual strainers, if there's any type of issue, can they be switched on the fly, basically, in service?

A. Yes, that's correct. That's their design. So that way you don't have to shut down the system in order to clean the basket.

Q. So, again, if there was a restriction in one of the strainers or something, an anomaly, how would the engineer know that a switch needed to happen?

A. Once again there would be a lowering of the discharge pressure because you would have less oil going in. That means less oil would be coming out, so your pressure from your discharge

side would start dropping.
Q. So in troubleshooting that pressure difference, the first thing the engineer would do would be check the strainers and switch them?
A. Yeah. You could tell -- also on the strainers that's an inlet and an outlet pressure gauge. So once the discharge pressure would signal that you would have a low lube oil pressure, you go down and check those. And if the differential was too great between the inlet and outlet side of your strainer, then you knew that was the problem.
Q. And in your experience, have these strainers ever been a problem? Is it common for them to become obstructed and be switched?
A. No. Over the years, I've never seen these strainers get to the point where we can't run off them. Usually we would pull them on a regular basis just to make sure. But this system was cleaned, the lube oil was pure. It was -- so there was never any real obstructions in those strainers.
Q. When you say you would pull them on a regular basis, what would be the interval?
A. Usually at least once quarter. But say we, for whatever reason, if we did something with the system, we would probably pull it once a month until we understood that we definitely didn't have anything else in the system.
Q. Is there anything on the suction side of the strainer

specific to the strainer that could happen or could cause the pump to lose suction?

A. As long as everything stayed intact, there's nothing that would prevent that pump from doing its job.

Q. Would a failed gasket cause enough air to be introduced into the system to cause a pump to lose suction?

A. Yes, that could possibly happen.

Q. And on this strainer, were there any drain cocks or magnetic plugs or anything that could become an issue?

A. Yes. There are drain plugs on both sides so you could drain the basket down so you could work and pull that side.

Q. And if there was a restriction on the discharge side of the pump, how would the pressure relieve itself? You had said in the positive displacement pump it just continues to build until something fails. Is there any safety mechanism in place for this system that would allow it to relieve the pressure?

A. Yes. There's a relief valve on the discharge side of those pumps, and that would recirculate it back to the suction side.

Q. Any known issues with that system or the relief valve that you ever experienced?

A. No. I've never seen an issue with that relief valve.

Q. After the discharge side of the pumps, the line becomes common to the system and then it goes into the lube oil coolers. Is that correct?

A. Yes, that's correct.

Q. Can you describe the lube oil coolers and any potential issues you've ever had with them?
A. The lube oil coolers are of tube type, where the saltwater goes through the inside of the tubes and the lube oil is on the outside of the tubes. The only issues we've ever had with those is that you get fouling from sea life, organisms, and we just clean them on a regular basis.
Q. What would be the result of fouling a cooler because of sea life?
A. Your lube oil system would start overheating. The oil would be getting too hot.
Q. And so you said in that situation you would just switch over to the other cooler and clean the one that was -- so the coolers didn't go on in tandem and just require one to keep the system cool?
A. During the winter months we would run one at a time. Sometimes in the summer, depending on the sea temperature, we would have to run both in tandem, but that was very short periods of time. And we would probably clean the coolers at that point at least once a week to once every other week just to keep up with marine growth.
Q. Thank you. And moving on beyond the coolers in the line diagram, just before it tees off, I see there's a check valve, what looks like to be a check valve in the diagram. Do you see that?

A. You talking right there?
Q. That is correct.
A. Yes, I see that check valve.
Q. And what's the purpose of the check valve? And can you describe what type of check valve it is?
A. That check valve is there so in case your lube oil pumps fail, that the overflow tank here does not drain back down towards the pumps, but yet towards the turbines themselves.
Q. Do you recall what type of check valve it is? Is it a spring-loaded check valve? Is it gravity or gate valve? Can you describe the type of valve it is? Do you recall?
A. I believe it was a swing check valve.
Q. Have you ever had or have you ever heard of this check valve failing to open and preventing the flow of oil into the system?
A. No. Most pieces of equipment that deal with the lube oil system don't fail because you are dealing with a lube oil system and it's constantly being lubricated, and it stays in pretty much pristine original condition even when you pull it out to inspect it.
Q. Moving beyond that check valve, the flow of oil is then directed to the bearings through what is called a variable orifice or I've also seen it called the adjustable orifice. Can you describe that to us?
A. The orifice would be there just to make sure that you maintain a certain pressure, a certain pressure or a volume of

flow to the bearings.
Q. And it's called adjustable, but is it something that is adjusted by the crew or is it something typically done by the technical representative or in the shipyard and then just left alone?
A. I've never adjusted that. That would have been something that we would all have to sit down and talk about and would be adjusted more likely in a shipyard.
Q. Thank you. At this point the excess flow from the system, and just my understanding, is directed up to the gravity tank. Can you please describe the function of the gravity tank as you understand it?
A. The gravity tank is there for emergency purposes. It is an emergency reserve of lubricating oil. And what would happen is if you're underway and both your lube oil pumps fail, that oil would then slowly drain down into your turbines to maintain lubrication as you're trying to slow down the system to make sure you do not burn up your bearings.
Q. Do you recall approximately how much time a gravity tank would provide to give the engineers the opportunity to react to that situation?
A. I've never done it, so I wouldn't know the exact time, but I believe approximately it was supposed to be 5 to 10 minutes.
Q. And in the situation where the gravity tank was dumping its contents into the system, what type of -- what would be the

procedures for the engineers to react to that situation? What would they be doing?

A. So you're asking what the engineers would be doing if the lube oil pumps failed and the gravity tank was slowly draining down to the turbine?

Q. That is correct. In that 5 to 10-minute period you described, what would be their primary concerns?

A. Their primary concerns would be to stop the turbines, and that's what they -- they would call the bridge, let them know there's an emergency, and that they need to stop the turbines now.

Q. And did you ever experience any issue in a gravity tank as a result of sloshing in heavy seas? It's my understanding the overflow line in the gravity tank directs oil back to the sump, and there's an illuminated bull's-eye that the engineers look at during their watch. And so in a sloshing situation or a heavy sea situation was that kind of intermittent?

A. Yes. Due to sloshing you would see where at times the oil would be real heavy and other times where you would not see oil traveling back down to the gravity tank, but that time frame was usually very minimal.

Q. Would that result in any alarms going off?

A. No. That did not have an alarm on it to say that there was no oil flowing down through that. That was up to the engineer to keep an eye on that at all time.

Q. Did the gravity tank itself have any alarms on it to let

engineers know, if there was like low lube oil, high lube oil level alarm?

A. Yes. It did have a low lube oil alarm on it that would be both audio and visual at the console.

Q. So did you ever experience any listing conditions?

A. Yes. I've been on those vessels during rough weather in listing conditions.

Q. In those conditions, when you talk about the flow changing in the system, was that something that the engineers just acknowledged and accepted it just because of the heavy weather and there was never any remedial-type action that needed to be taken, like adding more lube oil to the system or anything like that?

A. It would probably be given directions by the chief engineer to maintain a good watch of the lube oil system and that bull's-eye if you were in rough weather, and if it seemed out of the ordinary to call the chief, and he'd come down and investigate to find out whether or not it was normal or abnormal conditions.

Q. Do you recall if the gravity tank was vented?

A. Yes, it was.

Q. And what type of vent do you recall on top of that gravity tank?

A. I believe it had a pressure vacuum valve type system on it, which is -- and it was also outside of the engine space where that was located.

Q. Do you recall if that was regularly inspected to make sure it

was clean and properly functioning?
A. Yes. It was -- that was inspected, I believe, once a month along with all the other vents that were part of our normal check sheet.
Q. Thank you. I'd like to move on now to the sump and ask you have you ever been inside the lube oil sump?
A. Yes, I have.
CDR ODOM: Will you please get Exhibit 349 displayed?
BY CDR ODOM:
Q. This is a drawing of the lube oil sump, and I'd like you to take a look at it. And this specific drawing has the suction line for the lube oil system and the sump. You see the middle there, there's a CL ship at the top of the drawing, which is center line. Do you recall this to be the arrangement on the *El Faro*, that the suction was offset a little bit from the center line?
A. I do not recall.
Q. And do you recall what the normal operating sump level would be whenever you were on the *El Faro*?
A. Yes. Standing operating procedure would be to have that sump between 28 to 32 inches.
Q. In the *El Yunque* operations manual it states a range of 18 to 33 inches; 18 obviously being the low, 33 being the high. And that's from the machinery manual, and it recommends an operating level of 27 inches for normal operations. Do you ever recall reviewing machinery manual from the *El Faro*, and do you recall

that being the ranges stated in that manual?
A. I don't recall reading the manual on that, but that would seem like a logical understanding of that system.
Q. Can you tell us what some of the pros and cons are for changing the sump level to a lower level or a higher level within the operating range? What would be a reason to operate the system at the upper end of the level or reduce that?
A. Normally we ran it at the upper level just for safety factor to make sure there was plenty of lube oil in the system. I'm not sure why you would want to run it too low. So like I said, normally we just we kept it up a little bit higher because of a safety factor.
Q. When you say safety factor, a safety factor from what in particular?
A. Making sure that we always had good suction and there's plenty of oil there to -- in reserve in the sump to be used.
Q. Thank you. Did you ever recall any circumstances where it would be necessary to fill the sump to the higher level of the range? For example, would there be something necessary if you knew you were entering heavy weather conditions or heavy seas that you kind of just make the decision to raise the sump level?
A. Yeah, that could be a possibility if, depending on the weather and the conditions that were coming, that we -- if say the level's around 28 or 27, it may be directed to them to bring it back up to around 30 to 32 to make sure we're at a good safety

level to get through the conditions at the time.
Q. Typically speaking, whenever you were doing that type -- making that type of decision, who made that decision or who made that call to raise the sump level? Did that generally come from management or was it solely a decision at the discretion of the chief engineer?
A. That would have been on the chief engineer.
Q. Do you recall on the *El Faro* if the system consumed oil or was it -- would it lose oil from the heat?
A. Very minimal. We never went through a whole lot of oil through the course of a year.
Q. That being said, how often do you recall adding oil to the system?
A. We may have to add an inch or two into the sump maybe once a quarter.
Q. Can you describe the process of adding oil? How would that -- how would you do that?
A. Usually anytime transferring oil would go through the lube oil purifier, and we'd take the suction from the storage tank and would add it from -- through the purifier into the main sump.
Q. And typically speaking, how long would it take to add 1 inch of oil to the pump?
A. Through the purifier, it would probably take probably a half an hour to an hour to add an inch.
Q. Are you familiar with the CargoMax stability program?

A. No.
Q. Within that stability program, there's a lube oil reading, and the lube oil sump level is reported as a percentage. So when the vessel was loading, that it was one of the things -- one of the factors that was taken into consideration. Do you recall ever having to, on a routine basis, make a report to the bridge on what the sump levels were?
A. Before every time we set sail, I would have to give a report to the bridge on all my tanks of liquids so they'd know exactly where all of our lube oil, fuel oil, and water was.
Q. And would you give those reports in soundings of inches or percentages?
A. I believe usually we gave it in gallons.
Q. Take a look at Exhibit 341. Exhibit 341 is an engineering log from 1 September 2015 from the *El Faro*. In this log, are you familiar with this section that reads, sump level?
A. Yes.
Q. And in this log it shows four readings of 25 inches and two readings of 26 inches. That is the sump levels for a 24-hour period for each watch; is that correct?
A. Yes.
Q. Can you describe to us how the engineers on watch would have been obtaining these readings?
A. Yes, through the sounding tube on the main sump. And what there was is, it was a big piece of flat bar, brass, that we had

inches marked off on it. So then you would take that and dip it down and then measure, and it would tell you exactly what you had in there for inches of lube oil.

Q. Typically at sea is that a pretty accurate way to get the sounding? Is it very consistent?

A. Yes, because that sounding tube was in the center of the tank.

Q. Was there any other means to monitor the sump level? Was there an indicator on the console?

A. Yes, I believe there was a low level indicator on the console.

Q. And did that indicator give a constant reading of the sump level or is it just giving you an indication when the level is low?

A. There was an alarm, a visual -- a visual and audio alarm that would go off if it's too low. And I believe there was also a digital readout of the reading of the sump at the same time.

Q. And was it typical for the engineer to compare the reading on that readout to the sounding to ensure it was a accurate reading?

A. Yes.

Q. Take a moment to discuss some of the sensors and indicators within the entire system. Can you describe some of the protections that were built into the lube oil system to monitor it and to give indication to the engineers when there were potential issues within the system?

A. As I said earlier, there was the lube oil discharge low pressure alarm,, and there's a low level alarm in the gravity tank and the main sump. There would also be alarms on the main unit themselves, the turbine bearings themselves if there was an issue there. Plus temperature alarms in case the temperature started getting too high, you would have a high temperature alarm.

Q. So if there was a low bearing pressure, was there a switch to indicate a reaction in the system to close the steam valves or to shut the system down if the pressure was too low?

A. No. Normally we'd get the alarm and we would start slowing down manually.

Q. If there was no interaction by the crew, would the system do it on its own eventually?

A. Eventually, yes. If there's not enough lube oil, it would secure the steam throttle to the HP unit.

Q. And is there any indication on the bridge for any of the sensors or alarms in the lube oil system that there's a potential issue -- without a report from the engineer on watch?

A. No.

Q. Can you describe in a little bit better detail if the lube oil system is -- pressure was dropping off, the specific actions that the engineer on watch would be taking to mitigate and protect the equipment?

A. A lot of that depends on how fast you are going. But if you are all the way up on all bleeds, which means -- or steam

extractions from different places throughout the system, then as your lube oil pressure dropped off and you had to start slowing down, you would also have to start securing all of your extraction valves to keep the plant running. Especially on the LP unit, the LP bleed, that was usually the first one you close in emergencies to make sure you maintain vacuum in your main condenser.

Q. Thank you. Did you recall anything, or are you aware of anything in the TOTE safety management system or any of the machinery manuals that provides a procedure to follow in the event of a lost lube oil suction resulting from a list?

A. So you're asking did they have a manual that said what to do in order -- if you lost lube oil pressure due to a list?

Q. Specifically if you lost suction, if you're losing suction in the sump, was there any specific guidance or anything in the emergency operations manual or the machinery manual that gave the engineer very specific guidance and instruction on what to do in that scenario?

A. Not that I recall. I never read or saw anything like that. It was all based on our own knowledge on how to run the system.

Q. And in your experience sailing in heavy weather, did you ever lose suction from the sump?

A. I never had any issues with lube oil during heavy weather other than slight variances of pressure due to the rolling.

Q. Did you ever experience a shutdown of the plant or an issue in the plant as a result of faulty sensors that could have been

confused with a loss of suction or a loss of prime in the pumps?
A. No.
Q. As a chief engineer, did you ever take any specific precautions -- looking at it from a holistic, the entire engine room, what type of precaution did you take in the engine room when you were known to be going into heavy weather?
A. Typically what would happen is I would have sat down with both the port engineer and the captain to understand fully what we were going to do and what we were heading into. And then before we even set sail, during maneuvering I would sit everybody in the control area and we would discuss what expectations were, and there would be some standing procedures of how things were going to be run left on the chalkboard that was at that level.
Q. Speaking about going to the turbo generators, was there anything specific required or anything that you did to them to protect them in heavy weather?
A. Other than just doing constant watches, no. We would just let them -- they ran fine, and I never had an issue with the turbo generators in rough weather.
Q. Do you recall if there was an inclinometer in the engine room at the console?
A. Yes, there was.
Q. Do you recall what the range was on it?
A. I believe 15 degrees.
Q. Did you ever experience any failure of any type in the engine

room as a result of weather?

A. Not due to weather, no.

CDR ODOM: Thank you, Chief. And this concludes my questions specific to the lube oil system. So at this time I'd like to open the questioning up to the Board, with any additional questions specific to the lube oil system.

BY CAPT NEUBAUER:

Q. Mr. Gay, I just have a few follow-up questions. If a vessel was traveling at a near max speed, how difficult would it be to close those extraction valves you mentioned? And I'm wondering if they're in a centralized location or would that take moving around the engine room?

A. Those extractions are all within 25 feet of the throttle. So between an engineer and his oiler on watch, you can easily get all three of those shut while slowing down the throttle.

Q. What would happen if you didn't close those in a timely manner?

A. The HP and LP bleed was a little bit lesser of concern. Usually those check valves -- there's check valves in all the systems, but we were always paranoid that the LP bleed wouldn't work. So that would be our first valve to shut in order to keep vacuum in the main condenser. The other two you would just end up losing a little steam out, but it wasn't that big of a deal, and you would -- you can shut those second.

Q. Were you nervous about the LP bleed because it hadn't

functioned in the past or it just was a critical bleed?
A. It was the critical bleed to the main condenser.
Q. In regard to operations in heavy weather, did you ever experience a situation where you incurred a sustained list to one side while you were going?
A. No. I've never occurred a sustained list for any period of time. We would continue to roll back and forth.
CAPT NEUBAUER: Thank you. I'd like to direct the questions to the NTSB at this time.
Sir, are you okay to continue for a few more minutes before lunch or would you like to take a break?
THE WITNESS: I'm doing just fine. Thank you.
CAPT NEUBAUER: Okay. Actually before we go to the NTSB, Commander Venturella has another follow-up question.
BY CDR VENTURELLA:
Q. How you doing, sir? Earlier during your testimony when we were looking at Exhibit 320, you mentioned the pressure vacuum valve indicated on the drawing was something that you had been familiar with during your time on the Ponce Class vessels. On another drawing it's indicated as 4 ounces in vacuum and 8-ounce pressure. Does that sound familiar?
A. Sounds familiar, but I cannot recall the actual specific pressure ratings.
Q. Sir, during our time aboard the *El Yunque*, we noticed that the pressure vacuum valve is not present, that there is a

gooseneck vent instead. Do you recall any discussions about replacement of the pressure vacuum valve with a gooseneck aboard *El Faro*?

A. I don't remember anything about the *El Yunque* having to go to a gooseneck. The *El Faro* at times did have a little bit of extra pressure sometimes when we ran it, but as I recall it would -- everything worked fine while I was there.

Q. Sir, as you mentioned the presence of a PV valve could potentially increase the pressure in the gravity tank. Given that the -- if the gooseneck vent was in place instead of the pressure vacuum valve, can you comment on the impacts that that could have to the flow from the gravity tank should run-down be required?

A. If anything, it would assist in allowing the oil to go down easier because there would be less resistance. It would just be an open pipe compared to vacuum pressure valve.

Q. And just one more question, sir. Do you recall the piping on the *El Faro* or the *El Yunque* from the gravity tank to the sump, was there any piping that was not directly vertical, more horizontal, perhaps transverse across the overhead and above the turbines?

A. Yeah. They would -- some of them would be transverse and -- while some of them, other ones were at angle and some are vertical.

Q. Have you ever experienced any problems due to list one direction or another from the sections of the pipe that turned

like that?
A. I never had any issue with the venting system on any class of this vessel.
CDR VENTURELLA: Thank you. That's all my questions.
CAPT NEUBAUER: Commander Denning.
BY CDR DENNING:
Q. Hello, sir. In the beginning of your testimony Commander Odom showed you Exhibit 320, the diagram. You mentioned it was from the *El Yunque*, asked you if the *El Faro* was identical. And I apologize, I didn't hear your response. Did you indicate that it was the same, you didn't note any differences?
A. I don't note any differences, no.
Q. Regarding the lube oil coolers, you stated that during winter months you only needed to run one of those coolers; during summer months you needed to run both. At the time of the loss of the *El Faro*, would they have been -- is it correct to assume that they would have been only needing to run one or would they have been running both at that time?
A. At that time of year we would have been only running one.
Q. Regarding the sump, you mentioned that you didn't recall whether it was offset. You had been inside the sump. Is it -- if you're inside the sump and you're looking at that suction, is it challenging to maneuver and see inside that sump?
A. Yeah. The manholes -- there's dividers and manholes in there, and trying to get through that would be -- for my size, it

was never easy for me to get in and out of those tanks. But you get down into one of those tanks, if it's off center, you really can't tell too much. That tank's not that wide.

Q. Would it be useful information to you as an engineer to know that it was off -- that the suction is off center?

A. Yeah, it would be useful information. But in that sump, with the way we kept the level, that offset would not have come into a factor.

Q. Are there -- is it indicated -- besides the drawing you saw, Exhibit 349, do you recall the offset being indicated in any plans or having attention drawn to that particular, to that offset?

A. No.

Q. Regarding adding lube oil to the system, you stated it would take about a half an hour to an hour to add 1 inch; is that correct?

A. That's correct.

Q. And can that be done underway or is it typically done in port?

A. That can be done at any time.

Q. If a vessel was experiencing heavy weather, would that present any challenges to adding lube oil to the system at that moment?

A. During normal heavy weather conditions, I would -- my standing operating procedure would have been to secure the purifier, because with the rolling they tend to break over and

become an issue. So I would have just added directly from the storage tank if I needed to.

Q. And by securing the purifier, what is the implications in the system? Is that potentially allowing impurities into the system? Or you would do that is an emergency, is that what you're saying?

A. Usually with this purifier -- like I said, with this system it's clean. We ran the purifier purely as a extra measure. It was good engineering practice. Whenever we cleaned it, it would be clean. So securing it for short periods of time wasn't a big decision to make, because the problems that it would cause by breaking over while rolling back and forth would be more detrimental than actually leaving it online.

Q. And just one final question regarding the inclinometer. You said the range was 15 degrees. Is it safe to say then if the vessel is listing more than 15 degrees or rolling more than 15 degrees, you would not have any indication in the engine room of how far the list was inclining?

A. At the main console, yes. Down by the fuel oil pumps there was another one that I think went up to 30 degrees.

CDR DENNING: Thank you, sir. That's my last question. Mr. Fawcett has some questions for you.

CAPT NEUBAUER: Mr. Gay, Just one follow-up question on the lube oil purifier. With that secured, how fast could you fill the sump?

THE WITNESS: Basically instantly. It would be directly from

the tank down to the sump.

CAPT NEUBAUER: Thank you.

BY MR. FAWCETT:

Q. Good morning, Mr. Gay. I just have one question for you. Did you say that engineers were required to constantly monitor visually the illuminated bull's-eye to protect the turbine?

A. That is correct.

Q. What if their attention was drawn away from that duty by some other event that might take place in the engine room? Is there more modern technology that would constantly monitor the flow and alert the engineers to the fact that they've lost critical lube oil?

A. No. But there were mirrors throughout the engine room where you could take observation other than just at the console. So you could continually look at that bull's-eye.

Q. And just to restate, if you lost the flow through the bull's-eye, there were a limited number of minutes, between 5 and 10 minutes, to restore the lube oil to the turbine; is that correct? Or take other action to protect the ship's propulsion equipment.

A. Yeah. If you lost -- flow through the bull's-eye sometimes would disappear, as I stated earlier, due to rough weather. So you would kind of wait maybe 10, 20, 30 seconds later, it comes back real heavy, and you would see it that way. Where you would really start taking action is due to the fact that you had probably lost lube oil pressure first and got a low lube oil

pressure alarm, and that's when you would take action.
Q. So what were your expectations -- how many personnel would normally be on duty in the engine room?
A. During normal operations you would have one engineer and one oiler.
Q. So it would have been your chief engineer standing order that that bull's-eye was constantly monitored -- say, for example, you had to go to the head as the engineer or perform some other function, was it your standing order that the oiler would monitor that bull's-eye to make sure you had the continuous flow of lube oil?
A. Yes. Everybody would have had that understanding in the engine room of how that bull's-eye worked and how often you'd want to maintain that during operations. So, yes, everybody was well aware of that bull's-eye and to keep an eye on it.
MR. FAWCETT: Thank you, sir.
CAPT NEUBAUER: I'd like to direct the questioning to the NTSB at this time. Mr. Kucharski. I'm sorry, Mr. Young, will start.
MR. YOUNG: Thank you, Captain.
BY MR. YOUNG:
Q. Good morning, Chief. We have talked to a few other chief engineers that have operated these Ponce Class vessels in heavy weather, and I know you've indicated you've experienced heavy weather as well. Can you tell us what the worst heeling angle you

may recall that you've operated in?
A. I believe once it was reported to us we actually took up to maybe a 30-degree roll.
Q. And was that a temporary roll or a sustained heel?
A. Temporary.
Q. And you also had indicated too that the weather had affected the pressure in the lube oil system with some sort of fluctuations. Could you describe why those fluctuations may have been caused?
A. You're dealing with liquids and gravity. So as the vessel is rolling back and forth, it's going to increase and decrease the ease of the flow of the fluid through the piping system, and due to that, you know, pressures would fluctuate as well.
Q. And in preparing for heavy weather you would secure the purifier. If you needed to add oil to the sump, would it be the proper way to do it would be to add oil via the storage tank and it would be fed via gravity?
A. Correct.
Q. And would the process of adding oil be -- the speed of it be increased with the purifier or would it be slowed down with the purifier?
A. It was faster without the purifier.
Q. Can you give an estimate without the purifier about how long would it take to add an inch to the sump?
A. Basically maybe 30 seconds to a minute. It was much faster

to go directly through just piping.
Q. And to clarify, that would be adding oil from the storage tank or from the gravity tank?
A. That's the storage tank.
Q. Did the *El Faro* have the ability via the piping system to add or drop additional oil from the gravity tank into the main sump?
A. As you could see on that drawing, usually how that -- the overflow level is already set. So unless you're adding oil to the system, the sump would not increase or decrease due to what was in the gravity tank.
Q. Looking at the diagram, adding on from the storage tank, do you remember the size of the pipe that may have been added there to add the oil?
A. I believe it was either inch or inch and a quarter.
Q. Understood. Thank you. I may have missed the answer previously, but because it was a closed system and rarely did you have oil leaking out, what was the frequency that you did have to add additional oil to the sump?
A. Usually about an inch or two once a quarter.
Q. And typically it was done through the purifier, correct?
A. Correct.
Q. With regards to the pressure switches for switching in lead/lag pumps on the lube oil pumps, was there ever any sort of tests on those pressure switches to ensure that they were operating properly at the set and design pressure?

A. Yeah. As I stated earlier, when we would switch those over in port on a monthly basis, we would usually switch off the online pump, let the pressure slowly drop. It would -- the pressure switch would then indicate that and kick on the standby pump.
Q. And were those switches ever calibrated so that they would kick on at a known pressure?
A. We never had to adjust them because they always kicked on at a relatively comfortable pressure for us.
Q. When discussing the actions the engine department would take upon a loss of lube oil pressure -- in securing the main engine, what actions would need to be taken to the main propulsion boilers with a sudden securing of steam to the main engine?
A. Usually with a burner management system, while closing the throttle you have to watch your actual boiler pressures, but the oiler management system itself would take care of the burners that need to be in. Usually they'd kick a couple of them out until we got a steady state again.
Q. Would the amount of steam production ever come to the point when one of the boilers would completely shut down?
A. No.
Q. If the gravity tank did drop down and dumped the contents of the gravity tank into the main sump, would there be any ramifications of running the main engine with an elevated sump level, possibly up in the 40- to 50-inch range?
A. No. I don't believe it would get that high up into the

actual turbines where it would be an issue.
Q. If you had any issues with the main engine, was there a manufacturer's representative that would assist in the engine department's process of making repairs?
A. Yes. We have tech ops that would come on board and help with the main engine, yes.
Q. And was that from General Electric?
A. While I was with Sea Star it was mainly Lee Peterson.
Q. And he acted as the manufacturer's rep for main engine issues, correct?
A. Yes.
Q. Previously you discussed how the discharge pressure from the lube oil pump would feed the suction side of non-running pump to kind of keep a prime on. If both pumps were lost, how would you go about reestablishing that prime?
A. There is a line that goes directly from your storage tank to the suction side of your pump where you could use the storage tank to then start up another pump.
Q. Is that a relatively quick process to be able to establish lube oil flow via gravity from the storage tank to the suction side of the pump?
A. Yes. I don't think it's more than three valves, and most of them are all generalized right by the pump.
Q. And can you recall any casualty control drills where this process may have been explained to engineers as a routine drill

that's practiced?
A. I would not say there was a routine drill, but during the monthly changeover it was usually done by the third with either the first or the chief standing by with them, and you would review things as you went.
Q. When discussing weather and how it pertains to the operation of the lube oil system, with a sustained list and rolling around s heel angle, if a portion of air was introduced into this suction side of the pump, how would that affect the ability of the pump to maintain pressure?
A. Small amounts of air wouldn't be that big of a deal. They'd just get pushed up into the gravity feed tank and just get aired out. Large pockets of air going in could possibly kick that pump offline.
Q. And do you know the ramifications of running a positive displacement pump without fluid passing through it? What would be the resulting issue?
A. You would destroy the internal rotating gears of that because the fluid going through it isn't just being pumped. It's also its lubricating and cooling medium for that type of style -- that style of pump.
Q. And with, obviously, through your experience, this has not happened, but do you have any idea from operating these pumps about how long the pump would have to run without fluid to be destroyed?

A. It would take some doing. You would really -- there would be so many other indications of things going wrong, that I don't see how you would end up destroying that. It's not a quick -- it's not something that's going to happen real fast. You know, it's not -- I don't know. You'd probably have to run it, I think, for at least a half an hour before it would actually start doing some damage to that pump. Because you would still have residual fluids in there that would maintain some sort of cooling and lubricating medium.

Q. And would the lead-lag switch help prevent that situation from happening? If I have a loss of pressure on one pump, it would be secured?

A. Correct. Once you lost pressure, it kicks off the lead one and kicks on the lag.

Q. And is there any way to override that, where you can manually force a pump to run?

A. Yes. You can put those in manual instead of automatic switchover. And on the automatic switch I believe there was a neutral position where it wasn't either leading forward or aft, but just a neutral position you could start and stop them as you needed to.

Q. And just, if you wouldn't mind explaining regarding the loss of lube oil pressure what type of operational controls you had to put steam back on the engine upon a loss of lube oil pressure. Are there any overrides or any way steam could be admitted to the

engine without lube oil pressure?
A. As we were talking earlier, if you lost complete lube oil pressure, it would first secure all the steam to the turbines. But there is a method of opening up those manually, if needed, using hydraulic jacks and some wiring that would actually open up the throttle.
Q. And were those emergency operating jacks tested at any regularity?
A. Yes. We would test those before we left every port. It was part of the procedure to test everything before sailing.
MR. YOUNG: Thank you very much. Appreciate your time.
CAPT NEUBAUER: Mr. Kucharski.
MR. KUCHARSKI: Thank you, Captain.
BY MR. KUCHARSKI:
Q. Good afternoon, Chief Gay. Thank you for coming. I have a fairly small number of questions. Back to the -- you mentioned that you had a pressure switch which the engaged the pump or the pump that was on, if it lost pressure, then it would shut that pump down and the other pump would come online. Is that correct?
A. That is correct.
Q. What would happen then if the lag pump, if you will, comes on the line, it's not getting any pressure? Will they cycle back and forth?
A. Yeah. The lead pump would try to kick back on after a while, and usually -- any time I was on board, there was always somebody

present down there while we were trying to switch over pumps. So if the lag pump was not coming on, we could always try to switch on the lead pump, back on quickly.

Q. So that would have to be manually done, then? I think you mentioned there's a manual switch or something you could stop them from cycling back and forth?

Q. Right. Actually, I think I misspoke. The lag pump kicks on first, and I do believe once that built up pressure, the lead pump would then kick off. So the lead pump's running continuously until the lag pump takes over.

Q. And those pumps have common suction lines; is that correct?

A. Yes.

Q. And looking at this diagram 320, the machine operating manual shows the lube oil system schematic. You mentioned there was a line from the gravity tank that went directly to the suction side of the pump or pumps; is that correct?

A. Yes.

Q. Does it go to any specific pump or --

A. No. It would just go to the suction side of both pumps.

Q. You mentioned there's a compound gauge on the suction side of the system to the pumps; is that correct?

A. Yes, that was correct. On all our strainers there would be gauges on both the inlet and outlet side.

Q. Okay. So this diagram, I see one gauge, but you're saying there was a gauge on both sides?

A. Sometimes there was a -- as you say, there was one gauge, and other times we'd just have two separate gauges put in there.
Q. So if you have one gauge, is it -- which side of the strainer was it on? Is it on the sump side or is it on --
A. It would be a differential gauge. So it would have been taking readings from both the suction and discharge side of it.
Q. And these pumps, are they run at constant speed?
A. Yes.
Q. So you would have a pump that's running at a constant speed -- is it a fairly high speed pump?
A. I think those are 1760 RPMs.
Q. So if you lost suction, you try the pump -- you try to prime the pump possibly through the head tank or the gravity tank at a high -- at the operating speed of that pump. You had no way to slow it down?
A. Correct.
Q. You mentioned that you didn't see any list, if you will, or emergency procedures for loss of lube oil. There's no list or directions for that type of a situation that you recollect?
A. I believe the question was, did anything come from the office? There would have been something in the chief's standing orders on how to handle such a situation.
Q. Are you familiar with the critical operations section, critical equipment, in the safety management system?
A. Which -- you talking ISM?

Q. Yeah, the -- supposed to be a critical equipment list and then possible operations for the -- emergency operations for the critical equipment.

A. I'm well familiar with the ISM system, yes, and how it pertained to critical equipment.

Q. So was there a list of critical equipment that you recollect, a list of critical equipment?

A. Yes, there is a list of critical equipment that we would have to maintain a better observation of compared to non-critical equipment.

Q. And were there emergency procedures that were generated off of that critical equipment list for loss of lube oil or any other situations in the engine room for loss of critical equipment?

A. Yeah. That was generated by on-board personnel, usually the chief engineer working alongside with his other engineers so they all understood how to handle that.

Q. So back to Mr. Young's question. Was there -- do you remember a procedure that you saw, not in the standing orders, but a procedure specifically for the loss of lube oil?

A. Nothing unless it was in the actual chief's standing orders.

Q. Would you mind telling me what kind of an inclinometer it was at the console? Do you remember, was it a bubble type?

A. Yeah. At the main console it was a bubble type.

MR. KUCHARSKI: Thank you. Thank you, Chief.

Thank you, Captain.

BY CAPT NEUBAUER:

Q. Sir, I just have one follow-up question. Mr. Young -- during Mr. Young's questioning, I believe you discussed that you had received tech rep assistance by going through Mr. Peterson. During your tenure with Sea Star, can you assess the responsiveness of Sea Star Lines to your request for tech reps, equipment, any repairs needed?

A. Yeah. That was -- it was always easy. I never had any problems lining things up that needed to be fixed with tech reps. It was just a matter of coordinating it with the ship's schedule and availability.

Q. Would you say the same thing was true for critical equipment and/or supplies?

A. Yes.

CAPT NEUBAUER: Thank you. At this time I'd like to go to parties in interest, and then take a break for lunch. Is that okay for your schedule at this time, sir?

THE WITNESS: Yes. I'm fine.

CAPT NEUBAUER: I'd like to go to TOTE for any questions, please.

BY MR. REID:

Q. Good afternoon, Chief. To your recollection was the manuals for the various equipment, including the lube oil system, would those be on the vessel?

A. Yes, they were all on the vessel.

Q. And in those manuals, do you recall there being a troubleshooting analysis, troubleshooting guide for various kinds of problems?
A. Yes. All the manuals would have a section for just troubleshooting.
Q. And do you recall there being a troubleshooting guide for dealing with a loss of lube oil?
A. Specifically I don't remember actually looking at that, but I believe that was part of the whole troubleshooting manual. Because any manual I've ever seen with a troubleshooting guide would have had that included.
Q. If after lunch we showed you the troubleshooting analysis would that -- the section of the manual, would that refresh your recollection?
A. Yeah.
MR. REID: Thank you.
CAPT NEUBAUER: Mrs. Davidson?
MR. BELL: No questions.
CAPT NEUBAUER: ABS?
MR. WHITE: No questions.
CAPT NEUBAUER: Herbert Engineering?
MR. SHILLING: No questions.
CAPT NEUBAUER: I believe we have another question from the table, Commander Odom.
CDR ODOM: Thank you, Captain.

BY CDR ODOM:

Q. Going back to Exhibit 320, there's one more component I would like to identify and take a look at. In the sump, following the suction line out of the sump, I see another check valve right there. Can you tell us what type of check valve that is and what the purpose of that check valve is?

A. That was also, I believe, a swing check valve. And its whole purpose was if you were just securing pumps, because you had to shut down the system, that all the lube oil wouldn't drain back into the sump, that it would stick -- that whole line would stay full of fluid, so that way when you went to go start the system back up it would be all there ready to be pumped.

Q. So the purpose of that check valve is to preserve the prime for the pump?

A. Correct.

Q. And also if the primary pump lost suction as a result of air in the suction line, it's a common line, so that would also affect the standby pump in the same manner; is that correct?

A. Yes, it would affect it pretty much the same manner. As I said, there's a bleed-off line. And if you look at those suction valves, those are I believe check valves also. So that short line between the suction valve and the pump is where that priming line would have gone to. So that -- you know, to start off with, you would have had some liquid to start that pump back up.

Q. Thank you. And referring back to the safety management

system and the critical equipment that's required in that, there's also a requirement for spare parts to be identified to support the critical equipment. Do you specifically remember any spare parts that were available on board in regards to the lube oil system?

A. I'm pretty sure we had enough parts to rebuild at least one pump on board at all times.

Q. Any other spare parts for any other components in the system?

A. Lube oil specifically?

Q. Yes, sir.

A. I believe there were spare strainer baskets. There are gauges. Like I said, differential pressure gauges and other gauges that we'd need. Probably a pressure switch would have been part of all that.

CDR ODOM: Thank you, Captain. I have no further questions.

CAPT NEUBAUER: Mr. Kucharski.

MR. KUCHARSKI: Yes, Captain. Thank you.

BY MR. KUCHARSKI:

Q. Just one more question. Chief Gay, you mentioned that to vent the pump itself you had to crack the mechanical seal.

A. Yeah. If for whatever reason that pump would get air-bound, we would use the mechanical seal lubricating and cooling line to bleed all that air pressure off by adding lube oil pressure from, say, the head tank.

Q. And what does that entail, actually entail?

A. Just opening a couple of valves, putting pressure back on

that suction side of the pump, and just loosening up the nut on a piece of tubing, and air would come out until you get a little bit of bubble-up oil. And you just retighten that, and then you'd be all set.

Q. I think a question was asked or they were asking about a large amount of air. Is that an effective way to vent a pump for large amounts of air?

A. In a closed lube system like that, it's the best way you have in order to get that done. I suppose depending on how large of air you're talking about, you could always, say, pop off a pressure gauge and start using the pressure gauge shut-off valve and start bleeding air that way if you needed to in an emergency. But under normal circumstances of just trying to get some air bled off to pick up prime, that mechanical seal cooling line worked fine.

Q. Is that fairly common in your experience, to vent a pump -- mechanical seal like that, not to have a dedicated vent on there, off the casing somewhere where you can vent?

A. Yeah. A lot of times it just depends on your system, your pump and your equipment at hand. But, yes, that would be a fairly typical way of getting a pump primed if you needed to.

MR. KUCHARSKI: Thank you.

CAPT NEUBAUER: At this time the hearing will recess and reconvene at 1:20.

(Whereupon, at 12:32 p.m., a lunch recess was taken.)

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

(1:30 p.m.)

CAPT NEUBAUER: The hearing is now back in session.

Mr. Gay, we're going to do one final round of questioning starting off with Commander Odom.

BY CDR ODOM:

Q. Chief, for the sake of time I'm just going to run through all of my questions. I'm no longer going to divide them up. So if you need a break, say so, and we'll make that happen. So this section here I'm going to talk about the emergency fire pump and the bilge and ballast pumps and those associated systems.

The emergency fire pump is located in number 3 hold on the aft starboard side; is that correct?

A. That is correct.

Q. Do you recall the lineup of the suction valve on the emergency fire pump for taking suction, did it remain open at all times when you were at sea or was it normally closed?

A. Due to the fact that the cargo hold 3 was not a manned space and that suction valve was on the sea chest directly to the hull, that valve was -- standard operating procedure is going to leave that valve closed. It does have a reach rod that goes all the way up to second deck. Along -- right above that valve, to open it, is also a motor control unit, in order to start that pump once you open that valve for a second day.

Q. And other than the suction valve, did the other valves in the

system remain open?
A. Yes. The only other valve in cargo hold 3 would be the discharge valve, which is -- that was a stop check valve, a lift stop check valve, which would remain open at all times.
Q. You were speaking about the reach rod. Is there any other means outside of the reach rod to operate that valve outside of the engine room or outside of the cargo hold?
A. No, there wasn't.
Q. Do you ever recall at any time through the movement of cargo in number 3 hold, anything ever hitting that suction pipe or the emergency fire pump or any of its associated systems?
A. No. There's no movement or hitting of anything down there in 3 hold that I know of.
Q. Was there anything specifically engineered to protect that fire pump and that line?
A. I believe there was a 4-inch pipe that was welded in place as a guard around that fire pump.
Q. Around the fire pump, and did it also protect the suction line coming off of the sea chest or did it just protect the pump?
A. I believe that guard was just more protective around the pump and the piping associated with it. But some of that suction piping actually was -- because in the cargo hold 3, when the hull came down and met -- where it met the deck, a lot of that was up a little bit higher on that down slope. So if cargo was shifting, it would have probably stopped and hit that -- the end of the deck

itself before it would hit anything else.
Q. And could you cross-connect the emergency fire pump to any other system?
A. Not the fire pump in the emergency fire in cargo hold 3, no. That was just strictly dedicated for the fire system.
Q. Moving on to the bilge system. Do you ever recall a situation where you needed to use the bilge system as to suck water out of the cargo hold?
A. Yes. We would do that pretty much on a routine basis we would test that system.
Q. So strictly for testing? You never needed it because water was in there from any other source other than test?
A. In order to maintain the cargo holds in good condition, the deck department would get down there, sweep up, sweep up all the debris, and then wash it all down. And that would help with also testing that system; as they're washing down those cargo holds, we were running those pumps and suck out of all those different separate suction wells.
Q. Did you ever see or did you ever test the eductor?
A. The eductor for the bilge system on there was never operational when I was on board.
Q. And why was it not operational?
A. We never had an issue with using the bilge system, and it just ended up being something we never used. So it ended up, I believe got removed.

Q. Do you recall any check valves in the system in the bilge piping?
A. In the bilge manifold those valves are all lift check valves. So basically that's what we end up using for check valves throughout that system was on the manifold themselves, the lift check suction valve to each compartment.
Q. It's my understanding the bilge pumps were also the ballast pumps. Is that correct?
A. Yes. They could be used for both.
Q. So we know from the VDR transcript the master of the *El Faro* was trying to simultaneously shift around tank ballast and pump bilges. In this type of operation, is it possible the system could be lined up in such a manner that instead of sucking water out of the holds it could be pumping ballast into the hold?
A. No. That's impossible because the pump you are talking about was completely isolated to just those two tanks. It was located in the after part of the engine room, and all that did was pump water from port and starboard ramp tank back and forth. It never had anything to do with bilge or ballast in the rest of the ship.
Q. Are you familiar with the bilge alarm panel and where it was located? And, if so, could you explain that to us?
A. The bilge alarm system was all dedicated to alarms that were in bilge wells outside of the engine room. It was located on the starboard side of the main console. It had both visual and audio alarm when it would --

Q. The floats which is associated with that system, the number 3 cargo hold, do you recall where they were located?
A. The floats which is for 3 cargo hold would have been in the bilge wells themselves. There are float switches. So as the water rises, it will electrically trip a switch, would then alarm into the engine room.
Q. When you say bilge wells, are you referring to the rose boxes?
A. That is correct.
Q. So if I understand you correctly, you're saying you recall the flow switch inside the rose box. Is that correct?
A. Yes, that's correct. That should have been just at the very top of that rose box.
Q. So was it in the rose box or was it above the deck of the rose box?
A. I guess technically it would have been just above the rose box, above the deck.
Q. Thank you. And was there a delay in the way the system -- for the float, float in the water, was there a built-in delay before the panel would alarm?
A. It never seemed like there was. I don't believe there was a delay. We would test those on a regular basis. We were using hand radios back and forth, and sometimes they would say, okay, I've triggered it, and, yes, it would take a little bit to alarm, but sometimes that's in just the communications. So if it was a

delay, it wasn't any more than 5 seconds.
Q. And on the panel do you recall the ability to silence an alarm?
A. I believe there was a way to silence the audio alarm, but the visual would still be there.
Q. And how would you clear the visual?
A. You would have to pump down the rose box and get that float to be back in its original position.
Q. Could the bilge alarm panel be turned off?
A. Everything could be turned off. I mean you can -- but I have never seen it off.
Q. Thank you. There was -- I guess what I'm asking is there just an easy means to just simply flip a switch and turn the panel off?
A. No. You would have to make an effort to shut that off from its power source.
Q. Do you recall if there was any indication on the bridge --
A. No, there wasn't. It was only in the engine room.
Q. If you received an alarm while underway, what was the -- what instructions was the engineer on watch to follow to respond to that alarm?
A. Depending on the condition. And if it was just an ordinary day, everything's going fine and we get an alarm -- on the *El Faro* there was an opening between the engine room and cargo hold 3, and we would just send somebody. The oiler would usually just go

check it out to make sure everything was all right. If they were in other cargo holds such as 1, 2, 2A, we would usually call the bridge and they would send somebody out. We would definitely always let the bridge know that we had received an alarm and that we were investigating it at the time.

Q. So in your experience in heavy weather you've never needed to pump out the bilges or never experienced any water coming inside the vessel in the cargo holds?

A. No. We never had to -- we never took on water into a space like that, no.

Q. And in your test in the system did -- or its function have any issues?

A. A lot of times -- or not a lot of times. I mean, yeah, a lot of times it worked perfectly fine. Once in a while those float switches, they're very small micro switches, and they would arc themselves closed, which means they would just continually alarm. So that we'd just change out the switch.

Q. Was it pretty routine maintenance to clean out the rose boxes on the -- at least, the cargo holds for anything that could possibly clog those up?

A. The routine and standing operating procedure for that would have been with the Deck Department. That was not really where I was overseeing. But I would talk to the chief mate if I noticed things were getting dirty, if I needed things done, then he would work at getting people down there to clean that up.

Q. If there's a notification about the bilge alarm going off, did the engine room always notify the bridge or in the course of their investigation, if they went up there and didn't really see anything of concern, would they just clear it and go back to work or what? Did they always --

A. It was pretty much understood that if you receive an alarm of any kind in the cargo holds that the bridge is to be notified.

Q. And on the rose boxes on the *El Yunque* there were some corrosion issues within the rose boxes that were repaired with fiberglass wrap. Are you aware of subsequent repairs to the rose boxes on the *El Faro*?

A. No. I know on some of the rose boxes, but I can't remember if it was specifically the *El Faro* where we did -- there's a piping and a flange and then more piping where we'd disconnect at that flange and replace the old piping with new stuff, but I don't know of any time that we used fiberglass wrap on the *El Faro* to do any repairs on that.

Q. Can you tell us what would be the consequence of a wasted rose box? Would it infect the system?

A. The biggest problem if you have a wasted rose box is you've got all that rust. And if you got a lot of water in there making some sort of turbulence when you're sucking it up, you're going to suck up a bunch of rust with it and plug up the suction strainer. That has happened before when I've used the system. Usually you'd pull the strainer basket once, maybe twice, and then it would work

perfectly fine.

Q. So I'm now going to move into another line of questioning. This is general operations type of questions.

So shifting gears a little bit here. Do you recall any loss of propulsion while you were sailing on the *El Faro*? And can you please describe the circumstances?

A. Yeah. On the *El Faro* we did lose propulsion once, but that's due to the fact that we -- the evaporator distilling unit got filled with saltwater, and that overflowed, ended up getting into the boiler. And the boiler flashed over, and so we had to shut down the system and shut down the whole propulsion unit before it made any more damage throughout the whole system.

Q. Do you recall when that was approximately and what the response was to it?

A. All I know, it was between when we were still on the Philadelphia run and we were heading southbound from Philadelphia. I don't recall what year or time of year that was. What ended up happening is we actually ended up replacing a few superheater tubes due to the fact that the salt made some corrosion on those and we had to replace those tubes.

Q. And do you recall if that was reported to the Coast Guard?

A. Yes. There was a complete report on that whole incident.

Q. What about the steering casualties? Do you recall steering casualties of any type?

A. I never once had a steering casualty while I was with Sea

Star, TOTE Services.

Q. Do you recall if there was ever a casualty that was not reported to the Coast Guard or to Class?

A. No. I know of no such failure, no.

Q. Do you remember making preparations for your normal Coast Guard exam?

A. Yes. For the yearly COI? Yes.

Q. Was it common in your experience during that annual COI for both ABS and Coast Guard to be on board simultaneous for that exam?

A. Yes, it was.

Q. And can you briefly describe some of the things that you would do in preparation for that exam?

A. Big thing would be going through all the boiler shutdowns, generator shutdowns, emergency generator shutdowns. We would test the sprinkler system out on second deck. We would go through all of our procedures with the steering system, and make sure all of our equipment was generally in good order.

Q. And do you recall entering the vent trunks or was that a part of the preparation to check the vent trunks and check the fire dampeners to make sure that they were clear and operating properly?

A. Usually with the cargo hold vents that was left up to the Deck Department. And usually when they found something that was not working properly, a broken handle or the damper wasn't moving

properly, they would let me know, and we would fix it. And if we knew there was something broken, we would definitely fix it as soon as we got the opportunity.

Q. And did you enter the vent trunks to fix any of those dampeners or handles?

A. Only in the upper space up on second -- near the second deck level.

Q. Do you recall the general condition of those vent trunks when you went in?

A. Generally for as old as the vessel was they were in pretty decent shape. Yeah, there were some rust flakes throughout the whole thing. Sometimes we did have to manufacture and make new edges to the actual dampener to make sure they would close fully if we needed to. But other than that, it was usually relatively good state.

Q. Was it generally understood that the dampeners were to remain open at all times when the vessel would sail?

A. Most of the time all those cargo fans and those dampeners were left to the Deck Department to maintain and operate. But do believe if they knew we were going to have rough weather they would go out, and they would secure all those dampeners to the cargo holds before we sailed.

Q. I'd like to talk briefly about your participation in the drills and some of the safety meetings. In your time on the *El Faro* when conducting fire on boat drills, can you tell us if it

was typical for the scenario to be the full exercise in using and deploying the equipment and boats or was it common for a drill to be a discussion or a tabletop type of exercise?

A. Are you talking fire drills or abandon ship drills?

Q. Fire on boat drills, both.

A. In both cases usually the fire drill was always almost hauling up hoses, pressurizing the line, making sure that part of the system works. Fire drill after about 5 minutes. Then securing that system depending on where it was on the vessel. Also, because we carry containers, one of the big drills would be container drill, which requires multiple teams in order to attack something like that. So it would be a full drill with everybody dressed up. As far as abandon ship drills, unless we were in rough weather where we couldn't do it, every week we lowered the lifeboats to loading, the loading level.

Q. From the TOTE Emergency Operations Manual it says that at least quarterly the boats should be put in the water and run. Did you observe that?

A. There were times when I was a third engineer that I would be on that boat because on one of the boats there's a diesel engine. So the third would be in charge of running that. So, yes, I have been a part of actually lowering the boat to the water. More, as chief, I was usually in the engine room doing something else. The starboard lifeboat usually got done right as we were entering port, anyway, so I never got to see that one actually lower to the

water. But they'd hold us off the dock long enough so we could lower the boat to the water and then bring it back up.

Q. And during the drills, was training ever given in regards to specifically abandoning ship by the use of a life raft with the vessel in listing condition?

A. We would have specific drills about how the life rafts were to be used, and that they -- as far as listing goes, I mean it was part of the discussion, yes. And a lot of it was making sure that you have the line tied off so if the raft deploys from the vessel itself from the hydrostatic release that it would operate.

Q. Was there ever any special instructions given to the crew about how to enter the water or which side of the vessel to go to in a list and attempt to get in the water from?

A. I can't remember specifics, but that would have been something that would have been generally talked about on how to enter the water, and depending on the conditions.

Q. Also the Emergency Operations Manual talks about during the lifeboat and abandon ship drill that the crew should show up in their lifejackets with them on. My question is did you ever see them do the same thing with the survival suits?

A. We would never show up to the lifeboats with the survival suits on. Usually what would happen is we'd do our typical fire boat drill for the day, and then everybody would go back to their respective state room and don their survival suit. And then usually the captain, the chief mate will come in and inspect, make

sure everything looks good, and then you take it off and put it back into the bag in storage.

Q. So the chief mate would go around to the individual rooms and verify that the person had a survival suit and it was the proper survival suit and fit them?

A. Correct. To make sure the zippers all worked, make sure you had your lights, your whistles and everything else. Yes, correct.

Q. Did you also observe something similar to this with the Coast Guard marine inspectors during their regulatory drills?

A. All I know is during yearly drill, is that they would -- the chief mate would get people and collect all the survival suits, and that they would get inspected. But I was not part of that inspection, no.

Q. So it also states in the manual, in addition to the mandatory drills conducted weekly, the master may at his or her discretion conduct additional drills and exercises to ensure proper training and performance of the crew. Were there any additional drills that were conducted to your knowledge?

A. On a regular basis it was fire on boat drill. But if we had -- we also do now, with the security issues, we do security drills as well. If say we were doing something different, out of the ordinary during those meetings, it would -- everybody gathered together, there would be special instructions sometimes given out depending on different situations that were happening.

Q. Do you recall ever a situation where the master required an

additional drill as a result of a poorly performing drill or a poorly conducted drill?

A. Yes. That had happened on occasion. Not very often. But on occasion if things were too lackadaisical or it just did not go right or he wanted to see something again, I have had that where drills have been re-performed.

Q. And was vessel flooding or damage control ever a scenario that was discussed or -- on drill?

A. Yes.

Q. And during the Coast Guard or ABS surveys and exams, did you ever observe them filling the rose boxes to test the bilge system?

A. Yes.

Q. And was it ever a discussion -- was there ever a means to rig additional pumps or auxiliary pumps for the purpose of dewatering the vessel?

A. As far as just the rose boxes?

Q. Was there any other means on board that was discussed for using portable pumps or anything like that that could be rigged to dewater the vessel?

A. There's always discussions if, you know, sometimes if we're running into issues that we would use, yes, say a diaphragm pump to discharge water out of it. But it was usually the bilge and valve system worked pretty well.

Q. Thank you. I'd like to discuss a couple of things with regard to the safety management system and crew competency. Have

you ever seen a junior officer question what a senior officer was doing as an unsafe act or intervene to the point of recommending an operation be halted for safety concern?

A. Yeah. I would say there were times, especially as chief, that I might find people trying to rush through a job thinking that they had to get something done faster than they should, and they would start cutting corners. But it never became any type of conflict. It would just be more of a guidance and letting them know that what they were doing was going to get somebody hurt, and that they would -- they'd be guided to a better way, be instructed in a better way of doing it.

Q. So that was you as the chief instructing a junior officer. Have you ever seen the reverse, if that were a junior officer question a senior officer with regards to safety?

A. Yeah. Because we all pretty much spoke our mind. When I was on board, everybody's pretty free to speak. And if somebody else saw something going wrong, I would hope -- and it did happen that they would say, hey, you need to watch out for this, because their eyes are looking at something that, say, mine wasn't or somebody else's wasn't.

Q. Did you routinely attend safety meetings?

A. Yes. I was at every safety meeting.

Q. Do you think they were effective in addressing near misses or conditions reported by the crew?

A. Yeah. Mostly, yes, it was. It was -- if there were certain

things that were really going to affect the safety of the vessel, it was addressed pretty seriously.

Q. And in your observation of the crew, do you feel like the safety meetings were of value to them or were they a routine thing that the crew just felt like they had to sit through? Or do you think that they were active participants and felt like their feedback was well received?

A. Most of the time it was well received, and they felt free to be -- to participate. I won't deny there were times that sometimes it was monotonous. It was another drill. But usually if I saw that or the captain saw that, we would get together and say, okay, we need to do something different because these guys are starting to -- we're starting to lose them.

Q. Do you feel like the crew felt like that for speaking up at a safety meeting there would be a fear of some type of reprisal?

A. No. I never thought that was ever a case.

Q. I'd like to ask you about the safety management system in general. Do you feel like it was an integrated part of everyday operations? Or was it kind of viewed from the crew as a separate system from operations?

A. Could you say that again?

Q. So you have the safety management system. Was it an integrated part of everyday operations, the use of the safety management system, or was it generally viewed by the crew that we did operations, and then we have to refer to the safety management

system for something?
A. A lot of, say, the chief engineers standing orders or are the way we did things anyway was -- came from using good operational management and using the safety management. So most people, it was pretty much integrated as both. So it was -- so the safety management system was always part of what we were trying to do.
Q. And specific to the *El Faro*, could you describe the safety culture on board the vessel, to include the management's attitude toward safety and the vessel?
A. The best thing we had for safety was preventative maintenance. And we had a good program with that on board as far as a computer system, and then that would keep us well apprised of what we needed to continue to work on. Plus over time we created our own work list for each individual that was in the Engine Department. And they would turn those in at the end of the month to the chief so that we understood what they had done for preventative maintenance to keep things going. And that would be reviewed, and any comments -- if they saw something that was unsafe or unsatisfactory, they'd make comments on those sheets, and we would do the best we could to get those fixed as soon as possible.
Q. And do you recall who your designated person ashore was?
A. I believe that time it was Harry Rogers.
Q. And had anyone on board ever used the designated person ashore to report an unsafe condition or concern they had with the

operation for the crew?
A. I don't remember of anyone actually using it to contact Harry for unsafe condition aboard the vessel.
Q. Did you ever participate or see the designated person ashore aboard conducting an internal audit?
A. Yes.
Q. Did you participate in those internal audits?
A. Yes, I did.
Q. Do you recall any nonconforming issue that resulted from the audits?
A. There was always things found that could be done better. One case scenario was we weren't recording our -- I think it was our torque wrenches and their calibrations properly. So something might -- because that's a critical piece of machinery, tools that we're using. But it was never real -- there's no real major ink on that.
Q. So did you or any of the Engineering Department ever use the safety management system to report nonconformance to the company in regards to an issue that was directly related to the safe operation of the ship?
A. Once again, I'm not aware of any, no.
Q. And did you as a chief engineer or any of the engineers participate in voyage planning?
A. Yeah. That would usually be myself with the captain and port engineer. Every time we would talk about what our next voyage was

going to be and how it was going to go.
Q. And who was your port engineer?
A. Mainly during my time of stay it was Lee Peterson.
Q. And during those voyage planning meetings, do you recall if voyages had involved heavy weather?
A. Yes.
Q. And what type of planning or risk assessment did you guys do with regards to the weather or storm avoidance planning --
A. When it came to weather I just, I relied on the captain. He would first ask me what is the condition of the engine room and is there anything we need to be leery of as far as equipment failing or anything else that's going on down there that he's not aware of at that time. Once I would give him a full report on where we were in the engine room, he would then make his decision based on the weather on how he was going to make his route.
Q. Do you recall a specific plan that was designed to avoid a storm?
A. I remember there was one hurricane that was coming through, and the plan was to just head for us -- with the way the storm was moving at the time, was to just head due east. And then see if we could stay out of its way, and then, when possible, start heading south back down towards Puerto Rico. It was asked of us, when will you get to Puerto Rico? And the answer was, when we get there.
Q. During the time aboard the *El Faro* did the Deck Department

have the support of the port captain or a port mate?
A. Yes.
Q. And did they -- were they involved in the voyage plan?
A. A lot of times they would be involved -- these weren't always usually say this is when we're going to have our voyage plan sit-down. Sometimes a lot of things would get discussed, say, during the lunch as cargo is being loaded, and then later we'd have a final discussion before we set sail.

Due to the busyness of loading a vessel, a cargo ship, a lot of times we would either talk to somebody on the phone or radio real quick to get their final information, and because they were still out on deck loading the last of the cargo and trying to get it on board while -- like I said, the captain and myself and usually the port engineer would make a final decision on how we're going to get out.
Q. Did you know Captain Davidson?
A. No, I did not.
Q. You never sailed with him?
A. No. I left the company before he was hired on.
Q. I'd like to shift into the VDR conversations, which is Exhibit 266, and starting on page 310. About in middle of the page, AB2 at 120 and 28 seconds, makes a statement, "pounding on the ship better, guys, slow down." The assumption here is he's talking about the pounding and the stress on the ship because of the weather. I would like to ask you in a parallel context, what

would the engineers be concerned about with the weather and pounding on the ship? Would they also be talking about the need to slow down? Would it be a situation where they would need to take any particular actions?

A. Normally during heavy weather like this you start rocking and rolling, and in your fuel tanks you get a lot stirred up. And if -- the first thing that would probably become an issue would be fuel pressure and keeping those fuel oil strainers clean. So, yeah, pounding like that it vibrates in the whole vessel and more things would break free and be possibly sucked up into the fuel system where we'd have to -- continually changing out fuel strainers.

Q. And would that create a situation where you had to slow down the vessel?

A. It could, depending on how bad you were sucking things up into the fuel system. But a lot of times what I would do is I would have it where you would have two oilers in the engine room at all times, and everybody would overlap. So if it was that bad, one oiler would just be dedicated to cleaning fuel oil strainers while the other guy is doing the primary job.

Q. So moving on to page 315, the very bottom, second mate, "We also lost RPM. Third engineer isn't paying attention down there." Does the RPM in heavy weather require constant attention or what might they be referring to?

A. With weather you're going to put a heavier load on the

propulsion system because you've got more resistance. You've got, you know, you're fighting more force. So if you're not opening the throttle more to keep that RPM up then, yes, it will -- the ship will slowly start slowing down due to the extra forces being put on to the vessel.

Q. Going to page 318. About halfway down the page where it says 2M, second mate, at 140 and 4.5 seconds. Just a small paragraph. Like to give you a second to read that.

In this paragraph the discussion is about not taking a safety meeting very serious, is the specific wording that's used. Then it's, "yeah, whatever, it fits, but nobody actually sees to see if their survival suit fits." That's their words. Earlier you testified about the chief mate when you were on the *El Faro* coming around and checking to make sure everybody had a survival suit that fits. And they're also talking about taking drills seriously at the very end. Can you provide any context to that?

MR. WHITE: Can I have a minute?

CAPT NEUBAUER: Sir, would you like to take a recess?

The Board will now recess and reconvene at 2:25.

(Off the record at 2:17 p.m.)

(On the record at 2:28 p.m.)

CAPT NEUBAUER: The hearing is now back in session. Chief Gay, we're going to continue on the line of questioning by Commander Odom. So we're going to move on from that section in the VDR.

You can go ahead and reask if you want.

Do you have an answer?

THE WITNESS: Yeah.

CAPT NEUBAUER: Why don't you reask the question then, Commander.

BY CDR ODOM:

Q. My question is, in your experience with TOTE and any of the Ponce Class vessels, based on the statements that were made in that section of the VDR, has that ever been your experience to have any of the crew members complain about the quality of the drills or the fact that their survival suits might or might not fit?

A. No. I never experienced that. As I stated before, we would try on our survival suits, and there would be a secondary person, usually the chief mate, that would come into your room and check to make sure everything was in working condition.

Q. I'd like to move on to page 326, the bottom of the page. The second mate is stating, "We're definitely getting set, 82 down to 16 knots." And then going on to the next page, "Yeah." In this section they're talking about down to 16 knots and getting set, is that something that just naturally occurs as the result of getting set, the vessel slowing down, or is this specific action that might be going on in the engine room slowing the vessel down?

A. In the engine room we're just trying to give the bridge what they want. Getting set and it slowing down to 16 knots would be a

typical thing that would happen if you were in rough weather.
Q. And moving on to page 376 and 377. I can give you a minute to review those two pages. Specifically the master saying, "need the RPM and blowing tubes." This is 4:30 in the morning and they're entering some of the worst weather on the voyage. "The engineer is blowing tubes." Can you please describe blowing tubes, and if you would consider this something you would have done in this type of situation at this time versus something that could have waited? And was there any risk associated with blowing tubes in this situation?
A. Standing operating procedure for a second engineer would be he comes down at 4:00, and he would instruct the bridge that he needs to slow down, take a boiler offline so that way he could blow tubes, clean those tubes, put that boiler back online, take the other boiler offline, blow tubes there, put it back online and come back up to speed. As far as the question of would I have thought that this was a good idea to do that at this time? No. It would have been my standing orders on the chalkboard written to keep plant conditions as steady as possible and to not blow tubes.
Q. Moving on to page 378, I just have one question before we go on to the next section. Chief Gay, have you read the entire VDR transcript prior to the hearing?
A. Yes.
Q. So as we ask these questions do you know some of the context of like the weather conditions? Are you already aware of some of

that coming in?
A. Yes, I am.
Q. Thank you. So we're on page 378 in the right-hand column. Appears the chief mate is on the electronic telephone. Says, "Hello," talking to the second engineer, "it's chief mate." Says, "Hey, listen, it should go without saying the weather decks are secure? I Just want to make sure you wrote it down because the third came up from the second deck on his way when he got off watch, and we don't want anyone else doing that." Can you explain what it means to be coming up through the second deck and what they're describing here?
A. I believe because that second deck does take on so much weather when you're in these conditions that they would have stated that no one is to be out on deck, and that nobody should have been out there on the second deck. When an engineer leaves watch it's his duty to go back to steering gear to check the steering gear. Well, that's not in the same space as the engine room, but in order to get there you can go from the engine room through cargo hold 5 and into a rope locker area and then into the steering gear. And then you return back that same way, and then you go back up in the house through the engine room.
Now I'm not sure where this particular third might have come up through second deck, but he could have come out -- there is an opening that it's out of that rope locker area outside the steering gear where you can get on the second deck to come up

through. Or if you come up at the top of the ramp on cargo hold 5, you could have gone through that door to go up into the house from second deck.

Q. And this watch relief would have been at 4 in the morning?

A. Yes. He would have been relieved by the second engineer.

Q. Page 399. There's a discussion that the supernumerary is having with the captain. Supernumerary in this case was a chief engineer. And in his discussion with the captain, he's stating "I've never seen the ship ride this way. I've never seen it hang." Can you explain that and what he might have been trying to describe to the captain?

MR. BENNETT: Excuse me. I don't think that's what the transcript says. There's no word ride in there. Can you just read that more correctly, please?

CDR ODOM: I can.

MR. WHITE: Commander Odom, could you just direct us to the page you're referring to, please?

CDR ODOM: Page 399.

BY CDR ODOM:

Q. At 5:11:33, supernumerary says, "I've never seen it list like this. You gotta be takin' more than a container stack. I've never seen it hang like this." Can you provide any context into what the chief engineer might have been talking about the supernumerary?

A. As we discussed earlier, I have seen these ships roll up to a

30-degree list, but we would roll back. The only thing I can understand from that context would be that you would roll but you would never really come back to the other side, so you'd so-called be handing to one side.

Q. And in your experience on the El Faro did the ship hang? was that common or --

A. No. That was not common.

Q. And continuing on the page, the captain said, "We certainly have the sail area." Supernumerary says, "Yeah." Parenthetically there's some verbiage there -- "think it was seven." Then he goes on. The captain says, "How does that affect below your operations as far as lube oil?" Supernumerary says, "The low pressure alarm on the lube oil -- level of the engine." There's some asterisks because the entire thing is not transcribed. Could you please give us your thoughts on that?

A. The only thing I think he referred to is the fact that for whatever reason during some of those long rolls like that, you know, as I stated earlier, you will get low lube oil alarms because the pressure will fluctuate, but then it usually comes right back as you roll again.

Q. Moving on now, page 403. 5:15:5, supernumerary says "CE have a problem." Captain says, "uh its" chief engineer "you know he's got a problem like you said, a low level." Supernumerary said, "yeah." So in this problem is the -- would you interpret it to mean that the low, just the low level alarms are going off or do

you think they're actually having like intermittent losses of suction that could be happening or just strictly the low lube oil levels are going up?

A. Yeah. It looks like to me possibly, depending on the rolls, that maybe a level alarm could be alarming that say measuring low levels, but from this I'm not sure of everything that's going on.

Q. Going on, page 414 and 417, in this section is a report that we have leak. A statement's made, "that's a lot of water." They're responding to the water in number 3 hold.

In your experience with the location of where the bilge flow switch was that you described earlier, can you approximate how much water you think it would take in that hold in extreme weather conditions for the alarm to go off?

A. As I was saying, I do believe at this point we were having a starboard list. It wouldn't take that much water because it would all collect on that starboard side and make that alarm go off. So say, I don't know, maybe 50 gallons of water could possibly all list to that spot to trigger that alarm.

CAPT NEUBAUER: Commander Odom, before you move on.

Sir, would it be your experience that the 3 hold would have 50 gallons of water normally? Would there be any water?

THE WITNESS: No.

CAPT NEUBAUER: In your experience it would be dry?

THE WITNESS: That is correct.

CAPT NEUBAUER: Thank you.

BY CDR ODOM:

Q. On page 418 and 420. And in this section of the VDR, the discussion is about using the -- transferring ballast from the ramp tanks from starboard to port. Based on our look at the suction and the lube oil sump being offset to the starboard and they're shifting the list in the ballast to obtain a port list, do you think this would have any effect on the suction?

A. If the levels were where they're set between 20 and 25 inches, no.

Q. So this is not anything that the engineer would be taking into consideration in shifting the list to port?

A. You would try to take everything you can into considerations with a case like this. But if their indication on that, like I said, that digital readout on the main console is still reading between 20 and 25 inches like was on that log sheet, then, no. You weren't concerned because that suction of that piping is, as it said on that drawing, 10 inches -- so you would have to do a whole lot more listing than that in order to move suction on that system.

Q. On page 428 and 442, don't necessarily need to look at them or read them. The discussion is that there's water coming in through the engine room ventilation and there's waster sloshing in the engine room bilges. In your experience on the *El Faro* in heavy weather, did you ever know that to be the case, if the weather was so bad water was coming in through the ventilation?

A. Yes. I have seen this. Where this would come into play is direction of wind of the rain. Because the ventilation for the intake fans are located -- are at main deck aft to the house. And so if the rain is coming in a certain direction, you will get water into that, and that will be indicated by -- or leak out some of the ventilation ductwork into the engine room.

Q. And was any of this ventilation located in such a manner that it would affect any of the electric motors on the lube oil pumps or any of the bus port or any of the electrical equipment in the engine room?

A. No. Everything has drip covers, and none of it is directly above anything electrical like that.

Q. Page 438, the captain says at 06:13:1, "I think we just lost the plant." What indications would the master have on the bridge to know that the plant was lost?

A. I'm not sure if he's talking about the propulsion plant or the actual boiler plant. But either way, if you lost the propulsion plant he would have gone down to zero RPMs and wouldn't be able -- that would be a real quick indication that we lost -- that they lost propulsion. As far as losing the plant goes, you would -- all your emergency lighting would be the only thing lit because your -- all electrical, your emergency generator would start up and then close that breaker and just emergency lighting would be on.

Q. So the situation where it seems obvious that they didn't lose

electrical power, then he's probably referring to the -- just the main?

A. Correct. From this I would infer that it was -- that they lost propulsion not electrical.

Q. And this would be indicated by simply the tachometer on the -- would be dropping to zero?

A. Correct.

Q. On page 441, in this section the Captain is on the electronic telephone saying "Any chance of getting it back online?" Captain: "Bring everything back up online." "They back?" Captain says, "said they are." Second mate -- looks like they go into a different conversation. Can you offer anything on this section, in reading this section in your --

A. Do you want to know about them getting it back online or do you want --

Q. I'm sorry?

A. Or was it more about what they said later?

Q. About getting it back online, what they would have been doing to possibly trying to get the plant back online and what they would have been doing later also.

A. Yes. You know, it says they'll bring it -- they'll bring everything back up online. They're doing everything they can down in the engine room. I'm sure it was all hands down there. And whether it was propulsion loss or if it was a boiler loss or whatever, you've got everybody down there doing whatever you can

to get everything back online. It's too vague to really give you too much detail on what they were trying to get back online.
Q. I understand that. Going to page 444, again they're talking on the electronic telephone. They talk about transferring ballast from port to starboard. About midway down, 6:21:27, the captain says, "Is there any way to tell is you have suction and it's pumping?" Assuming he's talking about the bilge pumps, how would the engineers or the chief mate that's down there running the bilge system know that they were pumping water overboard to that system?
A. The best way to tell is on the pump itself. The bilge pump should have a discharge gauge which was there, and it would indicate you had pressure. So you would be pumping, and that would tell you that you had flow of water throughout that pump.
Q. Going to page 453, on the left-hand column, 6:33:31, says, "Yeah, we'll see. They're gonna get the boiler back up online any, any second." Knowing from the previous conversation they were talking about lube oil suction issues, and in this sentence he's talking about getting the boiler back up online, is there any correlation between the lube oil pressure and the boiler? And why do you think you'd be talking about the boiler back up online?
A. The lube oil system has absolutely nothing to do with the boiler being online. As far as why they're getting the boiler back up online, I'm not sure. Because like I said, I've read this transcript. I'm not sure when they lost it offline. But if they

did lose it offline, then I'm sure they're doing everything they can to get fires back in that boiler and get it back online.

Q. On page 482, left-hand column, chief mate, the discussion is about do you know where it's coming from. They're saying they think the water level is rising. The chief mate says, "first the chief said something hit the fire main, got it ruptured hard." They're talking about no way to secure that. Chief mate ways, "We don't know if they've any pressure on the fire main or not. Don't know where seas -- between the sea suction and the hull or, uh, but anything I say is a guess." So talking about the emergency fire pump, the possibility that something hit it. And then they start talking about "any pressure on that fire main or not." Is the fire main normally pressurized?

A. No. It is not.

Q. Can you offer any context of what they're referring to in any pressure on the fire main?

A. No. I have no idea why there would be pressure on the fire main. And from this it doesn't give me any indication that there would have been pressure on the fire main.

Q. So can you offer any context to this conversation on what they might have been talking about if they weren't talking about pressure on the main?

A. He said it got ruptured. The only thing I can see is that possibly something did hit it, and they had water coming from somewhere. As I stated earlier, the standard operating procedure

is to have that sea check suction valve closed. So other than that, I'm not -- there isn't any reason why the water should be coming in through that fire main line.

Q. Go to page 484, and 484 there's a notification that there's a bilge alarm in 2A. So if there was an issue with the fire main and a rupture of the main system or the piping in the sea chest, would that have any effect on 2A or cause a bilge alarm in 2A?

A. From my experience, you've got really big cargo hold watertight doors that go between from one cargo hold to the other. You test them. You do everything you can. You seal them. But it's never perfect. So if there was large quantities of water in the cargo hold 3, slow leakage, as you can see from when first it was reported water in 3 hold to now they've got an alarm in 2, there was probably some slow leakage through that big watertight door that might have built up a little bit of puddle just enough to trip and signal that bilge in cargo hold 2.

Q. Also on page 484, the left-hand column, chief mate at 7:16:29 says, "I mean they can open up all of them (and suck the holds) at same time and one common suction they can suck." What effect would it have had on the bilge system had they actually done this, or assuming that they opened up all the suctions throughout all the cargo holds? Would that reduce the capacity causing to suck air or what would have been the benefit to doing this?

A. With the ballast system, in my experience you never open up

more than one rose box suction at a time due to the fact that if you have a rose box that does not have any product in it, you will be sucking in air and losing prime at that pump, and you will not have any flow of water. So if, say, cargo hold 3 was so flooded that both of them were covered, you could theoretically be pumping out both of those at the same time. But my personal opinion would be not to pump between two different cargo holds at the same time.

Q. On page 486, 7:17:31, chief mate, supernumerary "was suggesting like rig a Wilden pump. I'm like where? Through the scuttle." Can you offer context to that conversation of what they're talking about by rigging a Wilden pump?

A. That type of pump is a diaphragm pump run with compressed air. And so what they end up doing -- more than likely that was a 2-inch pump. That's usually what we carried. And we would have dropped a long hose down there and just used compressed air to run that pump, and just start pumping out water using that. Probably -- saying, oh, through a scuttle, probably from second deck.

Q. Go to page 487. Chief mate, 7:18:13:5, says, "I saw water level too high, fire main's right below the water dark black water." Approximately how deep would the water have had to have been in that hold for that fire main to be underwater?

A. The piping for that fire pump is probably approximately 24 inches. I believe the top of that pipe would be 24 inches from the deck, maybe to 30 inches.

Q. Going to page 489, they're discussing ways to isolate the

fire main. From our earlier conversation, you said there was a reach rod. And they're discussing is there any other way to isolate the emergency fire main. Can you again just restate what they were asking in this part of the transcript was not possible?
A. As far as that reach rod, all that would secure is that sea check suction valve. On the discharge piping, that's just the one that goes from the lower cargo hold all the way out onto second deck and into the fire main system. I don't -- other than the discharge valve right there at the pump, the rest of that line is just directly connected in the fire main. I don't believe you can isolate that any further.
Q. In reviewing the transcript from the time that they lost the plant up until the end of the transcript, was there anything that you read to indicate at any time that they regained propulsion?
A. No. I never read anything from where they started talking about losing the plant to where they actually got propulsion going again. No, I didn't. I can't see where they said they did that.
Q. So in conclusion of my questions, I would just like to give you the opportunity to share any observations you made from anywhere in the transcript or any conclusions you've drawn that might be beneficial to the Board.
A. I guess from reading this and after the first time I read it, you had a lot of good people trying to do whatever it took to get this thing going and getting out of harm's way. I hate to speculate or guess what was going through their minds and what the

condition that they were actually dealing with. So I do know that I've been in conditions where things have gone wrong in a hurry, and you've got to make some quick decisions fast. And to me they were doing everything they could to hold on and to do what it took to keep that plant running.

CDR ODOM: Thank you, Chief. That concludes my questions.

Turn it back over to Captain Neubauer.

CAPT NEUBAUER: Thank you. Chief Gay, I was about to pass the questioning to the NTSB. Are you okay to continue or would you like to take a break?

THE WITNESS: I'm all set right now. Thank you.

CAPT NEUBAUER: Mr. Young.

MR. YOUNG: Thank you, Captain.

BY MR. YOUNG:

Q. Thank you, Chief. Just a few follow-up questions based on Commander Odom's line of questioning. I'll try to keep it in the same order that he had. In regards to the lube oil system, you had mentioned too that you had, in heavy weather had some fluctuations of the pressure and were seeing these in alarms. Could you be more specific as to what type of alarms you would be hearing based on heavy weather?

A. That would have just been low lube oil pressure alarms would probably be the only thing I would hear.

Q. And not to the point where the pumps would kick off, but you would just get a notification that the pressure had diminished?

A. Yes. There's two levels of pressure. There would be a low pressure alarm and a low low pressure alarm. And it's that second one where the lag pump would come online.

Q. Understood. Thank you. How about a low lube oil sump pump? Would that be an issue or something that you had seen before?

A. I've never seen the main sump level go off during operating conditions.

Q. We've reviewed 2 years of log notes and we've noticed that the lube oil level was maintained about 23 to 27 inches. And you had stated when you were operating you remember the oil level being about 28 to 32. Is there any advantage or any reason why the level would be kept at a lower -- low level? Is there any benefit to having a lower lube oil level in the main engine?

A. The only benefit I can see is if for some reason you overfill the tank you'd have a longer time before it actually got into a detrimental condition into the gearing of the turbines itself. On that, it's just a comfort level where you think you need to keep that.

Q. Understood. Thank you. Changing gears from lube oil to operations. Other than the ramp tanks on the *El Faro*, what other options were available to help control the ballast or the list of the ship?

A. Most of it was due to loading the cargo itself, and that was left with the chief mate and the captain and the port captain to load the vessel so we would be pretty well even while leaving

port. There were some ballast tanks that we would use up forward to help 1A port and starboard tanks to help list if we needed to. But basically it was the little bit of list that we'd have to correct would be with those port ramp tanks.

Q. And what degree of list could the ramp tanks affect?

A. A lot of that would be dependent upon load. I mean you only have enough water to fill one of those tanks. That's the condition. So you would either have one tank full all the way or you would have partially filled in order -- so you've only got so much weight you can actually use to correct the list.

Q. With regard to heavy weather, understood when it was raining that the engine room ventilation may have some rainwater coming down. How about the cargo holds? Have you ever seen in heavy weather any water coming through the ventilation ducts via the cargo holds?

A. No. I've never seen any.

Q. And discussing some of the events from the VDR, in your experience, and listening to the heavy weather situation on the VDR, had you ever seen any cargo trailers or cars broken free where it contacted the hull or the bulkheads?

A. I have seen cargo break free, but I've never seen it to where it actually hit a bulkhead or destroyed any structure, critical structure of the vessel. I've seen it take out some handrails, but nothing else.

Q. And based on your experience, and the configuration of the

piping of the emergency fire pump, do you think it's possible that a vehicle may have been able to strike the valve within the piping system?

A. You're talking the suction valve or the discharge valve?

Q. The suction valve.

a. I suppose it's possible, but the way that was connected on there it was solid. So I'm not sure where it could have hit it at such an angle or force where it would have broke that valve.

Q. And was there anything else forward of that piping that may have prevented any sort of vehicles or any action in striking that valve or piping?

A. I do believe there was some ventilation ductwork running right along that side of the hull.

Q. On the outboard bulkhead?

A. That is correct.

Q. Would that be the cargo hold ventilation supply exhaust troubleshooting you're talking about?

A. No. There -- off those ventilation trunks there was other ductwork that would help ventilate the cargo hold better so to flow out and spread it out throughout the cargo hold.

Q. Regarding the bilge system, if there was debris in a rose box, is there any way to remotely clear the debris out such as a pneumatic connection where you can put compressed air into the bilge system to blow out the rose box?

A. No. The only way to clean that is manually. We go down

there and clean that box out.

Q. Regarding a situation such as we heard on the VDR where the Engine Department has experienced multiple issues such as bilge levels, ballasting, issues with the main engine and possibly fuel strainers, how many people initially would have been on watch at that time?

A. Initially you would have one engineer and one oiler. That would have been the minimum. As I stated earlier, I probably would have at least had the oilers overlapping and doing 6-hour watches so there was two oilers on hand. So that way you have an extra hand down there due to the conditions of a plant.

Q. And do you recall on *El Faro* if there was a method for the watchstanders to immediately call the rest of the Engine Department to have them report to the engine room such as an all call?

A. Yes. There was an all call on the starboard side of the control panel.

Q. And what would the response be from the rest of the Engine Department if they were to hear that alarm?

A. The entire Engine Department would be in the engine room.

Q. The last question I have is switching gears once again, is pertaining to the cargo hold ventilation. Did the Engine Department provide any welding and cutting services for the Deck Department within those cargo ventilation ducts at any time aboard *El Faro*?

A. I do not recall any happening while I was there, no.

MR. YOUNG: Thank you very much.

CAPT NEUBAUER: Mr. Kucharski.

MR. KUCHARSKI: Yes. Thank you, Captain.

BY MR. KUCHARSKI:

Q. Good afternoon again, Chief Gay. Just a very quick point of clarification. When you worked on the Ponce Class vessels, talking about the -- all of them, were they under Sea Star or TSI, TOTE Services management?

A. When I started with them it was Sea Star, and then it was TOTE by the time I left.

Q. And you mentioned I think to Commander Odom's question about a port captain, port mate. It was like a compound question, port captain, port mate. Can you sort of separate those? Was there a port captain?

A. Yeah. There was one individual that they referred to as the port captain that would help with the chief mate in getting all the cargo loaded.

Q. And was this port captain, do you have a name associated with that?

A. I do not. If someone gave me his name, I would say, yes, that was him. I can picture his face, but at this time I cannot recollect his name.

Q. Don Matthews?

A. That would be him.

Q. And what's your knowledge of his involvement with the actual vessel operations as a port captain?
A. I wasn't really involved with him much, so I can't give you a good answer on his full capacity of what he did with the chief mates.
Q. I think Commander Odom, maybe Mr. Young, they talked to you about participation in voyage planning. You did participate. And what was your actual participation in the voyage plan?
A. My participation would be the fact that I would give a full detail of any issues that we might have mechanically for operation purposes from the engine room or even outside of the engine room that might affect the voyage.
Q. Was fuel ever discussed as part of the voyage plan or between you and the master? Your fuel capabilities and the possibility of having to weather move, change course and capacity, that you had enough fuel?
A. Yeah. Sometimes depending on the conditions it would -- that discussion would come up about fuel, and we would just make sure what we had on board at the time would suffice for a safe voyage to the next port.
Q. And what was typical amount of fuel you left -- had on board leaving Jacksonville?
A. I want to say somewhere between 8- and 12,000 barrels. But the exact numbers I can't remember. We used to have different amounts depending on hurricane season or non-hurricane season of

what we needed on board just in case we did reach some type of weather where we needed extra fuel.

Q. So that would seasonally change or was it changed by trip?

A. That was seasonally changed.

Q. Just a clarification or just want to be absolutely sure. There was no connection in any way, shape or form between the pump used to pump out the cargo holds, the bilge system and the fire system, there's no connection between those two?

A. No. The only way there could have been a connection is through the general service pump because the general service pump can be used as both a bilge valves pump or an emergency secondary fire pump. But I don't see how that would have affected the system at this time.

Q. And what does it take to connect those? Is it some kind of a spool piece? Do you have sort of -- flange? Do you have to --

A. No. It was valves.

Q. Repairs to the fixed securing arrangements -- by those I mean like buttons, D-rings, did you get involved with any of that as chief engineer?

A. Yes. As a chief engineer you are overall in charge of all maintenance that goes on throughout the entire vessel. So if any D-rings or buttons or any securing mechanism was deteriorated or malfunctioning, I would end up getting a list from the chief mate in order to try to get those repaired.

Q. And who repaired them? Did the engine -- did your personnel

repair them or did you have riding crews, shore gang? How did that work?

A. On most occasions it would have been the -- a riding gang, shore supply, shore support would have been on board to fix all those.

Q. And you mentioned that all the repairs basically go to the chief engineer. How did you account for the repairs if a riding crew did or shore gang did or anybody did on this -- on the fixed securing devices? How was that accounted for?

A. Usually we just had a -- we had a list that we'd work off from that, as I said, was reported to me usually by the chief mate, and as they got repaired, we would just check them off the list and continue no.

Q. And they weren't entered into AMOS or the planned maintenance, preventative maintenance system for the vessel?

A. Not by me, no.

Q. You said not by you. That leads into another question I have. Did anyone else make entries into the planned maintenance system besides yourself? Who might they have been?

A. All the engineers were instructed and trained on how to use the AMOS system. So for a lot of the stuff that they did for preventative maintenance they would have entered it into the system. So for a lot of the stuff that they did for preventative maintenance, they would have entered it into the system themselves. The chief mate was also trained on how to use the

AMOS system and enter some of the stuff that he would work on.
Q. Maybe clarify it. But trained on it, while you were chief engineer on board the vessel could the chief mate make entries into the planned maintenance system?
A. Yes. They did make them --
Q. You mentioned that all repairs go through the chief engineer. How about bridge equipment? Were you notified of any repairs that needed to be done to any of the bridge equipment?
A. Yes, I was. They would notify me, and between the captain and I, we would work out some sort of third-party tech rep to come on board as soon as possible to get that stuff repaired.
Q. And you say it was a third-party tech rep. Did anyone from your department make any repairs to any of the bridge work?
A. As far as navigation equipment or anything like that, no, we did not. We would maintain the GMDSS battery backup. The electrician would take weekly readings off that making sure it was fully charged and the batteries are fully wet. Other than that, the only other repair we'd do up there might be some structural stuff as far as say a door not opening or a light switch not working.
Q. But just to be clear, the process was if there was anything that needed to be repaired on board the bridge, whether it was a third party or someone from your department, it all -- you were notified of everything?
A. That is correct.

Q. Who tests the emergency fire pump and how is that tested?
A. That was usually tested as a combination between the deck and engineering department. Because it was a piece of equipment, we always wanted to know whether it would run. But sometimes the chief mate would go out there with a couple of people, operate it from second deck, make sure it would run. We also had some preventative maintenance on that. So at least once a quarter one of the engineers would go down, grease couplings, exercise valves, make sure they work right, operated it, make sure come up to pressure, then put it back in ready condition.
Q. So the test was run apart from the normal -- fire on boat drill cycle?
A. Yes. I believe it -- there was preventative maintenance in the AMOS system that where we would go down and we would test run that. Like I said, grease the couplings and bearings and make sure the whole general area was in good condition ready to be run. Usually we would time that up with -- we would pull probably the suction strainer at the same time just to make sure there wasn't any growth inside that even though it didn't have a lot of product on the --
Q. And you say that's all accounted for in the planned maintenance system, correct?
A. Yes. It should be.
Q. The engineers all-call alarm that Mr. Young was talking about, could you hear that throughout the house?

A. You could hear that on the engineer call, that's where the -- but it was so loud that it resonated where most people, you know, if you -- definitely if you were awake you heard it. I mean it was loud, and it definitely was noticeable. But the actual alarms were located on the engineering deck.

Q. Did you hear them talk about that anywhere in the transcript, the VDR transcript? Do you recollect seeing that?

A. No, I do not.

Q. The ramp tanks. You mentioned that that had a separate pump, completely segregated system from the rest of the ballast system; is that correct?

A. That is correct. That was located in the shaft alley in the after part of the engine room.

Q. And these ramp tanks are they also called flume or anti-heeling tanks?

A. Yes.

Q. Going to do a little exercise back into the -- exhibit, and ask Commander Yemma to please pull up Exhibit 59. And it is the CargoMax printout. I know you said you didn't really deal with CargoMax, but I'd just like to use that as a reference, tankage, if you will. Do you have open to that now?

A. Yeah, that's open.

Q. Look at page 2 for us, please. And there's a tankage there called fresh water tanks. Do you see them?

A. Yes.

Q. Talk to us about the freshwater tanks on board the *El Faro*. What were they used for? How were they filled? Do they carry saltwater in there also?
A. The forepeak tank was freshwater. It was treated freshwater as I recall. Along with all those double bottom tanks, 1's, 2's and 4's, those were all freshwater treated water for ballast. And we never touched those unless we were going into a shipyard for inspection of those tanks. The potable water tank and the distillate water tank, those were constantly being filled from the evaporator water maker. Depending on which one was the lowest, we'd switch them back and forth to keep filling those up. The stern 2 compartment was always full of treated freshwater. And that -- I believe those DT aft port and starboard are those ballast tanks we've been talking about. Actually let me back up. The double bottoms -- port and starboard, those are the reserve distillate water. So those were always topped right off at all times also with fresh water, where it would be filled from the overflow of the distillate water tank.
Q. And just so we're clear, the overflow from distilled water, is that evaporation water using the evaps?
A. Yes. It was made by the evaporators.
Q. And treated freshwater, what's your understanding of treated freshwater?
A. That's water with a chemical in it in order to prevent corrosion because it was a tank that we don't normally go into.

So that way -- you know, like I said, we only go in there during inspection periods.

Q. Were there any directives from the company to try to avoid using those tanks, putting saltwater in them?

A. Yes. We would try to leave those freshwater at all times in order to not complicate issues with corrosion of those tanks.

Q. Double bottom, I guess DB 1, I'm sorry, 2. It says IP and IS. Those don't have anything in them. What were those used for? See, and it says weight 00. I guess you mean by that they have a capacity of 431 and 390, respectively, but there are zeros in there. Are those also -- would treated water go in those tanks also?

A. I don't recollect what we used those for. Trying to make sure I give you a correct answer on the vessel. I believe those possibly also could have been used ballasting with some saltwater. But all three vessels had a different loading and ballasting plan. So it's hard for me to remember exactly each use for each tank.

Q. Who maintained the watertight doors on the vessel?

A. That would have been the chief mate.

Q. Did that include the large -- when you say chief mate, so Deck Department (indiscernible), and who maintained the large cargo watertight doors?

A. As far as the actual gasket material and sealing material and all that, that would have been also the Deck Department. But those doors are huge and heavy. And so the Engineering Department

was in charge of maintaining all the hydraulics that it took to open and close the doors.

Q. Just hydraulics. The water tightness for any leakage or anything like that, that would have been handled by the Deck Department?

A. Usually what would happen is they would test them and do as much as they could to get those to stop leaking. And if they ran into issues then, yes, we would be called in and make sure that we could do the best we could to get everything to seal properly.

MR. KUCHARSKI: Thank you, Chief.

Thank you, Captain.

BY CAPT NEUBAUER:

Q. Chief Gay, one clarification question. The bilge alarm flow switches placement, if a rose box is full, would the alarm sound just from that location?

A. If the rose box itself was right -- full right straight to the level of the deck, I do not believe that that would have alarmed. It would have had to be above that rose box level in order to trigger the alarm.

CAPT NEUBAUER: Thank you.

I'd like to go to the parties of interest.

TOTE, do you have any questions?

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

CAPT NEUBAUER: Yes. The hearing will recess and reconvene at 3:40.

(Off the record at 3:33 p.m.)

(On the record at 3:47 p.m.)

CAPT NEUBAUER: The hearing is now back in session.

Chief Gay, at this point I was going to open the line of questioning to the parties of interest. This should be the final questions.

TOTE, do you have any questions?

MR. REID: Yes, sir.

BY MR. REID:

Q. Chief, if you could open up Exhibit 353, please, page 20. You see it, sir?

A. Yes. It's --

Q. So the picture on the right is a picture of the fire pump, emergency fire pump on the *El Faro*. Do you recognize that?

A. Yes, I do.

Q. Can you explain which way we're facing on that picture?

A. You are facing aft.

Q. And the ladder that goes up to the -- that goes up there, where does that go to?

A. There's a small platform and then another ladder that would continue bringing you up to the second deck.

Q. Do you recall how wide that platform is?

A. I believe it was pretty much a standard -- probably a 4-foot wide platform.

Q. If you are coming down the ladder in that space you'd land on

the platform; is that right?
A. That's correct.
Q. And to the left of the pump, is that the suction side of the pump?
A. Yes. You can see the suction strainer just behind those pipes.
Q. And to your recollection did that suction line go directly to the side shell?
A. Yes. That should have gone pretty much right straight to the suction valve.
Q. And you see the other picture there, which is the *El Yunque*.
A. Yes.
Q. And that area the piping sort of snakes around forward and then to the side shell. See that?
A. I do.
Q. Do you recall that type of arrangement being on the *El Faro* or was it more direct to the side shell of the *El Yunque*?
A. In the area for the *El* Yunque where the pump's actually located, that was a tank on the *El Faro*. So that entire pump and suction strainer would have been forward basically right inboard of that suction valve.
Q. Thank you. And do you see off to the right of the fire pump in the *El Yunque* picture, do you see the rose box there?
A. Yes, I do.
Q. And do you see that that's not right near the side shell of

the vessel?

A. Yes.

MR. REID: Can you open up Exhibit 7, please? Go to page 5, which is the 3 hold, at the tank top level arrangement plan.

UNIDENTIFIED SPEAKER: Is there a specific section you want him to zoom in on there?

MR. REID: Yes.

BY MR. REID:

Q. The 3 hold, Section 4D where the emergency fire pump is located. It's page 5 of 5 of the general arrangements --

A. Yes.

Q. Well, it's -- again, it's the tank top 3 hold where you can see the emergency fire pump. On the drawing it says tank top. Drawing 670 tack 100 tack 026.

A. I see that now.

Q. So do you see the -- you see where it's depicted says emergency fire pump area?

A. Yes.

Q. And you see just inboard of that area it says on the -- you can see it on the starboard side, it says, drain well port and starboard. You see that?

A. Yes.

Q. And you were asked a question about how much water would be in that hold before an alarm would go off, and I believe you answered 50 gallons.

A. Correct.
Q. And Dr. Stettler testified recently that if the vessel were in a 70-knot wind the heel may be something on the order of 7 degrees. Would you accept that?
A. Yes.
Q. And if the vessel were heeled over at 7 degrees, would there be some accumulation of water up against the side shell before that alarm would go off?
A. Yes, there would.
Q. And as more water started going into the hold would the vessel not heel over even further?
A. Yes. I believe it's possible.
Q. And so is it quite possible that that alarm would go off before there was a considerable amount of water in that hold under those conditions?
A. I suppose there could have been, yes. Also depending on the draft and how much is leaning aft.
Q. And you're not able to calculate here how much water would be in that hold if the vessel were heeled over 7 degrees and taking in water into the --
A. No. I'm not. That was an estimation on my part.
Q. Thank you. If you would turn to page 453 of the VDR transcript, which is Exhibit 266. And at 6:33 in the morning, the captain says that -- are you there?
A. Yeah.

UNIDENTIFIED SPEAKER: Yes, we're there.

BY MR. REID:

Q. And on 453 of the transcript, at 6:33, the captain says, "Yeah, we'll see. They're going to get that boiler back up online any second." And as you scroll down, a minute or so later, the captain says, "They're gettin' that boiler back up. They're gettin' lube oil pressure up." Is it possible when the captain said that they're going to get the boiler back up online that he misspoke or was confusing lube oil and lube oil pressure and the boiler? Is that possible?

A. I suppose, yes, it could be possible that he was maybe mixed up with communication with the engine room possibly, I suppose. He could have -- wasn't clear on whether they're -- or not they're talking about a boiler or a lube oil pressure.

Q. So it's possible he could have been confusing the main propulsion unit with the boiler?

A. Yes. That's possible.

Q. So when you were on the *El Faro* were there -- you mentioned that there was a port captain, Don Matthews. That's right?

A. That's correct.

Q. And when you were on board were there also port mates on the vessel or not?

A. No. Not that I recollect.

MR. REID: Thank you. No further questions.

CAPT NEUBAUER: Mrs. Davidson.

BY MR. BENNETT:

Q. Chief, thank you. How many years have you been sailing deep sea?

A. Probably 20 years.

Q. Have you sailed through heavy weather?

A. Yes.

Q. Have you sailed through tropical storm winds?

A. Yes.

Q. Have you sailed through hurricane winds?

A. Yes.

MR. BENNETT: No further questions.

CAPT NEUBAUER: ABS.

MR. WHITE: No questions. Thanks for your testimony, Chief.

CAPT NEUBAUER: Herbert Engineering.

MR. SHILLING: No questions.

CAPT NEUBAUER: Are there any final questions?

Commander Denning.

BY CDR DENNING:

Q. Chief, thanks. I just have one new question, and just a few real brief follow-ups. On page 492 of the VDR transcript, you don't need to turn to it. I'm just going to, for the sake of brevity, I'm just going to read something that the captain says. Captain's speaking on the house phone with someone down below, on the previous page is identified as the supernumerary number 1, which would be -- chief engineer. And the Captain says, at 7:22,

they're speaking about the -- he says "all right, all right." So obviously there's words spoken on the other end of the phone we can't hear. Then he says, "down-flooding angle? Um, that I don't have an answer for you." Then there's a pause. He says, "yup" and then he says, "What's it called again?" Another pause. "Okay, we'll check that." And then "(it's/that's) in the chief's office? All right, thank you."

So again he's speaking about down-flooding angle, and then he's referred to the chief's office for maybe some type of document, possibly referring to down-flooding angle. We're not quite sure. Do you have any insight on what that may be referring to that might be in the chief's office?

A. I have no idea what they're talking about there.

Q. Thank you. Earlier in your testimony when Commander Odom was asking you about the ventilation trunks, you said as old as the ships are they were in relatively good shape. My question is, do you recall any work being done in terms of chipping, painting, any type of corrosion-resistant work being done inside those spaces?

A. As far as it specifically pertains to the *El Faro*, I can't remember what work got done where. But I know on some of those vessels we have had to replace some of the cowling and ventilation. And definitely on the outside of those, those were usually pretty well maintained by needle-gunning and then re-priming and repainting everything that was on the outside.

Q. On the outside of the hull or internal on the second deck

bulkheads?

A. On the second deck bulkheads.

Q. And inside the ventilation trunks themselves, if I were to go into the manhole, what about coatings inside the space where the fire dampeners would be?

A. Those were regularly inspected, and if maintenance was needed, it was given.

Q. And maybe I misled you. I wasn't speaking about maintenance on the dampeners themselves, but the internal baffles and bulkheads inside that space where the fire dampeners would be located on the -- all the baffling where all the steelwork inside the blisters and ventilation trunks. Is there coating chipping, painting, coating going on in that space?

A. If we opened something up and it looked like it needed repair then, yes, it would have been done. I don't remember a lot of it being done inside those spaces, but I do remember having things inspected even gauged on certain vessels of that class and plates being replaced, you know, steel being replaced if needed for those ductworks and all the surrounding area.

CDR DENNING: Thanks, Chief, no further questions. Thank you for your testimony today.

CAPT NEUBAUER: Mr. Fawcett.

BY MR. FAWCETT:

Q. Yes, sir, Chief. Just one question. You mentioned a voyage where you -- the ship ran out to the east if there's a hurricane

out in the operations area. During that voyage, do you recall if there was ever a time where you were part of a meeting or a discussion where you called ashore and talked to your shoreside support where you told them, you mentioned you said -- you were going to tell them when you were going to get to Puerto Rico? Do you recall having conversations with the captain where you called ashore or communicated ashore to update them with your plans or intentions?

A. Usually when it came to the actual voyage and timing, that was between the captains and shore side. But the captain and I would constantly talk and communicate with each other on the conditions of how the engine room was working and how toe operations were going. And so then he would make his decision based on my report to him on how things were up in the engine room.

Q. Do you recall on that voyage if there were like frequent calls from ashore on a regular basis, like daily or like say every 6 hours or anything like that, to ask the ship to update what their plans or intentions were?

A. On any given day when we were at sea we would -- I knew the captain would be talking to shore side at least once a day. If conditions were worse or where it called for it, I know he was in constant communication with shore side letting him know what we were going through.

Q. Would this be via INMARSAT communications?

A. I believe so.
Q. Had you observed occasions where they used the satellite phone to facilitate communications during a voyage where there was a storm or hurricane out in the voyage area?
A. Yes. I had been to the captain's office with him on the sat phone as he's talking to shore side about the conditions.
Q. Did they ever provide him with information to help him with the voyage like additional weather information or other guidance to help ensure the safety of the voyage?
A. Far as I can recall they usually -- they were pretty supportive of whatever decision we made. And I can't remember any specifics of actual information they would have given us. Usually, like I said, the captain would have reported everything he saw presently around him and what he knew from all satellite and other information he would gather and refer that, and relay that to them, his decision on how he was going to continue the trip.
MR. FAWCETT: Chief, thank you for your testimony today.
CAPT NEUBAUER: Mr. Young.
BY MR. YOUNG:
Q. Chief, one final question. Do you recall from your time aboard *El Faro* the height of the bilge flow above the tank top that would initiate the alarm --
A. The exact height of the -- when the alarm would go off, I cannot recollect that at this time, no.

MR. YOUNG: Thank you.

CAPT NEUBAUER: Are there any final questions for Chief Gay at this time.

MR. BENNETT: Yes, Captain.

CAPT NEUBAUER: Mrs. Davidson.

BY MR. BENNETT:

Q. Chief, thank you again. If you can turn to Exhibit 266, which is the VDR transcript, page 59, time stamp 07:42:23.3. The chief mate is speaking, and he says, quote, "It is what it is. Get there when we get there." Is that the same sort of mentality that you discussed about skirting the hurricane, is that we get there when we get there?

A. Are you referring to as far as getting to the next port on time?

Q. I'm referring to the fact that there was no rush. We're going to get there when we get there. Isn't that what he's implying there?

A. It does sound like that, yes. And when I was on board and the captains I worked with, our -- that was our philosophy is we'd get there when we can and as safely as we can.

Q. And if you can go turn to page 95 of the transcript, time stamp is 11:53:03. It's a conversation between the second mate and the captain. And, again, the second mate says, "We get there when we get there." And the captain says, "Yeah." Do you see that?

A. Yes.
Q. So the atmosphere that you experienced seems to have carried over into this voyage as well, as we'll get there when we get there. Correct?
A. Yes. It seems to, yes.
MR. BENNETT: Thank you, sir. No further questions.
CAPT NEUBAUER: Mr. Kucharski.
BY MR. KUCHARSKI:
Q. Chief, one quick question. On this conference call that you participated in where the shore side was called, who was on the shore side end?
A. Usually I believe it was Don Matthews because he was probably trying to relay to Puerto Rico when we would actually get to port.
Q. Did Harry Rogers ever participate in phone calls like that between yourself and the captain?
A. Harry Rogers was on conversations, on phone calls before. Not necessarily on that particular one, but I can recall when I know, like we mentioned earlier, when we lost that boiler, I know the captain and I would talk with Harry Rogers on the phone at one point about what happened.
Q. Was he on any phone calls, weather-related phone calls when you were calling to talk about the weather or any delays or any problems, any routing or anything like that? Was Harry Rogers on those phone calls?
A. Not while I was present, but I know the captain had related

to me that he had talked to Harry before about the fact that he's told him the condition of the vessel and what our plans were.

MR. KUCHARSKI: Thank you, Chief. Thank you for coming today.

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

Chief Gay, you are now released as a witness at 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.

At this time do any of the PII's have any issues with the testimony that we just received?

MR. REID: No, sir.

MR. BENNETT: No, sir.

MR. WHITE: No, sir.

MR. SHILLING: No, sir.

CAPT NEUBAUER: The hearing will now recess and reconvene at 4:20.

(Off the record at 4:11 p.m.)

(On the record at 4:22 p.m.)

CAPT NEUBAUER: The hearing is now back in session.

At this time we are going to hear testimony from Captain Phil Anderson and Captain Edward Walker, Junior, of the National Cargo Bureau. To provide some background, the National Cargo Bureau or

NCB was requested by the NTSB to conduct a study based on the cargo situation on the *El Faro* during the accident.

Gentlemen, I want to say first thank you for being flexible today as we move the schedule. And Lieutenant Commander Yemma will do the swearing in.

(Whereupon,

PHILIP ANDERSON AND EDWARD WALKER

was called as a witnesses, and having been first duly sworn, testified as follows:)

LCDR: Thank you. Please be seated, gentlemen. Start by having each of you please state your full name and spell your last name for the record.

CAPT. ANDERSON: My name is Philip Ian Anderson. That's A-n-d-e-r-s-o-n.

CAPT. WALKER: My name is Edward F. Walker, Junior. Last name Walker, W-a-l-k-e-r.

LCDR YEMMA: And can you both please tell the Board where you're currently employed and what your positions are?

CAPT. ANDERSON: Well, we're both employed by National Cargo Bureau. I am Chief, Technical Department. We're both based in New York City, corporate headquarters. I've been in this position since January 2004. Much of it is still conducting marine surveys to a limited extent primarily when it's of a more technical nature. I act as consultant to quite a bit of expert witness work with respect to cargo and vessel-related issues. I develop and

oversee various training courses, ship stability and cargo securing. We also do grain loading in the United States. We approve the vessels' grain loading booklets on behalf of U.S. Coast Guard. That's something that's passed on to us.

I also have attended on numerous occasions International Maritime Organization, primarily as an advisor to the U.S. delegation, mainly on matters relating to carriage of cargos, cargo stowage and securing, although there have been other variations on that. So Maritime Safety Committee. Design and equipment, dangerous goods, solid cargos and containers, and now CCC, carriage -- carriage of cargos and containers. That's a brief little bit of my background. Pass it over to Ed.

CAPT. WALKER: My current title is Assistant Deputy, Technical, to Phil Anderson. I'm also the Deputy Chief Surveyor for the West Coast, which includes all the West Coast ports and Honolulu. So I monitor the work that's conducted there. I've been in my current job since 2009. I joined National Cargo around 2001 as a staff surveyor in Norfolk, Virginia. In 2004, I was promoted to the senior surveyor position, in which I was directly responsible for managing the port and supervising the other staff surveyors there.

With regards to cargo, I'm also approved by U.S. Coast Guard to grade and monitor the self-study course -- Coast Guard approved self-study courses that Phil just mentioned with regards to stability and cargo securing.

LCDR YEMMA: Thank you gentlemen. I understand that you have a presentation for the Board. I'll pull up the screen and go through that, and then we'll continue with questioning.

CAPT. ANDERSON: Thank you, sir. As Captain Neubauer pointed out, we have no direct involvement with the vessel or anything relating to this incident. We were simply asked by the National Safety Transportation Board to conduct an independent review of certain aspects based on information provided to us by NTSB.

We were asked to specifically review the vessel's cargo securing manual to review the sufficiency of securing arrangements for the main deck, the container cargo and the second deck Ro-Ro cargo, to review the sufficiency of securing arrangements for any suspect loads, and to calculate the breaking or failing points for the above. So in beginning that, we looked at the cargo securing manual and reviewed that. The cargo securing manual was prepared by Herbert Engineering, approved by ABS in January 2006. We reviewed it for content in accordance with guidelines in the 2003 edition of the Code of Safe Practice for Cargo Stowage and Securing. This was the edition in effect at the time that the cargo securing manual was approved. There have been several subsequent modifications. They have not been addressed. In all honesty, probably not significant enough to change anything that we would be saying anyway.

The guidelines themselves were referenced in MSC Circular 745. This was reproduced in its entirety in Appendix 2 of Code of

Safe Practice. The guidelines have been separated into a number of different sections, the primary ones being Chapter 1, which is General. Chapter 2 is Securing Devices and Arrangements. Chapter 3 is Stowage and Securing of Non-standardized and Semi-standardized cargo. And Chapter 4 dealing with the Stowage and Securement of Containers and Other Standardized Cargo.

Basically these all talk about what information should be provided in the cargo securing manual and the manner in which it should be presented.

When we looked at Chapter 1, we found some very minor differences mainly regarding the precise language used and explanatory statements that should be included more so I would say and precisely where they should be included. These differences though we considered insignificant as the overall intent appeared to be met. So in that respect with regard to Chapter 1, we considered the cargo securing manual satisfactory.

Chapter 2, this deals more with specifications for cargo securing devices and inspection and maintenance schemes. There we found some inconsistencies and items probably not as good as they should be. For instance, safe working load, SWL, was listed alongside breaking strength for certain lashing equipment with no apparent correlation between the two. In most respects, this should not be an issue. SWL is to running gear what MSL, maximum securing load is to lashing gear. Technically, when it comes to securing, it is maximum securing load, MSL, that is being dealt

with. So it really should have been MSL that was referred to. However, it is also accepted that SWL can be used as MSL provided it does not exceed the strength defined by MSL. They both use safety factors linked to breaking strength, but using these factors essentially result in lower proportions of breaking strength being used to define SWL as compared to MSL. I'm not personally aware of any situation in which this would end up being more than the strength defined by MSL. So assuming that SWL values are correct, they can be used as MSL, and we would have no issues with that.

CAPT NEUBAUER: Captain Anderson, could you move the microphone closer.

CAPT. ANDERSON: Another thing we noted there, there was no proper means of obtaining or verifying correct tension under deck lashings. What we're talking about here in particular is the screw type tensions. With those tensions, when there is a screw type lashing, there is normally some means of controlling the tension. So because too much tension can impose an additional force on the lashings; not enough obviously can leave the lashing not tight enough.

In our experience, it's normally done by providing a dedicated tool, something along the lines of perhaps a wheel wrench, ratchet or bar of certain length so that the amount of leverage that can be applied is limited, and this prevents overtightening.

We also noted that in the CSS Code, Appendix 4, Resolution A, IMO Resolution A-581 talks about securing arrangements for the transport of road vehicles on Ro-Ro ships in particular. It states, among other things, that the MSL, the maximum securing load of lashings should not be less than 100 kilonewtons. On the *El Faro* there were considerably less than 100 kilonewtons. However, that again should not be an issue with respect to securing as long as sufficient lashings are used. In the cargo securing manual that we looked at or reviewed, there was really no inspection and maintenance documentation. Realistically that is to be expected. And as we were working with a copy, we would expect the actual information to be with the original which, unfortunately, would be considered lost with the vessel.

So our views with respect to Chapter 2 we'll say generally in compliance.

Chapter 3, there we talked more about the specifics of non-standardized and semi-standardized cargo. Part of what this includes is the incorporation of Annex 13 to the Code of Safe Practice, and essentially says when and why Annex 13 should be used. Annex 13 provides a method of calculation for non-standardized cargo. This, again, we found generally compliant. Annex 13 was incorporated into it. What we found missing though was detailed sketches showing the layout and strength of securing devices. Again, Resolution A-581 that we mentioned previously also discusses distances between securing

points on the deck for instance should not exceed 2½ meters long. Accumulation should be not less than 2.8 or more than 3 meters transversely. It was not clear to us whether this was complied with or not. We have not seen anything to confirm that or refute it.

In addition to this, there was a sketch in Appendix 5 of the cargo securing manual itself that we found difficult to reconcile with other written requirements in the manual. In particular, this is the sketch, incidentally, we're talking about Appendix 5. We have shown here a schematic of a trailer with securing points, D-rings. Elsewhere in the cargo securing manual it specifies that you must have a 45-degree or no more than 45-degree lashing angle or 4 feet lashing lead. When you look at position in these D-rings next to the wheels here, it's very difficult to see how it would be possible to achieve 45-degree angle or 4 feet lead.

With respect to Chapter 4, this details in particular the stowage and securement of containers and other standardized cargo and forces active on cargo units. A standard system as shown in the cargo securing manual for trailers shows a Roloc box on button. Then it says, the standard system, specifies use of the Roloc box on button, maximum lashing angles 45 degrees or, and it says from horizontal, or 4 feet lead. It also states that if the standard system is not used an Annex 13 calculation should be done. If that is the case, we're doing an Annex 13 calculation, then actual lashing angles should be determined and used in the

calculation.

It also states in the cargo securing manual that planning of container stowage is done ashore. There are container stack configuration diagrams in Appendix 13 of the cargo securing manual. We found those not very clear. They're difficult to use, and in our opinion, they are unlikely to be fully understood by ship's officers. We believe, therefore, that container stowage and subsequent securing requirements are not likely to be checked on board, and the vessel would be reliant upon arrangements determined ashore.

So overall, as far as the cargo securing manual, let's say some errors and inconsistencies; confusing in some respects. But, realistically, in that regard, I would have to say that it's not traumatically different from most others that we see. It is very rare to see perfection in a technical document of this type and size. So overall, we deemed it insignificant.

We saw nothing to suggest that compliance with the cargo securing manual would have a negative effect or be likely to have contributed in any way towards the incident. In our opinion, if the cargo had been secured in accordance with the cargo securing manual, it would have been considered properly secured.

We checked the sufficiency of the securing arrangements for containers, and in our initial report we identified stacks that appeared noncompliant. However, we were then advised that they had actually been secured in accordance with EL Class Minimum

Lashing Requirements document. We do not know who prepared that document. We do not know who approved that document or if it was approved. It was not, as far as we can see, part of the cargo securing manual.

However, if we review the securing of containers in accordance with that, then there only appears to be one stack that remains improperly lashed. So assuming that use of this document is acceptable, we would say that just one outstanding, and we could not reconcile the EL Class Minimum Lashing Requirements document with a CargoMax program for that condition. The CargoMax program details lashing requirements amongst other things.

So what we were left with -- this is the document that we're talking about here, the EL Class Minimum Lashing Requirements, a single page. What we were left with was one stack, Bay 17, Stack 8, CargoMax indicated it should be lashed, but it was not shown as such in the Minimum Lashing Requirements.

One other thing I should point out here. These address the securing only, the securing requirements. We had a number of stacks in our initial report identified as slightly overweight. This does not address any of those.

The second deck cargo, the Ro-Ro cargo, we were advised that there was a significant amount of trailer cargo stowed off button. Off-button stowage is not part of the standard trailer securing detailed in the cargo securing manual. So for off-button stowage an Annex 13 calculation should have been carried out on each

vehicle off button. We found no indication that any Annex 13 calculations had been carried out.

We did numerous calculations in accordance with Annex 13 showing the results first in our initial report, and then as some of our initial assumptions were challenged, we expanded on them in our supplemental report. While we believe that our assumptions are valid, it is not our intent to address or attempt to determine specifics such as vessel speed, trailer weight distribution. We're working simply as a review with information provided to us. We are not going to argue those points and any findings of fact in that regard we feel should be properly left for the Board.

So continuing with that, we carried out Annex 13 calculations covering a broad or broader range of variables, and included those in our supplemental report. We concluded that securing may have been satisfactory for most of the cargo if lashings were properly applied, but was not likely to be satisfactory for heavier pieces stowed off button.

Details of weight limitations regard to how much the lashings configuration in use could accommodate would depend upon a number of variables. These are outlined in our reports. And we included various lashing angles amongst these. As we noted during our review that photographs reportedly from *El Yunque* and the TOTE lashing manual for the class of vessels appeared to show lashing angles significantly different to those specified in the cargo securing manual. This we would say suggested a tendency towards

lashings not being properly applied at times. Whether that was done as a standard, we have no way of knowing for sure, but it's perhaps telling that it appears in these locations. So in particular, photographs show lashings, as we say, well in excess of the 45 degrees specified, and lashings also did not always appear to be properly attached to points of equivalent strength on the cargo. Some of the photographs from the lashing manual showed lashings attached in ways that we believe would be unlikely to support full lashing strength.

Come back again to this Resolution A-581 in Appendix 4 of the CSS Code also discusses securing points on the trailers and specifies placement and minimum numbers, marking strengths for that. In our experience we are more likely to see these recommendations not complied with than followed. And this is something that was brought out in the cargo securing manual. I don't recall off the top of my head the precise statement, but it does point out that proper securing points on the trailers essentially may be lacking. That in itself can create problems in achieving proper securing. But, again, we have no firm information on specifics in this case. So really not able to attach any causation to that.

Weight limitations would depend on the number of variables, as we said outlined in our reports, and a broad range of variables is included in our supplemental report. As far as failure points, we were not able to determine breaking or failure points.

I'm sorry. I skipped ahead here. I just wanted to come back very briefly to show you what we were talking about on the lashings. It's a little difficult to see perhaps, but right here these are lashings well in excess of 45 degrees in photograph from the *El Yunque*. And, again, well in excess of 45.

These photographs came from the TOTE lashing manual, similar type of things. Well in excess of 45, and no way is that a 4-foot lead. Same kind of thing. So this is why, as we say, if these are in the lashing manual, these things are standard. I don't know. Lashing attachment to trailers from the TOTE *Lashing Manual*. There are a number of comments in the cargo securing manual. One of them is that you should not be putting open hooks on like this. They should be going around strong points so that -- not able to break free. But it's to my mind, looking at that, it's highly questionable that the bottom side here, whatever that piece is on the bottom of the trailer there, it's highly questionable that would be equivalent lashing strength or equivalent strength up to the lashing.

Similar thing here. Highly questionable.

We also have, as far as the lead goes on this one, you've got the hook, but it's not coming off straight, which is going to lead into another concern that is referenced in the cargo securing manual. When you don't have it coming off straight, you have that kind of twisted pull. You're working to not necessarily secure the cargo but damage the securing points or open up that hook.

Another question here is why is it being done that way? If you look right there, there's a lashing point on this one. So I question perhaps the amount of training that people may have had in the use of the cargo securing manual and the way things should be done.

So failure points, we could not determine. There's too many variables involved; not enough information regarding the precise manner in which lashings were attached and led and precise vessel motions.

We believe that it is probable that there was a cargo shift. In the event of any cargo shift, a domino effect would be likely to result in progressive lashing failure as shifting cargo overloaded adjacent lashings as the vessel rolled. Depending upon circumstances, cargo shift, if it occurred, may have contributed towards the incident or it may have occurred as a result of the incident. We cannot make that determination.

Thank you.

CAPT NEUBAUER: Sir, would you like to continue on with questions or we take a break at this time?

CAPT. ANDERSON: We're entirely at your disposal.

CAPT NEUBAUER: I'd like to shift to the NTSB and start the line -- Mr. Young.

Mr. Kucharski.

MR. KUCHARSKI: Thank you, Captain.

Thank you, Captain Anderson, Captain Walker. Page 7 of this

brief mentions no proper method or means of obtaining or verifying correct tension. I think it's -- is this the -- are those the binders you're talking about, the chains?

CAPT. ANDERSON: Yes. The screw type tensioners.

MR. KUCHARSKI: But you say that's insignificant. If every one of those lashes were overtightened would they possibly -- would that contribute to failure earlier than calculated strength?

CAPT. ANDERSON: I would say in all honesty it's more of an issue for containers than Ro-Ro type cargo like this, because when it comes to the Ro-Ros you've got -- or to the trailer cargo, you've got another wrinkle involved, the trailer suspension. So one of the other recommendations that actually appears, I believe, in Resolution 581 is you do tighten them down to essentially stop bouncing on the suspension because that itself can start loosening things up. More to the point though we think that the strength here was -- with these tensioners was probably understated, and really do not feel that they would have had a significant impact. There are other things that would have been greater problems than the tensioners.

MR. KUCHARSKI: And what would have been those greater problems in the tensioners?

CAPT. ANDERSON: In particular there we're looking at the things that we pointed out just now, the securing points on the cargo, the angles of the lashings would be far greater impact.

MR. KUCHARSKI: I think -- have you read any of the VDR

transcript?

CAPT. ANDERSON: I have not. I honestly have deliberately stayed away from it. We've done this on the basis of information that we've been given, and I did not want to prejudice things by going out and seeking additional information. So, no, I haven't.

MR. KUCHARSKI: There was a discussion or mention of the vessel hanging or list to the vessel. There was also a phone call from the captain to DPA mentioning a 15-degree list. Is there anything in the cargo securing code which talks about small angles of heel having an effect on lashings just besides the accelerations that are mentioned?

CAPT. ANDERSON: I don't recall anything specifically. I mean, it is -- obviously the figures are predicated essentially upon the vessel being upright. But small angles of heel, it depends on what you're referring to by small. A few degrees I would consider insignificant. You're far more concerned with the accelerations that would be involved with rolling in particular motion at that point.

MR. KUCHARSKI: So your answer is there's nothing in the cargo securing code that mentions failure for lesser angles -- an angle of heel for a longer period that remains for a period of time that could have an engine denigration of the lashing arrangement.

CAPT. ANDERSON: Not that I can recall off the top of my head.

MR. KUCHARSKI: Exhibit 290, please, Commander Yemma.

And it's page 4 of Exhibit 290 that I'd like you to just take a look at, please. And in that you mention the Resolution 581, and Resolution -- A, alpha, tack or decimal 581(14), and the other resolution on that page was A.714(17). Are you familiar with those resolutions?

CAPT. ANDERSON: Yes. I believe they are shown in the CSS Code.

MR. KUCHARSKI: The title of A.714(17) -- I believe is semi-standardized stowing and securing arrangements. And I believe it mentions ships should be provided with securing points spaced sufficiently close. Would you like to -- we also have that as an exhibit. Would you like to review that?

CAPT. ANDERSON: Yes, please. We don't have anything on here, so I'm not quite sure what you're referring to.

MR. KUCHARSKI: Commander Yemma, that was just added as an exhibit.

And on page 2, once you get to that exhibit, it talks in Section 4 about securing points on ship's decks. What is your idea of a securing point on a ship deck?

CAPT. ANDERSON: I still don't have this up here. Essentially what I would consider securing point on ship's deck could be a pad eye, D-ring, and various other types. You may have a recessed fitting for chain or something along those lines. Something you could put an elephant's foot or even the button for

the Rolocs would all be fixed securing points on the deck.

MR. KUCHARSKI: So would chain be a securing point?

CAPT. ANDERSON: I've never seen chain referred to as a securing point, which is not to say that it could not be. If it was part of the design and included in the cargo securing manual, then I would see no reason why not.

MR. KUCHARSKI: Commander Yemma, could you pull up Exhibit 109, please?

And, Captain Anderson, pages 27, 28, 29, 30, if you'd look at those.

CAPT NEUBAUER: I'm going to suggest -- one picture at a time. Do you --

MR. KUCHARSKI: 27. Start with 27.

CAPT NEUBAUER: Yes, sir. Start with page 27, please.

MR. BENNETT: Pardon me, Captain. I have only 9 pages of 109 -- photos.

CAPT NEUBAUER: I think we're at a good juncture for a recess to make sure everyone has the exhibits. Let's reconvene at 5:15.

(Off the record at 5:10 p.m.)

(On the record at 5:18 p.m.)

CAPT NEUBAUER: The hearing is now back in session. We're continuing on with line of questions from Mr. Kucharski.

MR. KUCHARSKI: Thank you, Captain.

So Captain Anderson, the picture I'd like to start with is on

page 27, which shows automobiles in 4D, which I believe is number -- we keep saying that number 3 hold, but 4D I believe is actually the tank top down in 3 hold on the -- this is on the *El Yunque*. But picture there, and then if you could go to 28, the next page, it shows -- 28 shows the back end of the two BMW SUV type of crossovers with chains attached or chains running across tensioners I believe at the ends of the chain, and the car lashings going from the wheels. Do you see that from the automobiles back to the chain? And photo 29, I should say page 29, shows lashings again from maybe a different angle. Do you see those?

CAPT. ANDERSON: Yes, we see them.

MR. KUCHARSKI: What you're saying is you've never seen lashings like this before on automobiles?

CAPT. ANDERSON: That's correct. I've never seen the chain part of it, I've never seen before. The other lashings are to an extent standard, just slight variations. But I have not seen them attached to what appears to be a chain strung across the vessel -- I certainly have not seen that in the cargo securing manual for these, this class of vessel.

MR. KUCHARSKI: And then page 30 is similar, but that actually is looking towards the fire pump area on the *El Yunque*. A little bit different from *El Faro*. There we see two rows hooked automobiles. And tell me if NCB -- do you go and inspect any vessels, cargo securing on any vessels? Do you do that?

CAPT. ANDERSON: We inspect cargo securing on many vessels. Not too many Ro-Ros. But when it is done, what we're looking for is compliance with the cargo securing manual.

MR. KUCHARSKI: So if you saw something like this, would you approve that?

CAPT. ANDERSON: Not unless it was detailed in the cargo securing manual.

MR. KUCHARSKI: And you said you don't do too many Ro-Ro vessels. Do you have any contracts out there with any Ro-Ro carriers, combination Ro-Ro carriers? Do you have any contracts or have you had any contracts to inspect the cargo?

CAPT. WALKER: Currently we do service Matson vessels, which they have several converted container vessels which do have Ro-Ro decks. Mostly garages which are for cars only. So I believe it's *Mokihana*, and but then the *Matsonia,* which is actually similar in class to the *El Yunque* and *El Faro* in design, except the entire forward part of the ship is just containers only. They actually have under deck stowage. It's only the back of the vessel that has the Ro-Ro decks below deck. But they do have a garage built up above it, which is used for cars only. But like the main deck and the second deck they use for Ro-Ro cargo such as trailers. And they have a similar lashing system as well.

MR. KUCHARSKI: So when you say similar is it similar for -- you say lashing system. Is it automobiles that they lash

automobiles? Do they also lash trailers?

CAPT. WALKER: From my recollection of looking at the cargo securing manual for the *Matsonia*, it's not required for automobiles to be lashed on those vessels unless they're on the ramps or they're loaded athwartships. In a foreign acquisition, they're not required to be lashed. The Ro-Ro cargo trailers, they have similar Roloc box, and they use chain, but they use a binder instead of a tensioner from my recollection of being on the vessel. I've only been on it once, and that's probably about a year and a half, 2 years ago.

MR. KUCHARSKI: That's sort of interesting. Why are they not required to have lashings on the automobiles?

CAPT. WALKER: I believe it was a -- just part of the cargo securing manual. That's what's stated in there, and that was -- if I'm correct, I believe it was prepared by Herbert Engineering as well, and approved by ABS. But I can't say that for an absolute fact right now. But there is a limitation with regard to the weight, and I think it's 7,000 pounds, but I can't -- it's just my experience in reviewing some of that stuff.

MR. KUCHARSKI: So the bottom line it's not approved -- if it's not in the cargo securing manual and approved as such, the NCB would not approve it?

CAPT. ANDERSON: Yeah, that is correct. Just to expand a little bit more on the question that Ed was answering, you can have, if you like, lighter lashing configurations or ultimately

resulting in a situation with no lashings being required for perhaps sheltered waters or something for different situations where the anticipated forces are going to be far less. But those conditions would need to be specified in the cargo securing manual. The general -- in general, the cargo securing manual was prepared for sort of a worst-case scenario with the North Atlantic. But if a ship is only going to be running coastal in sheltered waters, then the significant wave heights are going to be a lot less. Forces involved are going to be a lot less. So the lashing requirement can be a lot less. It would just have to be detailed as to what those limitations are.

MR. KUCHARSKI: So if those sheltered waters all of a sudden become hurricane waters, would that change your answer?

CAPT. ANDERSON: It wouldn't change my answer, but it would change the securing required.

MR. KUCHARSKI: Thank you. In your brief, pages 14 and 15, you talk about sufficiency of securing arrangements for the second deck Ro-Ro cargo and weight limitations. So if a stow was off button you'd have to do an Annex 13 calculation; is that correct?

CAPT. ANDERSON: That is correct.

MR. KUCHARSKI: And then based on that you would determine if the weight of the cargo was too heavy for the lashing for the securing arrangement?

CAPT. ANDERSON: I would have to say it's really the other way around. You would determine what lashings are necessary with

regard to the weight of the cargo. And if there's not a balance of forces, then you would need more lashings.

MR. KUCHARSKI: Let's reduce this down to looking at the *El Faro* and the lashing arrangements, the lashing arrangements of the off-button stows on there. You looked at the lashing arrangements, the -- lashing arrangement for the off-button stow, and then to see if the weight exceeded that particular lashing arrangement that they had. Is that how it worked?

CAPT. ANDERSON: Yeah. Essentially we looked at for a range of angles and speeds of the vessel working on the assumption that six chains, six lashings had been used for the Roloc box off button, what was the theoretical maximum cargo that could be suitably restrained in accordance with Annex 13 for that situation.

MR. KUCHARSKI: And that analysis, in that analysis you discovered that some exceeded the -- the weights of the trailers exceeded the securing arrangements?

CAPT. ANDERSON: That is correct.

MR. KUCHARSKI: And you've also said that -- you mentioned a domino effect; is that correct?

CAPT. ANDERSON: Yes. The domino effect simply means that if one lashing fails and allows a cargo piece to start moving, then there will be progressive failure or is likely to be progressive failure of other lashings on that cargo piece as the vessel rolls one way, then the other. If that one cargo piece breaks free, it

will impact lashings on an adjacent cargo piece, which would be likely to overload that, and you get progressive failure, actually the domino effect as the ship keeps rolling and pieces keep moving and impacting adjacent pieces as progressive failure.

MR. KUCHARSKI: Your same report or your brief, what we call brief, at page 16 there's a picture of a trailer, the right-hand side, the right-hand picture.

CAPT. ANDERSON: Okay. I see it.

MR. KUCHARSKI: You mentioned earlier about the chain going up to a -- or through a lash point on the trailer. How about to the D-ring on the deck? Is that a problem to hook into the D-ring like that?

CAPT. ANDERSON: It's far better if you take the chain around it and hook to the chain itself. Because then, if there's any movement or any slight slacking off perhaps due to suspension, the vessel is slamming or anything like this, the hook is not able to slide out or to advance out of the pad eye. So it would be better to have it actually taken through and then secured. Unless you're going to seize the ends of these, the open ends, but that's a lot of work.

MR. KUCHARSKI: When you talk about seizing the ends, is that like putting wire across the ends so the hook doesn't come off?

CAPT. ANDERSON: That's correct. It's putting wire or something similar across it so it can't slide out.

MR. KUCHARSKI: And page 17, the left-hand picture, that

shows a hook into looks like some kind of the corner of a container. Do you see that?

CAPT. ANDERSON: I see that, yes.

MR. KUCHARSKI: Is that the same -- would that also be a problem there where the hook could drop out? Is that what you're talking about?

CAPT. ANDERSON: It's a potential issue. Doesn't mean that it will, but it could. It would be less likely to I would say in this situation because you're at the front end. You can see the box there. So you're not going to get suspension and such. You're not likely to have the same amount of bounce in the lashings, but as I say as an ideal it should be the chains taken around and secured so that they're not able to fall loose.

MR. KUCHARSKI: Please look at Exhibit 291, Page 4, Item 3.0. And my question there is -- and this document, I believe, was prepared as a response to a TOTE question, the percentage of Roloc boxes or off-button stows. In this here, are you agreeing with their calculation or are you just saying if even if we agreed with their calculation this is still a significant quantity of off-button stows.

CAPT. ANDERSON: The latter case. Even if the calculation I believe in this instance -- the information provided to us that as much as 60 percent of the cargo of the second deck cargo was stowed off button was considered to be subject to interpretation, and all we were doing here is trying to point out that regardless

of interpretation we are not involved in finding the precise amount. But 60 percent we considered in our initial report a significant amount. If we look at what TOTE was saying, we quite happily dropped this down to 43 percent of the Ro-Ro cargo, we still consider that a significant amount. And that was all that we were trying to address here.

MR. KUCHARSKI: You mentioned earlier in the lashing requirements of the containers, and I think it's page 12 of your brief. If you could go to page 12. That the -- it's the lashing the minimum lashing requirements you look at, even if it went by the EL Class lashing requirements. What about stack weights?

CAPT. ANDERSON: Stack weights did not appear to be addressed in those minimum lashing requirements.

MR. KUCHARSKI: So then you went by the stack weights in your initial report for exceedances?

CAPT. ANDERSON: The stack weights identified as being -- I think we had seven or eight slightly overweight in our initial report. They've remained -- that situation remained. We did not address that in this supplemental report. Here we were simply addressing the lashing requirements.

MR. KUCHARSKI: And could you refresh my memory or our memories. The stack weight there's two issues. One would be weight to the deck of the ship itself crushing the deck. And then the other is an actual crushing of the containers between themselves, if you will, as they're stacked on top of each other?

CAPT. ANDERSON: I would say, yes. You have the one issue, as you say, which you should not be overloading the deck structure. But as well as that, the stack weight and the stratification of the layering, the distribution of containers, the weight within a stack becomes important also. Because that all relates to securing as well as just the deck strength. It all affects the racking of the containers as the ship rolls, and the vessel motion, the weight, if you like, will be transferred down through the container corner posts and probably on the bottom container and also on the lashings. So we take them by the twist locks, we take them by the lashing bars.

When you change that weight distribution and the stratification, you have something higher, something heavier at the top, for instance, then as the ship rolls, you're getting a greater force imposed on the lower ones. You're getting greater forces imposed on the lashings, and greater likelihood of lashing failure. So exceeding the stack weights or not complying with the weight distribution requirements would all have a negative effect on securing.

MR. KUCHARSKI: Has NCB visited any ships where the containers have collapsed and deformed? I've seen pictures of those in different places. have you actually been involved in any of that?

CAPT. ANDERSON: We have the right person. We have people involved in investigations and inspections of precisely those

situations where there have been entire stack collapses and dozens of containers lost over side.

MR. KUCHARSKI: Do you also see situations where the containers aren't lost and the whole stack's deformed, so to speak?

CAPT. ANDERSON: Yes. Under that kind of scenario when you haven't lost -- quite often you've only lost half of the bay and the rest of them may be hanging there sometimes at such a ridiculous angle that you want to have -- you have to give credit to the securing in a sense that's holding them all together. But, yes, it's common for some to remain on board with the stacks just almost on their sides sometimes.

MR. KUCHARSKI: And did you notice if the ship had a list when that occurred?

CAPT. ANDERSON: In the situations that I was looking at, there was no significant list at the time that I was there. It was well after the fact. So I'm not able to say what the condition was when the incident first occurred.

MR. KUCHARSKI: Can you tell us overall motions in a seaway of a ship when a ship is working into a sea, a head sea if you will or a head swell, what kind of an effect does that have on lashings?

CAPT. ANDERSON: That's twofold. The major -- threefold, I suppose. The major motion that we're concerned with is roll in transverse securing. But at the same time you are getting some --

as the ship is surging possibly you can -- as it's moving forward riding with the waves, you're getting some longitudinal effect, and as it's rising up and down, it's predominantly at the ends you're getting vertical accelerations. So it's a combination of the three. But the transverse I would say is far more of a concern than the rest unless you start pounding into seas, and then you do start getting more of a vertical effect, and longitudinal becomes an issue. But, again, this is going on at the same time as the transverse as the vessel is rolling. So it can become significant.

MR. KUCHARSKI: Is it your experience, either your personal experience or talking to your crews on vessels, that when a vessel works into a head sea that tends to loosen up the lashings on Ro-Ro cargo?

CAPT. ANDERSON: I can't say that I've really discussed that with crew of
Ro-Ro vessels.

MR. KUCHARSKI: So then it's the roll, if you will, or the transverse that you're talking about that is the worst motion for the vessel and the lashings?

CAPT. ANDERSON: Yes. I would say it is usually the worst. Although having said that, one of the incidents that I was involved with, although it ended up being a stack collapse obviously due to the rolling motion, that was largely initiated by going into the head seas at a high rate of speed and slamming and

pounding is what happened in that case, was that some of the container sockets failed due to the vertical forces. As soon as they failed due to the vertical forces then the lashings became slack. Then the transverse forces involved, the slack lashings faulted. So it can be a combination of everything.

MR. KUCHARSKI: Thank you, gentlemen. Thank you, Captain. The end of my questions. Thank you very much.

CAPT NEUBAUER: Sir, we're running up to the end of our time for this venue for today. So I'd like to -- if you'd be willing to come back tomorrow, pick up where we left off?

CAPT. ANDERSON: Sure.

CAPT NEUBAUER: But I do have one question as I formulate my questions for tomorrow. In preparation for actually when you were preparing your study, did you consider the testimony from prior Marine Board investigations sessions that included the PORTUS individuals who did the cargo securing on the *El Faro*?

CAPT. ANDERSON: No, we did not. We stayed basically with the information that we were provided.

CAPT NEUBAUER: Thank you.

Before we adjourn, I have several schedules to report for tomorrow, the 9th. We are going to start with Mr. Tom Gruber of ABS. We will then finish testimony and allow all parties of interest to ask questions on the National Cargo Bureau Study. And then the last witness will be Mr. Berrios, who is the third mate on the *El Faro*.

For Friday, the 10th, we also will be doing Mr. Donald in the morning, and then Mr. Matthews will replace Mr. Rogers on the schedule, and then we'll finish with Mr. O'Donnell with ABS.

Our Public Affairs Office for the Board will publish the updated schedule this evening.

And I would also like to thank everyone who has testified to date, and those with the schedule changes for all the flexibility you've provided to the Board.

This hearing is now adjourned, and will reconvene at 9 a.m. tomorrow morning.

(Whereupon, at 5:47 p.m., the hearing was recessed, to reconvene Wednesday, February 8, 2017, at 9:00 a.m.)

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 8, 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