Page 1

Thursday, 7 March 2013

(10.00 am)

THE CHAIRMAN: We have received information -- no doubt you can confirm this, Mr Beresford -- that Mr Shieh needs a few more minutes in conference with the next witness, Professor Ho. That's the information we've received. We've come into the hearing room so that everyone can be informed of what's going on, and we're going to accede to what we take to be the request, so we'll adjourn now for what I would expect to be five or 10 minutes.

MR BERESFORD: Thank you, Mr Chairman.

(10.01 am)

(A short break)

(10.09 am)

THE CHAIRMAN: Yes, Mr Shieh.

MR SHIEH: Good morning, Mr Chairman.

This morning we are interposing the evidence of Professor Ho Siu-lau of the Polytechnic University. His report is already in expert bundle 3, page 1743.

THE CHAIRMAN: We have that. Thank you.

PROFESSOR HO SIU-LAU (affirmed)

Examination by MR SHIEH

MR SHIEH: Good morning, Professor Ho.

A. Good morning.

Q. Thank you very much for agreeing to assist the

Page 2

Commission at rather short notice. I know you have a busy schedule, so thank you once again.

Could I ask you to look at the expert evidence bundle 3 in front of you. It will also be projected on the monitor in front of you. You may actually have your own report you want to refer to. Either way will do, depending which one you feel is most convenient.

A. Okay.

Q. It is entitled "Assessment of the Electrical Aspects of Lamma IV"; that's page 173. Before we do that, I would like to look at your expertise. It should not be too controversial. Page 1771, internal page 28 of this bundle is your curriculum vitae, Professor Ho. Is that correct?

A. Yes.

Q. You are currently the chair professor at the Department of Electrical Engineering at the Polytechnic University of Hong Kong; yes?

A. That's right.

Q. Your curriculum vitae runs from page 28 all the way down to page 58, internal page numbering. The bundle reference is page 1801.

A. That's right.

Q. You had obtained your undergraduate degree at the University of Warwick; correct?

Page 3

A. That's right.

Q. With first class?

A. Mm'hm.

Q. And you obtained a PhD in --

THE CHAIRMAN: What was the undergraduate degree in?

A. Electrical science.

THE CHAIRMAN: BSc?

A. That's right.

THE CHAIRMAN: Thank you. What year was that?

A. 1976.

THE CHAIRMAN: Thank you.

MR SHIEH: In the year of 1979, you were awarded a degree of PhD in electrical engineering by University of Warwick; correct?

A. That's right.

Q. Your detailed qualifications and employment history can be found in the bundle at page 1775. Page 1776 sets out your employment history. So all along, you have been in academia, in various teaching positions; correct?

A. That's right.

THE CHAIRMAN: Have you given expert evidence in court or commission or tribunal before?

A. Yes, about 10-ish to 20.

THE CHAIRMAN: 10 to 20 times?

A. Yes.

Page 4

THE CHAIRMAN: In which courts of Hong Kong?

A. In various courts, including the High Court, District Courts and -- yes.

MR SHIEH: I believe most recently you've been assisting in the investigation in the fire at Fa Yuen Street in Mong Kok; correct?

A. Yes.

Q. You are actually about to testify in the coroner's inquest; correct?

A. Tomorrow.

Q. Tomorrow. So again, thank you for squeezing in the time to assist us today.

Could I now turn to the substantive part of your expert report. Could I ask you to look at internal page 1, the bundle number is page 1744.

A number of issues have arisen in the course of this hearing which have necessitated our requesting you to provide us with your assistance.

You were asked three questions. The first question can be seen at page 1744. That is:

"Where power supply is from the main engine generator (by turning the dial of the switch on the navigation light distribution board to '1'/'transformer'), the possible scenario or scenarios in which the switches for the navigation lights and the

Page 5

circuit breaker for them would be positioned as shown in the photographs of the navigation light distribution board and 24 DC main switchboard located in the wheelhouse ..."

As seen in a number of photographs.

Could I ask you to look at those photographs just to identify the photographs on which you are expressing your opinion. It's marine bundle 12, page 4899. That's actually not relevant for our purposes; it's actually page 4900.

A. Yes.

Q. Page 4900 is called the navigation light distribution board; is that correct?

A. That's right.

Q. And page 4901 is the box right below it in the wheelhouse; correct?

A. That's right.

Q. That's 24-volt direct current main switchboard; correct?

A. Yes.

Q. Specifically you looked at the way in which the various switches or circuit breakers are positioned, either up or down, on page 4900.

A. That's right.

Q. And also you looked at the way the various circuit breakers or switches were positioned up or down at

Page 6

page 4901?

A. That's right.

Q. Thank you. So that's question 1, on the basis that it was turned to "1", "transformer".

Question 2 is similar except that you are asked to assume that power supply is from the auxiliary battery by turning the dial of the switch to "2", "battery". Again, what scenarios would result in that form of positioning of the various circuit breakers or switches. That's what you understand by question 2; correct?

A. That's right.

Q. Question 3 is how the mute switch operates, in particular whether the sound alarm would be muted by switching to on or off. The mute switch is the switch that we can see at page 4900 at the bottom right-hand corner, where you see the words "alarm mute"; do you see that?

A. That's right.

Q. These are the three questions. Just for the sake of completeness, the documents you have seen are set out at pages 1802 and 1803, internal pages 59 to 60. These are the documents you were given?

A. That's right.

Q. You conducted two site visits to the wheelhouse; right? The first one is 2 March, as we can see at the bottom of

Page 7

page 1 of your report.

A. Mm'hm.

Q. And you looked at the various circuits. The second visit was undertaken later, I think on the 5th.

A. Two days later.

Q. Is it on the 4th or the 5th?

A. 4th.

Q. On 4 March.

Could I now briefly take you to your description of the layout of the various panels and ask you to describe very briefly what they stand for. Because previously, we've had the crew members describing them, and we've had Dr Armstrong describing them, but I think given that you have had detailed investigation, I think perhaps it would be helpful for you to comment.

First of all, can we look at photo 1. Photo 1 is the switch to "1" or "2" or "0" in the navigation lights distribution board.

A. Right.

Q. You say:

"When the selector is in the middle position, there is no power supply ..."

Correct?

A. That's right.

Q. In the note to photo 1, you say:

Page 8

"Power to the various light circuits can be obtained either from the generator or from the batteries pack. There should be no differences in the functionality of the circuits no matter where the supply was derived. However the power from the generator would be more stressful to the components (such as lamps) if the voltage rises above a certain threshold value. For example, if a 24 V lamp is fed from a 26 V source, there is more power pumped into the lamps, thereby shortening the life expectancy of the lamps."

A. That's right.

Q. So we've heard evidence from the crew members of Lamma IV that there have been occasions when, if they switch the switch to "transformer", that is, "1", there is a risk that because more power is given to particular lights, there is a higher risk of the navigation lights blowing up --

A. That's right, yes.

Q. -- during the course of a voyage. And that is a possible result of switching the power source to the generator rather than batteries; correct?

A. That's right, yes.

Q. Thank you. Note 2:

"There were indicator lamps (each with its associated circuit breaker that controlled the power

Page 9

supply to the external lights) to indicate the status of the external lights. The physical layout of the circuit breakers associated with the indicator lamps on the cover of the distribution box was as shown below ..."

If we turn to the next page, 1746 --

A. That's right.

Q. -- that corresponds to, again, the same switchbox but to the left-hand side of the "1", "2" switch?

A. Yes.

Q. You then give a rather detailed description as to the result of your physical examination:

"It was further noted that electrical circuits are commonly protected against over-current by means of either a fuse (which is a non-resettable device which contains a fusible element which melts when a current higher than a designated value flows through the element) or a circuit breaker (which is shown in photo 2 and which would be tripped to open-circuit if a current higher than a designated value flows through the circuit breaker."

I have been reminded that I am a bit fast, so I will slow down.

THE CHAIRMAN: I've been checking. Apparently the simultaneous interpreters, unbelievably, are able to keep up with you.

Page 10

MR SHIEH: I'll slow down perhaps.

THE CHAIRMAN: We ought to congratulate them.

MR SHIEH: And express my gratitude.

They both perform the same function, whether you use a circuit breaker with a switch form or whether you use a fuse. They both perform the same function?

A. They are both trying to limit the current that flows through the device.

Q. Yes. In the case of a fuse, the fuse would simply be cut off; correct?

A. The fuse will just melt and become open-circuit, and it's a throw-away unit, so you cannot reuse them later on. For the circuit breaker --

THE CHAIRMAN: I think we're all familiar with this. The circuit breaker just breaks, and you can reset it?

A. Yes. The circuit breaker just trips and then you can reset them.

MR SHIEH: Yes.

A. Unless the current is too high. Then that will damage the circuit breaker.

MR SHIEH: Which is something that you -- I'm sorry.

THE CHAIRMAN: You deal with that in your report, don't you?

A. Yes.

MR SHIEH: Can I now read on:

"Circuit breakers, like those shown in photo 2, can

Page 11

be mechanically or manually reset to the 'on' state after being tripped to the 'off' position. If the current which trips the circuit breaker is too high, the circuit breaker would be damaged and it would become non-resettable in that it could not be tripped to either the 'on' or 'off' position). In photo 2 the circuit breakers for the stern light ..."

That is the one right in the middle of the set of seven switches; correct?

A. That's right.

Q. "... anchor light ..."

Which is the one on its right-hand side; correct?

A. Correct.

Q. "... and the NUC light on the far right of photo 2" --

THE CHAIRMAN: That's not-under-command light.

MR SHIEH: I think so. Yes, it is.

"... were malfunctioning in that they could not be tripped positively one way or the other."

A. Right.

Q. So basically if you touch it, it would be dangling in its position without any force --

A. Yes, it's loose and dangling. Hang.

Q. Yes. And you say:

"This is typical for circuit breakers which had been tripped by a very large current. It is noted that the

Page 12

circuit breakers in photo 2 were used to control the power supply to the various external lights. If, for example, the circuit breaker for the masthead light was clicked to the 'off' position, the masthead light would receive no power supply and it would not be energised at all. In other words, the masthead light would definitely be switched 'off' if the circuit breaker for the masthead light in photo 2 was clicked to the 'off' position."

A. Right.

Q. At this juncture, perhaps I will ask you to comment on something that you have written which you actually commented on subsequently, but this is an appropriate juncture to comment on it.

If you look at the photograph, you can see "stern light".

A. Yes.

Q. It is positioned rather differently from the position of the anchor light and also the NUC light on the far right. You can see that?

A. Yes.

Q. Because the anchor light and the far-right NUC light were, I think, in a downward position?

A. In the "off" position, yes.

Q. In the "on" position?

Page 13

A. "Off".
Q. "Off". Whereas the stern light was in the "on" position?
A. That's right.
Q. But from your physical inspection and touching, they all belonged to the category of malfunctioning buttons in the sense that they were dangling?
A. Right.
THE CHAIRMAN: Meaning that they couldn't be reset to function?
A. No.
MR SHIEH: So what possibility could you offer or suggest to account for the different positioning of these three switches, given that they, as you say, had been possibly subject to very large current and they were all malfunctioning? How can come one was in the "on" position and the other two were in the "off" position?
A. Well, by looking at switch for the stern light, it's in the "on" position, ie in the upward position. But then once the circuit breaker had been tripped, it should go to the downward position or if it has been tripped by a very large current, it will be in the middle, not up or down. But looking at the photo, the switch for the stern light is definitely in the "on" or upward position, indicating that some --

Page 14

Q. Even when you were there, it was in the upward position?
A. When I first went there, it was in the upward position.
Q. Yes.
A. So it's definitely been tripped to this position after the accident, by somebody. I do not know who did that. But it definitely tripped by somebody, flicked to that position by whoever.
THE CHAIRMAN: Not done by operation of electricity, but by human intervention; is that what you're saying?
A. That's right.
MR SHIEH: Because as I understand you, if it's tripped by a not-too-strong current so that it might be resettable, it would be to the "off" position; you can then reset it to "on"?
A. Yes. If it's tripped by a normal current, it will go down.
Q. Yes.
A. Then somebody can trip it upward.
Q. Yes. If it's tripped by a very large current, it should be dangling somewhere in the middle?
A. That's right.
Q. Most certainly it should not remain the "on" position if it's tripped?
A. It will not be in such a physical position as we have seen.

Page 15

Q. Thank you.
Could I move on to page 1747, internal page 4:
"It is noted that the circuit breakers for the masthead light, port light, starboard light and stern light were seen to have been clicked to the 'on' position at the material time of the visit on 2nd March, 2013. If the observed circuit breaker status were the same as that at the material time of the accident, then all the four navigation lights as mentioned earlier would be energised, unless there is no power connected to that particular circuit or the light bulbs were blown. If, however, there was no power feeding into the distribution board in photo 2, then the light bulbs would remain to be dark even if its associated circuit breaker was switched 'on' (and remains 'on' regardless of whether power was fed to the distribution board, as circuit breakers can be clicked to either 'on' or 'off' positions manually) because, for example, we can click the light bulb switches in our flat to the 'on' position but the light bulbs will remain dark if the power company has cut off the power supply to the flat. The last three circuit breakers, namely those for the anchor light and the two NUC lights were clicked to the 'off' position in photo 2 and these lights had therefore been switched 'off' altogether (if these circuit breakers

Page 16

were clicked to the 'off' position prior to the accident)."
The one circuit breaker for NUC next to the right-most one, although it was clicked to the "off" position, it was a normal "off"? It's a resettable "off"; you see what I seen?
A. Yes.
Q. It's a resettable "off"?
A. That's right.
Q. It's been clicked, but by a normal current?
A. That's right. Or it's been clicked to that "off" position by the officers on deck.
THE CHAIRMAN: Yes. Set manually because you don't want to display that light?
A. That's right, yes.
MR SHIEH: As a matter of objective observation, it could be switched manually to that position or it could be tripped by a strong current not strong enough to damage it?
A. That's right.
THE CHAIRMAN: These are lights that you wouldn't have lit if you were underway in normal circumstances?
A. That's right.
MR SHIEH: Yes.
"It is further noted that the circuit breakers for

Page 17

the masthead light, port light and starboard light were functioning 'normally' as they could be set positively to either the 'on' or 'off' position. The circuit breaker for the stern light was however malfunctional and this is indicative that this circuit breaker had previously been tripped to the 'off' position by a heavy current. In other words, this circuit breaker should not stay at the 'on' position as seen in photo 2. The fact that the circuit breaker was clicked to the 'on' position was probably because it could have been clicked to such position by an unknown person (as the circuit breaker would not return to the 'on' position automatically after being tripped to the 'off' position) during inspection and investigation, for example."

There were lamp indicators indicating the status of the external lights as shown in photo 3. The indicator lamps could also be turned off by the switches as shown in photo 3 as well."

Over the page we can see the photographs of the various indicator lamps and also the corresponding buttons. You have a legend on the right-hand corner, where you say:

"Switches of the indicator lamps and they can be click to the 'off' position to turn off the indication lamps without affecting the status of the external

Page 18

lights."

A. That's right.

THE CHAIRMAN: So the four switches operating the indicator lights for the masthead, port, starboard and stern light, were on. Whereas those for the anchor light and the two not-under-command lights were switched to the "off" position. Is that the position?

A. That's right.

MR SHIEH: In the caption next to the words "Photo 3", you say:

"The indicators of the lights can be switched off without affecting the actual lighting circuit outside."

A. Correct.

Q. "The light intensity can be controlled by a dial as shown in photo 4."

If we look down at photo 4 we see a metallic round button next to that row of seven switches; correct?

A. Right.

Q. That is the one that says:

"Dial to control the light intensity of the indicator lamps."

A. Right.

Q. Thank you. Over the page at page 1749, you took us to the back of that panel. Basically you opened it up by unscrewing the cover. Is that the way you did it?

Page 19

A. Yes.

Q. So the red arrow points at the variable resistor, which corresponds to that dial on the front side of the panel; correct?

A. That's right.

Q. "The dial as shown in photo 5" -- that's in the middle of page 1749 -- "actually is a variable resistor which controls the current that flows into the indicator lamps. Basically, the supply circuit to the indicator lamp is as shown below."

So by changing the level of resistance, you can control the current that flows into the indicator lamps; correct?

A. Yes.

THE CHAIRMAN: And that allows the wheelhouse crew to dim these indicator lights when they're sailing at night so that their night vision is not interfered with?

A. That's right.

MR SHIEH: Thank you.

Now, over the page at 1750, in the middle, you say:

"The undersigned had tried to measure the ..."

The top part basically sets out the calculation demonstrating the relationship between the light intensity and the power absorbed by the resistor, which in a way depends on the resistance. Basically that's

Page 20

the purport of setting out those calculations; is that correct?

A. Correct.

Q. Yes. But then in the middle:

"The undersigned had tried to measure the resistance of R1 during the site visit ... However it was found that because of rust formed on the surfaces of the variable resistor was difficult to measure R1. It was subsequently found on 4 March 2013 that there were so much rust on the variable resistor that it was difficult to measure the resistance after the rusts were cleaned by sandpaper. It is likely that the variable resistor needs to be taken back to the university for further cleaning before one can measure the resistance more accurately.

Notwithstanding the fact that R1 had not been measured, it is estimated that the light intensity of the indicator lamp will be less than half of its full intensity when R1 was set to its maximum value."

In other words, when it's set to the dimmest. Because the higher the resistance, the dimmer it gets?

A. That's right.

Q. So if it's set to the highest resistance it would be the dimmest, so the level of intensity between the brightest and the dimmest would basically be 50 per cent; about

Page 21

half?
A. Less than.
Q. Less than half, sorry.
A. Well, by looking at the physical size of the variable resistor, it looks like when you set it to the dimmest position, the lamps could be very dark. But that's my estimation. So that's the reason why I tried to measure the resistance, to ascertain what I estimate. But then I couldn't measure it on site.
THE CHAIRMAN: So the estimate that you have reached comes from your observation of the physical size of the resistor?
A. Of the wire in the resistor. Because if you look at the variable resistor in photo 5, you can see actually the variable resistor consists of a lot of wires around the green stuff, the (unclear) support.
THE CHAIRMAN: So that the more wire you send the electricity through, the dimmer the light becomes; is that it?
A. That's right, yes.
MR SHIEH: Can we now move on then, Professor, to look at page 1750 at the bottom:
"Upon removal of the cover, it was found that there were relays associated with the lighting circuits as shown in photo 6."

Page 22

A. Correct.
Q. So if we compare page 1748, photo 4, with page 1751, which is photo 6, basically page 1751 is what you would be looking at if you removed the front cover of the panel; correct?
A. Right.
Q. Because on the bottom left-hand corner, you see the seven circuit breakers, page 1751, which correspond to the seven circuit breakers at the bottom left-hand corner of page 1748; correct?
A. Right.
Q. The relays on top of page 1751 -- in a way they are unconnected with the indicator lamps, because the indicator lamps are connected to what we see at the other side of the front panel, which is the previous page?
A. Electrically, they are connected.
THE CHAIRMAN: The fourth relay, the one that's badly disfigured, is that the stern light connection?
A. It's connect to the stern light.
THE CHAIRMAN: Thank you.
MR SHIEH: At the bottom of page 1751, you describe:
"... the 4th relay ... was ... badly disfigured, it was taken down and compared with a 'healthy' relay ..."
That we can see over the page at page 1752.

Page 23

Photo 8, there was another view of the disfigured relay and a healthy relay, and you commented:
"From the outside appearance of the disfigured relay, one can confirm that high current had been flowing through the coil inside the relay for a prolonged period, of the order of at least several minutes. The reason for such high current was possibly because the devices in series with the coil inside the relay had been short-circuited."
A. Right.
Q. Page 1753:
"It is noted that there are 'red flags' in circuit breakers No. 4, 5 and 7 (when counted from the left) in photo 6. This is typical in circuit breakers indicating the status of the circuit breaker being in the 'on' state. An example from a circuit breaker being used at the university is as shown in photo 9."
I understand, Professor Ho, that you may have some modification about the positioning of the arrow because of what happened during the print-out process; is that correct?
A. Yes.
Q. Can you point that out to us, what modification you wish to make?
A. Basically I move the arrows nearer to the coloured flag.

Page 24

Q. Yes?
A. Because if you look at the photo over there, the arrows are quite far away from the red and the green flag, so I just move it closer.
THE CHAIRMAN: Yes. The flags, as you call them, are the rectangular boxes?
A. That's right, yes.
MR SHIEH: Thank you.
Over the page:
"A further observation was that two wires in the lighting circuit had been cut as shown in photo 10."
So we see at photo 10 the two wires in circuit 3.
But then it has subsequently been confirmed, as you note in your note to photo 10, that:
"... it was confirmed subsequently that the wires were cut by Mr Szeto ... of Mardep for the purpose of marine accident investigation."
THE CHAIRMAN: Before we move on, Mr Szeto Yiu-kuen is the person, is he not, who took the photographs, or some of them, in marine bundle 1, page 147, for example? Photograph 16.
Go down to photograph 16. "YK Szeto" took the photograph on 4 October 2012, and we see his name in other photographs in this bundle.
A. Yes.

Page 25

MR SHIEH: Yes.
THE CHAIRMAN: Is it known when Mr Szeto cut these wires, Mr Shieh?
MR SHIEH: There was an email -- 15 October. 16 October.
THE CHAIRMAN: Thank you.
MR SHIEH: Yes, he took some of the photographs but the photographs showing those panels were unfortunately not taken by him. He took others.
In paragraph 7 of your report, you said:
"In order to confirm the circuit, a further inspection of Lamma IV took place on 4 March 2013 with the assistance of 5 marine police officers. A simple test was carried out to identify the wiring of the circuits as shown in figure 2. In essence, if circuit 3 in photo 10 was marked as the circuit for the starboard light, then wire 1 will be connected to point A as shown in figure 2. Similarly wire 2 will be connected to location B. A 12 V battery was then connected to the wires at the distribution board as shown in photo 11. If the markings on the wires are correct, then the test light bulb would be lit up."
A. That's right.
THE CHAIRMAN: And that's what you found to be the case?
MR SHIEH: Yes.
A. I'm trying to identify the wiring is connected to what.

Page 26

THE CHAIRMAN: Yes, I understand.
MR SHIEH: Yes. So basically in the photographs that follow, if you look at pages 1756, 1757, all these experiments and also the results of looking at the test light bulb were basically to verify which wire was connected to which external light?
A. Yes. Just to check whether the labels are correct.
THE CHAIRMAN: And they were correct?
A. They were correct.
MR SHIEH: Thank you. Incidentally, at the top of page 1756, photo 12, you noted:
"Two crocodile clips were used to connect two wires from the test light bulb to the starboard wires. It was found that the two wires ... which have been cut in the distribution board were wires of the starboard light."
A. Right.
Q. If we were to look at page 1758, at the top, it says:
"However the circuit to the stern light was found to be discontinuous as the test light bulb could not be lit up."
A. Right.
Q. "This however is understandable as the stern sank to the seabed and one would not be surprised to see that the wirings were broken and discontinuous."
A. Right.

Page 27

Q. "One further observation was that the cables to the masthead light and anchor light were cut open as shown below."
You have taken photographs as to how they were cut open in photo 16. You say:
"Wires connecting to the anchor light and masthead light were found to be cut open during the second inspection ... However it was confirmed from photographs 45 to 61 of police photo album V ... that the wirings were intact, hence ascertaining that there was nothing untoward in the wiring connections for the anchor light and masthead light."
A. Right.
Q. "In addition, it was found that most circuit breakers shown below were malfunctional."
Now, the circuit breakers as shown below, we are now moving away from the navigation light distribution board but moving to --
THE CHAIRMAN: Before we do that.
Page 1758, next to the legend "Photo 16", we're to understand, are we, from this that the wiring was not in a cut state on 15 October 2012, but by 4 March 2013, it was in that cut state? Is that the position?
A. That's right.
THE CHAIRMAN: Do we know when it was cut and by whom?

Page 28

A. I don't know.
MR SHIEH: We're trying to find out.
I've just located an email. On 18 October.
THE CHAIRMAN: By whom?
MR SHIEH: 18 October, the police did cut it. They did not actually identify the name of the person cutting it.
In respect of the switchboard, the name of the person who cut was identified by the Department of Justice, whereas in respect of the two external wires, no names were mentioned. It only says "the police did cut a total of 4 wires on the roof of Lamma IV".
THE CHAIRMAN: Do we know why they were cut?
MR SHIEH: It is said to be "for the purpose of removing the respective light bulbs for forensic examination as per the Government chemist's instructions".
THE CHAIRMAN: Thank you.
That's Dr Cheng?
MR SHIEH: That should be the case. So 18 October would be obviously after the date of the relevant photographs which were in the police album and which Professor Ho referred to. Because those photos were 15 October.
THE CHAIRMAN: Yes. If my memory serves me correctly, Dr Cheng said that he received the bulbs on 19 October in the laboratory.
MR SHIEH: Yes. So the cutting was the 18th, receiving on

Page 29

the 19th. Those photos were on the 15th, before they were cut.
THE CHAIRMAN: Thank you.
MR SHIEH: Just for the Commission's information, the email I was reading from has been inserted into marine bundle 13 at page 5069.
THE CHAIRMAN: Thank you very much.
MR SHIEH: So it may be a handy guide, if the Commission wishes to locate that. It also talks about the cutting of the wire inside the distribution board that we have just looked at.
THE CHAIRMAN: Page 5069?
MR SHIEH: Correct. Marine bundle 13.
Professor Ho, coming back to photo 17 in your report. That series of circuit breakers is located in the other switchboard, the 24-volt DC main switchboard that we can see in a clearer state in marine bundle 12 at page 4901 -- if we look at marine bundle 12, page 4901. We are now moving to the other panel; correct?
A. Yes.
Q. Here, you say:
"All the circuit breakers, with the exception of the main circuit breaker ..."
Now, let's identify that. That is the one on the

Page 30

far left; correct?
A. Yes.
Q. "... and the two marked with white paint on the handle ..."
Now, the two marked with white paint on the handle, just for identification purpose, are the third and the fourth ones from the far right; correct?
A. Mm'hm.
Q. "... were malfunctional, indicating that large current had flowed and tripped the circuits."
Just to pause here. By saying "malfunctional", are you saying they were in the same dangling state as the malfunctioning circuit breakers in the previous --
A. That's right, yes.
Q. Thank you.
"The circuit breaker for the external lights controlled the power supplied to the seven light circuits ..."
When you say "the circuit breaker for the external lights", you mean the second one from the left?
A. Yes.
THE CHAIRMAN: The one that's marked "nav light"?
A. Yes.
MR SHIEH: "... and hence the turning off of this circuit breaker would cut off the power supply to all the

Page 31

external light bulbs (including the corresponding indicators)."
A. Yes.
THE CHAIRMAN: Just give me a moment, if you would. Thank you.
A. Just a minute. I think there's a typo here. What I mean is the turning off of this circuit breaker will cut off the power supply to all the light bulbs -- the indicator light bulbs, not the external lights.
MR SHIEH: Oh, to the indicator light bulbs?
A. Yes. Hang on, hang on. Just a minute.
THE CHAIRMAN: Take your time. Because you go on to say in brackets --
A. No, no. Sorry. This is right.
MR SHIEH: This is right?
A. Yes, this is right.
Q. So if this button were switched our tripped to the "off" position, then basically the external lights are off?
A. That's right, yes.
Q. Alternatively, if one of the external lights suffered a high surge of power or current, it would cause this to trip?
A. That's right, yes.
Q. Any one of them suffering this would cause this to trip; correct?

Page 32

A. Yes.
THE CHAIRMAN: So for our purposes, the nav light circuit breaker had been tripped by a large current?
A. Yes.
MR SHIEH: But merely by looking at this panel, you would not be able to tell which of the external lights had tripped so as to result in it being in this current state?
A. No.
Q. Because any one or more of them would have this result?
A. That's right.
Q. The power surge to any one or more of them would have this result, of causing this to trip; correct?
A. Yes. Basically you have the master switch supplying power to all the seven circuits.
Q. Yes.
A. And if one of them or several of them are drawing a large current, then the large current would have to come through the master switch, and that will trip the master switch.
Q. Yes.
THE CHAIRMAN: What we do know is that the relay related to the stern light was disfigured, distorted.
A. (Witness nods).
THE CHAIRMAN: So the likely culprit is the stern light; is

Page 33

that it?
A. I think it's inevitable, large current had flown through the stern light. But then the fact that there are some other circuit breakers which have been tripped so heavily to become inoperational, meaning that there were also other currents helping to trip the master circuit breaker as well.
THE CHAIRMAN: Thank you.
MR SHIEH: When you say "the master circuit breaker", you are talking about the second one from the left?
A. That's right.
Q. As opposed to the main circuit breaker, which is the one on the far left?
A. Right.
THE CHAIRMAN: Why can't we call it by its name? It's called "nav light", is it not?
MR SHIEH: Yes. We'll call it the navigation light circuit breaker. Because otherwise we may get confused between the two words, one master, one main.
So the nav light circuit breaker had tripped because of high current going through the stern light and possibly some other navigation light?
A. Right.
Q. Thank you. Photo 18, you say:
"It was also observed that there was a button on the

Page 34

coxswain's deck marked with the description of 'horn' as shown in photo 18."
Would you wish to comment on the position of the arrow here?
A. Actually the arrow -- again, it's because of the printer. It should be pointed as the metallic --
THE CHAIRMAN: The silver button on the right hand of the row of buttons?
A. Yes, the cursor position. So the arrow should be pointing at the arrow position.
THE CHAIRMAN: Thank you.
MR SHIEH: Thank you.
"The controls of the various circuits, including the one marked with the description of 'horn'. It is understood that by pressing the 'horn' button, a loud horn would be produced to alert other vessels."
A. Right.
Q. Over the page at 1760, you say:
"It was however found that there were some rust on the switch associated with the 'horn' button as shown in photo 19. It could cast doubts as to whether the switch could function normally to emit a loud warning to other vessels.
It is also noted that there were lots of copper oxides in the other switches or even on the plastic

Page 35

cables as shown in photos 20 and 21. Hence one could not conclude whether the rusts were there before the accident in issue."
A. Right.
Q. You are saying that because of widespread appearance of rust, you can't be sure whether the rust was there before the collision or whether the rust was formed after or as a result of seawater ingress after the collision?
A. That's right. Because actually I was trying to measure the resistance across the switch. Because for those switches, when I pressed the button, the resistance should be quite small, so as to allow the current to flow and give out the audible sound. But then when I measured the resistance across that particular switch, the resistance was so high that it is unmeasurable. So the switch had probably been damaged through the sinking of the boat. But then I do not know whether damage was actually because of the accident or it's malfunctional before.
I checked other switches. They were in the same state, ie they are open-circuit.
THE CHAIRMAN: So nothing different about this switch compared with the other switches?
A. No.

Page 36

MR SHIEH: Thank you. Can I now move on to the electric circuit explanation and various circuit diagrams that you have drawn -- I think five of them.
A. Yes.
Q. If I may just ask you a rather macro question. These five circuit diagrams that we see basically set out the different permutations as to how the mute button and the individual circuit breaker can be switched on or off, and basically you set out the result of current flow of each of these permutations; is that a fair way of putting it?
A. Yes.
Q. Thank you. You can see the big circle in the middle of each of these circuit diagrams. That big circle basically describes the relay; correct?
A. Yes.
Q. And each of these diagrams apply to one of the seven navigation lights?
A. Yes.
Q. Thank you. In fact, that is what you say in the opening paragraph. You say at internal page 18, bundle page 1762:
"For the lighting circuits, there were essentially seven electrical circuits coupled together."
Masthead, port, starboard, stern, anchor, NUC and

Page 37

NUC.

"Each of the seven electric circuits is however independent of each other and a typical circuit for the starboard light can be drawn in following figures to illustrate how electric currents flow in the circuit."

I suppose the only thing that is not self-standing but is common would be the mute switch; is that so? There's only one mute switch?

A. That's right.

Q. Looking at the first permutation -- sorry. One point about the legend. Inside the coil we can X and Y; yes?

A. Yes.

Q. Basically these are contracts contacts inside the relay whose position would vary depending on whether or not an electrical current flows through the coil inside the relay?

A. That's right.

Q. If an electrical current flows through the coil in the relay, the contacts in X and Y would be at an angle to the horizontal?

A. Right, yes.

Q. Whereas if one takes an example of -- let's say we move two pages down. This is jumping a little bit ahead to page 1764, for example. This has no current going through the coil, as we shall see later. In that case,

Page 38

the two contacts inside the relay would be positioned, by way of legend, horizontally?

A. Right.

Q. So this basically affects the way the current would go through the other parts of the relay; correct?

A. Well, it will affect how the current is being directed to flow --

Q. Directed, sorry.

A. -- through different parts.

Q. Yes. So basically a clever mechanism inside the relay whereby, depending on whether or not current goes through the coil, the electricity would be directed to flow one way or the other --

A. Yes.

Q. -- by the moving of the contacts at X and Y?

A. Yes.

Q. Can we now go back to the first permutation at page 1762. The 10-amp circuit as shown in photo 2 closes, the circuit breaker in photo 2 closes. When a circuit breaker closes, you mean it is switched to the "on" position?

A. Right.

Q. Current flows from location A. Could you tell us in real life what would location A be?

A. Location A would come from the battery.

Page 39

Q. I suppose depending on whether it's switched to "1" or "2"; right?

A. Yes.

Q. If it's battery, it's battery; if it's switched to "1", it would be transformer, generator.

A. Actually, I think there's no transformer in the circuit. It's from the generator.

Q. Yes, yes.

A. But you can see that they are trying to indicate two different paths only. So if you really look at the spelling of the transformer, it's spelt wrong as well. It's basically a generator, not a transformer.

Q. Okay. But for present purposes, let's say this is the source of electricity: battery.

A. That's right, yes.

Q. So you say:

"Current flows from location A into the path comprising pin 2, the coil ..."

So if we imagine an arrow from A moving down to that black dot immediately below A and move to pin 2, it goes through the coil --

A. Yes.

Q. -- and out to what I think would be pin 7; correct?

A. Yes.

Q. And then via the closed 10 A circuit breaker to return

Page 40

to the power supply at B. So it would go past starboard light, it would go down and then back to the 10 A circuit breaker, because it's closed --

A. Yes.

Q. -- so therefore electricity can flow back through to B.

A. Yes.

Q. B is what? B is also the other end of the --

A. B is -- basically you can say the negative terminal of the battery.

Q. Yes. You assume that A is one end and B would be the other end?

A. That's right, yes.

Q. You go on to say:

"As current flows through the coil, the relay contacts at X and Y are as shown in figure 3."

So diagrammatically, they are tilted a bit upwards?

A. Yes.

Q. "Electric current also flows from location A into another path comprising pin 3 ..."

A. Yes.

Q. "... the indicator lamp ..."

A. Yes.

Q. "... the variable resistor and then back to the power supply at B."

A. Yes. Which means when current flows through the coil,

Page 41

there will be current flowing through the starboard. At the same time there will also be a complete circuit for the indicator lamp. So the indicator will light up.
Q. Yes. So this configuration, if we want to put a little note describing the physical appearance of the various switches, this depicts circuit breaker on, and this depicts indicator light on; correct?
A. Right.
THE CHAIRMAN: And starboard light on, as we've gone through earlier?
A. Yes.
MR SHIEH: As a result, starboard light outside would be switched on?
A. That's right.
Q. Thank you.
A. But then the circuit for the buzzer is open-circuit. So there's no current to the buzzer, so the buzzer would not sound an audible sound.
Q. Yes. Because of the configuration of Y?
A. Yes.
Q. Because if Y goes the other way, it would connect to the buzzer.
A. That's right.
Q. But here, it doesn't connect to the buzzer.
A. Correct.

Page 42

Q. Because the current flows through the coil.
Next, page 1763:
"The 10 A circuit breaker as shown in photo 2 closes."
So again, circuit breaker switched to "on".
"Current flows from location A into the path comprising pin 2, the coil, starboard light via the closed 10 A circuit breaker to return to the power supply at B."
So this is identical to the first case?
A. Right.
Q. Because we are focusing on the effect of closing the circuit breaker; correct?
A. Right.
Q. "As current flows through the coil, the relay contacts at X and Y are as shown in figure 4."
Again, the same configuration, tilted a bit upwards?
A. Right.
Q. The difference is because we have open-circuit for indicator switch; correct?
A. Correct.
Q. Because we have open-circuit for indicator switch, you say:
"Electric current however cannot flow from location A into another path comprising pin 3, the

Page 43

indicator lamp and the variable resistor because the indicator switch is opened."
A. Right.
Q. "There is no current through the buzzer as the circuit is broken at contact Y."
A. Right.
Q. So for as long as the contact is open at contact Y, there will be no sound?
A. No.
Q. Correct?
A. Right.
Q. And this scenario depicts what would happen if the indicator switch is basically switched off?
A. Right.
Q. It won't affect the external light?
A. No.
Q. It would simply affect the appearance of the indicator lamp inside the wheelhouse, on that box?
A. That's right.
Q. So this is circuit breaker switched on, indicator light off?
A. Right.
Q. Next page, 1764:
"The 10 A circuit breaker as shown in photo 2 opens."

Page 44

So this is switching off the circuit breaker; correct?
A. Right.
Q. "Current can cannot flow from location A into the path comprising pin 2, the coil, starboard light as the 10A circuit breaker is open-circuited. As no current flows through the coil, the relay contacts at X and Y are as shown in figure 5."
So both horizontal in this diagram; correct?
A. Right.
Q. "Electric current also cannot flow from location A into another path comprising pin 3 and the indicator lamp because the circuit is broken at the relay contact X."
A. Right.
Q. "There is no current flowing through the buzzer either."
A. No.
THE CHAIRMAN: So the indicator light and the buzzer are not operating; is that it?
A. No. That's right.
THE CHAIRMAN: Thank you.
A. So this condition is similar to when the master switch is also off, then there's no power and there's no light externally, internally. There's no buzzer.
MR SHIEH: So indicator switch closed. Yes.
The next permutation:

Page 45

"The 10 A circuit breaker as shown in photo 2 opens. The starboard light is also open-circuit due to a blown lamp bulb."

A. Right.

Q. So this is switching off the circuit breaker?

A. Right.

Q. And nothing can go through the coil --

A. No.

Q. -- because there's an open circuit at the starboard. So you say:

"Current cannot flow from location A into the path comprising pin 2, the coil, starboard light as both the 10 A circuit breaker and the starboard light lamp bulb are open-circuited. As no current flows through the coil, the relay contacts at X and Y are as shown in figure 6. Electric current also cannot flow from location A into another path comprising pin 3 and the indicator lamp because the circuit is broken at the relay contact X. There is no current flowing through the buzzer either."

A. That's right.

Q. Then the last permutation, figure 7:

"The 10 A circuit breaker as shown in photo 2 is closed."

So you switch on the circuit breaker.

Page 46

"The starboard light is however open-circuit due to a blown lamp bulb."

A. Right.

Q. "Current cannot flow from location A into the path comprising pin 2 ... as the starboard light lamp bulb is blown and becomes open-circuited. As no current flows through the coil, the relay contacts at X and Y are as shown in figure 7. Electric current also cannot flow from location A into another path comprising pin 3 and the indicator lamp because the circuit is broken at the relay contact X. Current will however flow in a path comprising of A, the closed mute switch, the buzzer, relay contact Y, pin 8 and then returns to B via the closed 10 A circuit breaker."

A. That's right.

Q. This actually depicts a situation whereby people actually wanted the starboard light to work, therefore they switched on the circuit breaker?

A. Right.

Q. And the only reason why it doesn't work is because it's blown?

A. Right.

Q. In this scenario, although starboard will not light up, the configuration of the contacts in the relay are such that it would result in electricity flowing through to

Page 47

the buzzer and making the buzzer sound?

A. Yes.

Q. Is that the rather layman's way of putting it?

A. Basically if the light bulb of the starboard light is gone, then the indicator will not light up. But then the buzzer will be energised.

THE CHAIRMAN: So those are opposite things of telling you the same thing? The indicator light goes out, and the buzzer goes on?

A. Yes.

MR SHIEH: Thank you.

I now move on to your responses to the questions given. You say at page 1767:

"The first question raised was 'where power supply is from the main engine generator ... the possible scenario or scenarios in which the switches for the navigation lights and the circuit breaker for them would be positioned as shown in the photographs'. The responses were that the generator in the engine room was supposed to generate electricity to supply power to various devices/appliances onboard of Lamma IV. When the generator fails, then the reserve batteries would come in to provide power to essential elements such as light bulbs for illumination. Other non-essential appliances such as air-conditioners would however be

Page 48

switched off to reduce the demand of power from the reserve batteries. It is not clear whether the changeover from powering up the appliances from the generator to the batteries were automatic or not, because insufficient circuit diagrams were given to the undersigned.

By noting that there is a switch as shown in photo 1, it looks like that the changeover was done manually (because the switch as shown was a manual switch) and hence the coxswain or the chief engineer could decide where the power supply was to be obtained to drive all the essential appliances (such as the radar, the starboard lights, et cetera). It is understood that the switch was always switched to position 2 (ie power was drawn from the batteries) because when Mr Chow Chi-wai was asked whether the selector was sometimes switched to position 1, he gave a lengthy explanation and the Chairman of the Commission then summarised and said, 'Are you saying that at some stage in the past, there was this phenomenon of the light going out about twice a week, and it was found out that it was because the switch had been switched to '1', and thereafter, the engineer told you to switch to '2', battery 1 power. And after this practice of switching to '2' has been installed, there were no more incidents

Page 49

of lights going out. Would that be a fair way of putting your evidence?', then Mr Chow said it was correct ..."

It was more or less the evidence I summarised for you this morning.

A. That's right, yes.

Q. "In any case the two generators inside the engine room would charge up the batteries to provide power to the lamp bulbs according to Mr Leung Pui-Sang who agreed that he had said 'When the "genset" ... is turned on it can charge up, directly or through the charger, the four sets of batteries on board the vessel. As far as I am aware Lamma IV was delivered from the shipbuilder with this battery system already installed'. Hence it suffices to say that [battery] power would be available to power up the lamp bulbs on the outside of Lamma IV. The issue is whether there are chances for power not being made available to the lamp bulbs. The answer to this question is: i) if the batteries were not given sufficient charge from the generator, then there would not be sufficient power to light up the lamp bulbs, but it appears from the schematic circuit diagram that as long as the generator is generating and the electronic converters are functioning, the batteries should have sufficient energy to power up the batteries; ii) if the

Page 50

selectors in photo 1 was set to position '0', then there is no power to energy the lamp bulbs; iii) if the lamp bulbs are blown, they could not be lit up; iv) if the electric wires are discontinuous then no power could be delivered to light up the lamp bulbs; v) if the circuit breakers were switched to the 'off' position, then there would be no power supply to light up the lamp bulbs.

2. The response to question 2 raised at the beginning of this report is hence similar to the descriptions given above, since once power is available from the source, the lamp bulbs should light up unless there were faults/switching as mentioned in the preceding paragraph."

So basically what you are saying is for the purpose of the various switches, it makes no difference whether or not you are powered for "1", generator, or "2", batteries?

A. Except that for batteries, the voltage is more stable, so the life of the light bulbs could be kept longer.

Q. Yes, but in terms of the flow of the electricity --

A. No difference at all.

Q. No difference?

A. No difference at all.

Q. Because I believe at one time there had been a suggestion somewhere that if you actually used battery

Page 51

power rather than generator power, that somehow the current would not flow through the circuit breakers. That is not correct?

A. Definitely, no.

Q. No. Thank you.

Paragraph 3 at page 1768:

"As explained before, if there were power available to the circuits and if there were discontinuities in any of the circuits which lead to either one of the lamp bulbs not lighting up or any of the lamp bulbs (such as the starboard light or port light) not lighting up, the buzzer would give out an audio signal. However if the buzzer circuit was muted, then the buzzer would fail to sound out the alarm, and those parts of the circuit which were healthy would continue to function and the faulty path would continue to be faulty without alerting the crew members on board of Lamma IV.

4. One further observation is that if the volume of the light intensity of the lamp indicators was turned to the lowest level, the intensity of the light could be quite weak. However one do not know how weak the light becomes until the variable resistor is examined in details, possibly at the university if field test at Lamma IV proves to be difficult for the undersigned to do the resistance measurement. Moreover, it should be

Page 52

note that the light indicators are the visual aids to the officers onboard of Lamma IV only. The turning off of the indicator lamps or the dimming of the indicator lamps have no effect on the status of the external light. The external lights such as port light would remain on even though the indicator lamp of the port light was turned off, for example.

5. The circuit breaker on the panel shown on photo 17 was the 'master' switch to control whether power is available to the panel of circuit breakers shown in photo 6."

I think for "master", we read "navigation light circuit breaker"?

A. That's right.

Q. Second from the left?

A. Right.

Q. Thank you.

"The turning off of [this] circuit breaker ... would not however affect the set position of the circuit breakers in photo 6 as all circuit breakers mentioned in this report were mechanical circuit breakers which could only be set manually."

Pausing here, Professor Ho. It would mean that if I manually switch the navigation light circuit breaker in the 24-volt switchbox to the "off" position, it will

Page 53

not cause the seven circuit breakers to jump?
A. No.
Q. That's what you are trying to get at?
A. That's right.
Q. Point 6:
"The seven circuit breakers as shown in photo 2 (and photo 6) controlled the powering of the light circuits. It can be seen in the photo that the circuit breakers for the masthead light, port light, starboard light and stern light were all switched to the 'on' position. Hence these four lights should be energised lit up if the light bulbs were healthy. It should also be noted that circuit breaker that controlled the power to the stern light was damaged ... and this, when viewed together with the damaged relay as shown in photo 7, is a strong indication that there were power supplied to the stern light circuit. Whether the stern light was lit at the material time of the incident would depend on whether the stern light bulb was healthy or not.
7. There were seven switches that controlled the indicator lamps as shown in photo 3. The first four (counted from the left) were all switched to the 'on' position and these four lamps were the lamp indicators for the masthead light, port light, starboard light and stern light. The remaining switches were in the 'off'

Page 54

position which means the indicator lamps of the anchor light and the two NUC lights were turned off. Hence the status of the anchor light and the two NUC lights could not be seen by the officers inside Lamma IV."
Can I pause here to ask you this question. Perhaps I will jump to paragraph 10 first.
"The circuit breakers shown in photo 17 were mostly damaged as they could not be tripped positively one way or the other."
A. Yes.
Q. "It is likely that these circuit breakers were tripped because of short-circuits which occurred on 1 October 2012. However one could not rule ought the possibility that some of the circuit breakers had been damaged before the accident."
Now, let's focus on the navigation light circuit breaker, the second one from the left on the 24-volt switchboard.
A. Yes.
Q. That was one of the damaged circuit breakers?
A. Yes.
Q. And your conclusion was that it would be because of short-circuiting?
A. Yes.
Q. Because that controls the seven navigation lights --

Page 55

A. Yes.
Q. -- as we have discussed just now, a huge surge in current for one or more of them would cause this navigation light circuit breaker to trip?
A. Right.
Q. To such an extent that it becomes damaged?
A. Right.
Q. We also discussed that it is likely to be stern light.
A. Yes.
Q. Or perhaps some other --
A. As well.
Q. -- as well. I want to establish the relationship between the tripping of this navigation light circuit breaker on the one hand, and the tripping of one or more of the severed circuit breakers on the navigation light distribution board. Do you see what I mean?
A. Yes.
Q. How do they interrelate? Is it the case that if there is a circuit, if there is a short-circuit for one of the navigation lights, the circuit breaker for that navigation light in the navigation light switchbox would trip and would also cause the navigation light circuit breaker in the 24-volt box to trip as well? Is that how it operates?
A. Well, basically the two are in series. But then the

Page 56

tripping current may be lightly different in that the navigation light, if one of those is short-circuited, then large current will flow and trip that particular circuit breaker.
Q. Trip one of the seven?
A. Trip one of the seven.
Q. Yes.
A. But then the master switch, which I call, would be tripped by a heavier current. So this is what we call a proper coordination in that if one of those trips, the other ones should not trip so easily. Otherwise when one of the circuits trips, all the circuits will be tripped. So that will cause a lot of inconvenience, nuisance.
Q. I see. I understand.
A. So basically if there's a fault in one of the circuits, this one will trip. Hopefully it will --
Q. In an ideal world, only one of the seven should trip, without bothering to trip what you call the master switch?
A. That's right, yes.
Q. Because once the master one trips, all --
A. Then all the seven lights -- yes.
Q. -- the normal ones would be gone?
A. Yes.

Page 57

THE CHAIRMAN: It would be absurd if it was otherwise, would it not? If one bulb fails, the starboard light fails, all of the navigation lights on the vessel go out? That couldn't possibly be the object of the system, could it?
A. No. But then electrically, you cannot guarantee. So basically when you look at the tripping of one of the circuits, if that results in a tripping of all seven circuits, you look at the seven circuit breakers, try to identify which one is the culprit causing all the trouble, and then you just turn off this particular switch. Or if it's so serious, then it will trip to become inoperational anyway. Then you reset the master switch. Then you restore the power supply to the rest of the six circuits. But ideally, hopefully, only one will trip, that particular switch only, without bothering the other one, the main switch, the master switch.
MR SHIEH: But on the facts of this case we have seen, assuming that the appearance of the seven circuit breakers as you saw was the same as that which pertained on the evening of 1 October, it was indeed a case whereby a short-circuiting was serious enough not just to cause one or more of the seven circuit breakers to jump; it was bad enough to cause what you call the master circuit breaker to jump as well.

Page 58

A. That's right.
THE CHAIRMAN: That's the nav light circuit breaker?
MR SHIEH: Yes.
THE CHAIRMAN: Can we call it that.
MR SHIEH: The nav light breaker to jump; that's correct?
A. Yes.
Q. But from what you have seen, the ones that jumped, the navigation lights, one of the seven, that jumped did not include the starboard and port light; correct? Because as far as you could observe, the circuit breakers for those two lights were in the "on" position?
A. They were in the "on" position at the time of the visit.
Q. Yes.
A. So that implied that not a very large current had flowed through the circuit. But I cannot rule out the possibility that it had been tripped, it had been open-circuited manually and reset to the "on" position later on. Because, as we heard this morning, some of the switches had been sort of --
Q. Basically the stern light, which should have been dangling but which you found to have been somehow in the "on" position?
A. Yes. Because during investigation, people are trying to toggle the switch "on" and "off". So I cannot rule out the actual position as seen reflects the actual position

Page 59

at the time of the accident.
Q. And the one example you had in mind was the positioning of the stern light circuit breaker?
A. Yes.
Q. Because it should have been dangling, because it should be neither "on" nor "off"?
A. All the evidence is showing that it should be on. But then a large current had flown. It burns out the relay, as well as tripping the circuit breaker.
Q. Yes.
A. But then as we observed, at the time when I made the first visit, it was in the "on" position.
Q. Yes. And also I think the circuit breakers in the 24-volt panel, you say most of them were damaged?
A. Right.
Q. Were they in the "on" or "off" position when you inspected them?
A. They were all in -- if my memory serves me right, they were all in the "on" position.
Q. Yes. Because if we look at photo 17, for example, page 1759, they were all in the "on" position?
A. Yes.
Q. Well, it may not be all, right?
A. Well, they are all in the "on" position, although it's not sort of "on" very tightly. But they were in the

Page 60

upper position. But had they been tripped, it should be in a much more downward position, rather than in the position as shown here.
Q. Yes.
A. That shows human intervention here. I mean, people have been moving them, trying to test the switches.
Q. Could I now ask you to look back at paragraph 8, which is where you discussed the "mute" button: page 1769.
A. Yes.
Q. "It is difficult to interpret the meaning of the 'on' position for the mute switch which controlled the operation of the buzzer because it was badly damaged. If confirmation is to be sought, then one could pay a visit to similar vessels such as Lamma II to ascertain the meaning of the 'on' position for the mute switch. The 'on' position of the mute switch (as seen during the visit on 2 March 2012) was likely to be the 'closed' position in which the buzzer would send out an audio sound when any of the seven external light circuits were abnormal (ie. if there were blown lamp bulbs externally)."
Now, how did you come to that conclusion?
A. Well, because when I looked at the position of the toggle switch on the outside, it's in the upper position.

Page 61

Q. Yes.
A. Then when I looked behind, after I opened the cover, then there was a label on that toggle switch corresponding to the upper position of the toggle --
Q. Yes.
A. -- which says "on". So to me, it's probably the "on" -- the closed position, when the toggle switch was flicked.
Q. Circuit flowing through? Circuit flowing through?
A. Current will flow through.
Q. Yes.
A. So the buzzer will be functional.
Q. "... likely to be the 'closed' position in which the buzzer would send out an audio sound when any of the seven external light circuits were abnormal ..."
A. But then I need to check out if I really need to confirm that proposition. I need to look at a similar switch. I reckon that probably it should be available on other similar vessels, like Lamma II, as I said.
Q. Yes.
"However the indicator lamps could be turned off and hence the buzzer could not sound out any audible warning even though there were faults on the external lights."
You mean if we break the indicator switch, to switch off the indicator lights, it would have the effect of actually opening the circuit for the buzzer as well?

Page 62

Because here you say:
"... the indicator lamps could be turned off and hence the buzzer would not sound out any audible warning ..."
I'm just trying to ask you why there is a linkage between the indicator switch contact on the one hand, and the buzzer contact on the other? Don't they belong to different circuits?
A. The indicator lamp --
MR SHIEH: It's 11.30. It's a small point for clarification. Would Mr Chairman wish to take the mid-morning break now whilst Professor Ho --
THE CHAIRMAN: The position is this, is it not. For example, the starboard light is lit but you can turn off the indicator lamp that indicates to you visually that it's working?
A. Right.
THE CHAIRMAN: And the question is, if you do that, have you also turned off the buzzer?
A. No, you haven't.
MR SHIEH: Right. I ask this because the sentence that I read out to you gives the impression -- because you say --
A. Yes, I think there's some confusion in that sentence, so that's why I --

Page 63

THE CHAIRMAN: This is wrong, is it not?
A. Yes. I think we should take out this sentence.
THE CHAIRMAN: "However, even if the indicator lamp was turned off, the buzzer would sound."
Isn't that what it should be saying?
A. Yes. I should take out the word "not" -- "would sound out audible signal".
MR SHIEH: Basically you want to say:
"Even if the indicator lights were turned off, the buzzer would still give out an audible warning."
A. Right.
THE CHAIRMAN: I think we'll take the mid-morning break. Professor, we're going to break for 20 minutes.
A. Okay.
(11.33 am)
(A short break)
(11.53 am)
THE CHAIRMAN: Yes, Mr Shieh.
MR SHIEH: Professor Ho, paragraph 8. We have corrected that sentence, the penultimate sentence of paragraph 8. Can we move on. You say:
"In a similar manner if the circuit breaker for the starboard light shown in photo 6 was switched to the 'off' position, the buzzer would not emit sound either because the circuit of the starboard light had been

Page 64

switched off altogether."
A. That's right.
Q. So at the end of the day, whether or not the buzzer would be heard -- I see.
I just wish to clarify, if it's switched to the "off" position, the buzzer would not emit sound. In other words, if the circuit breaker for the starboard light jumped to the "off" position, let's say because of a surge of current and it short-circuited, and it's in "off" position, does it also mean the buzzer would not sound, in that scenario?
A. Right.
Q. It would still not sound?
A. It will not sound because of this circuit. But it will sound because of other circuits. Because as I said, there are seven independent circuits. So if you switch off the circuit breaker for this particular circuit, then whatever happened in this circuit will not affect the buzzer. But the other circuits, for example the port light, if the light bulbs were damaged, then the buzzer will still sound.
THE CHAIRMAN: If it was otherwise, it would defeat the whole purpose of having an audio alarm, would it not?
A. That's right, yes.
THE CHAIRMAN: Mr Shieh, can you help me with this. We've

Page 65

made enquiries, have we not, of Hongkong Electric and Cheoy Lee for manuals that help describe the equipment?
MR SHIEH: Yes.
THE CHAIRMAN: And neither party has been able to give us anything; is that the position?
MR SHIEH: Yes. And Professor Ho has suggested -- if one is interested, and it's a matter for the Commission, in getting to the bottom of the mute button, the Professor is suggesting looking at --
THE CHAIRMAN: Well, as Captain Pryke told us, the place to have manuals is with the people who run the vessels so that by looking at the manual, you can tell how the equipment works.
MR SHIEH: But there's no paper trail and there's no document, as far as we can --
THE CHAIRMAN: Well, that speaks volumes.
MR SHIEH: Could I just have one minute just to see whether or not I have any questions to follow up on this issue.
THE CHAIRMAN: Yes. Please take your time.
MR SHIEH: Yes. Could I ask you to look back at page 1766. This depicts a scenario of closing the 10-amp circuit breaker; that is, switching it on.
A. Yes.
Q. And switching on the mute switch as well. I mean, meaning that the sound buzzer is switched on?

Page 66

A. Yes.
Q. But this also assumes that the starboard light has blown and it's an open circuit.
A. Yes.
Q. So you described how, because of the operation of the relay, and because of closing the 10-amp circuit breaker, the buzzer would sound?
A. Yes.
Q. Now, for this to occur, it is crucial that the 10-amp circuit breaker was closed and that is to say switched to the "on" position?
A. Right.
Q. Because if it is not, then there won't be any sound?
A. Right.
Q. But if it's blown, if there not likely to be a sharp power surge so as to trip the circuit breaker, so as to turn it into an open position?
A. Yes.
Q. So does it not spoil the purpose of having a buzzer?
A. The buzzer would not take care of this particular circuit. But then it will take care of the remaining six circuits.
Q. I see.
A. Because as the Chairman has said, the purpose of the buzzer is to sound out whether there's something wrong

Page 67

in any of the seven circuits. So you can take away, you can switch off a particular circuit altogether, but then the buzzer will still take care of the rest.
Q. Maybe I'm a bit slow. If there is an open circuit for the starboard light which results in the tripping of the 10-amp circuit breaker, for this particular light, for the starboard light, for example --
A. Yes.
Q. -- so it jumps --
A. Yes. Then whatever happened to the starboard light would not send any signal to the buzzer. So the buzzer would not sound out anything for the starboard light.
Q. Yes, but would that not spoil the purpose of having a buzzer, which is really to sound out signal when there's a short-circuit?
A. Yes, because the purpose of the buzzer is to give a warning as far as possible. So the normal fault that you anticipate, that you encounter, is because of a light bulb externally has blown. Then it will sound -- it will energise the buzzer. But then if it's a serious over-current, it will trip the power supply, then the power supply to the buzzer for that particular circuit will also disappear.
Q. I understand. So if it's simply a blown wire, it can happen without necessarily tripping the circuit breaker;

Page 68

correct?
A. Yes.
Q. I see. But if it's bad enough to trip the circuit breaker, then it would actually cut off the power supply to the buzzer as well?
A. That's right, yes.
Q. Thank you. Can I now move on to paragraph 9 at page 1769:
"It is noted that some of circuit breakers had a red flag and some had no red flag, even though they all appeared in the 'on' position in photo 17. It is likely that those circuit breakers that had a red flag were those that were switched to the 'on' position. Those which do not have a red flag, even though they were in 'on' position, were probably because they had been damaged. Since it is difficult to buy the same model of circuit breakers from the market, one can confirm the above information through a visit to a similar vessel such as Lamma II."
Can I ask you to look at photo 17, page 1759. When you say "some had a red flag", you are really talking about the red flag that you had shown for demonstration at page 1753, that little window with a red colour?
A. Mm'hm.
Q. If we look at page 1753, that's the red flag -- that's

Page 69

the red flag you mean?
A. That I refer to, yes.
Q. When you say it is likely that those with a red flag were those that were switched to the "on" position, you mean --
THE CHAIRMAN: Could we have page 1759 back on the screen, please. We can see the red flag clearly in this photograph. There it is.
MR SHIEH: Yes. That is equipment that is in your university; you just take it for demonstration purposes?
A. That's right, yes. I tried to buy a similar model from the market, but then -- actually, I didn't have enough time. So I sent out my technician to go and buy a similar model, but he bought me a different one.
Q. When you say "Those which do not have a red flag, even though they were in 'on' position, were probably because they had been damaged", what do you mean by that?
A. Well, because the red flag actually is sort of a very weak link to indicate a position of the switch. If it's switched to the upwards position, then a red flag will come up. But then if it's tripped, then a red flag, together with the switch, will come down.
Q. Yes.
A. So the red flag will then disappear.
Q. Yes.

Page 70

A. But because the linkage is not very strong, so if the tripping was very strong, or because of large current, then a red flag will just fall together. So it would probably drop to the bottom of the switch. You may not be able to see it later on.
THE CHAIRMAN: So are you saying that the presence of a red flag indicates that the circuit breaker is in the "on" position? Is that it?
A. For most circuit breakers, they are like that.
THE CHAIRMAN: And this one?
A. As far as I can see, there is no exception for this one.
MR SHIEH: Yes. But because for this one, for photo 17, you said many of them were actually damaged and they happened to be in the "on" position because maybe somebody had moved --
A. Well, for the photo in 17, as I said, most of them had been tripped or damaged, so they should be in the "off" position already.
Q. Yes. They should be down?
A. They should be down.
Q. Yes, but here, many of them were up?
A. Yes. And because they had been tripped down, the red flag should go downward. So the red flag should not appear.
Q. Yes.

Page 71

A. Okay? But then the one for the navigation light, you can still see the red flag there, even though I found that it's been damaged.
Q. Yes.
A. But it could be because of the accident, there was a large current flowing through, the current was large enough to sort of damage the circuit breaker but not to the extent that it's so excessive to break the link altogether. So if somebody tried to trip it up and down, it may be operational for one or two times and then it broke.
Q. Right.
A. So you can trip the red flag upward, but then when you try to trip it downward again, because of the weak mechanical linkage because of the damage, you cannot put it down again.
Q. I think I understand. If they were operating normally, then when they are switched to "on" position, ie closed, the red flag should appear.
A. Should appear.
Q. If you switch it to "off", then the red flag should not appear.
A. Disappear.
Q. But because of the tripping that occurred, if something had actually malfunctioned so that it dangles, then red

Page 72

or not red could be inconclusive?
A. That's right, yes.
Q. Is that what you are trying to suggest?
A. That's right, yes.
Q. Because, for example, the navigation switch is in the "on" position but you know, because you've touched it, that it's actually tripped very badly; it's in a dangling position?
A. Yes, because what I'm trying to say -- the switch was -- could be switched like that (indicates).
Q. Up or down, yes.
A. But then because of the heavy tripping current, that was partially damaged. So the link becomes very weak.
Q. Yes.
A. So I can trip it up once, and then it broke.
Q. Yes.
A. So later on, I could not move it. Or somebody trip it to the up position, to the "on" --
Q. So really looking at the red flag gives you no indication as to whether or not it has broken?
A. That's right. I have no indication whether it's been broken because of the accident.
MR SHIEH: Right. Thank you.
Thank you, Professor Ho. I think that's all I wish to ask of you.

Page 73

Mr Chairman, I have no further questions.
THE CHAIRMAN: Thank you, Mr Shieh.
Mr McGowan, do you have any application?
MR McGOWAN: Yes, I do. I think they'll be very brief questions, really dealing with the switches and perhaps the sequence of events.
THE CHAIRMAN: Very well.
Examination by MR McGOWAN
MR McGOWAN: This is O-level physics and chemistry a long time ago, so if you pardon some of my apparent ignorance in the questions, Professor.
Perhaps I can just start out by saying that Lamma II doesn't actually have the same equipment onboard, so going to Lamma II and inspecting that equipment will not assist in enquiries.
In paragraph 8 in your conclusions, you deal with the question of the various switches. You've told us the relationship between the indicator lamps, the buzzer and the main circuit breakers.
A. Mm'hm.
Q. Can I just ask you, if the dimmer switch is switched on, but the dimming power, the brightness of the light, is turned right down, the audio would still sound if there was a break in the circuit?
A. They are independent. So you can turn the dimmer light

Page 74

intensity to the lowest level, and the buzzer will not be affected.
Q. Right. Thank you.
The second point is, if the power to the buzzer fails, the warning indicator lights will still remain on; is that correct? Whether it's switched off or there's a break in the circuit for the power to the buzzer itself, the audio warning system.
A. Well, when you say the buzzer power supply fails, from the simple circuit, it's not easy for the buzzer circuit to fail unless it was switched off, the buzzer circuit, altogether.
Q. Right. But if you switch off the buzzer circuit altogether, the indicator lights --
A. Will continue to indicate the status of the external light.
Q. -- will continue to indicate. And if there was a failure in the buzzer circuit for some reason, the indicator lights will still remain on?
A. The indicator lights will reflect the status of the external light.
Q. Yes. So you've still got a visual warning if that bulb (sic) fails?
A. Right.
Q. The other points, very briefly, I think.

Page 75

The stern light, on what you found, appears to have suffered a fairly significant surge of power?
A. Yes. But then I cannot confirm whether the damage was done because of the accident, or it was before the accident.
Q. Yes. There has been evidence that that stern light was on and seen by other people.
A. In that case, because the relay was so badly damaged, it must be because of the accident.
Q. Yes.
A. Yes.
Q. And that would have caused the individual circuit breaker for that light to fail?
A. Because of the damage?
Q. Yes.
A. Yes.
Q. But that wouldn't necessarily have caused, as you've said, the main circuit breaker for the navigational lights system to fail?
A. Right.
Q. That could have occurred as a consequence of other subsequent navigation light surges of power or short-circuits?
A. That's right.
MR McGOWAN: Thank you very much.

Page 76

THE CHAIRMAN: Mr Zimmern?
MR ZIMMERN: Yes, we just have very few questions we'd like to ask about the relationship between the tripping of the circuit breakers on the navigation panel versus the main switchboard navigation.
THE CHAIRMAN: Very well.
Examination by MR ZIMMERN
MR ZIMMERN: Thank you, Professor.
Professor, as I understand it, on the navigation panel, you've given evidence that the anchor light and NUC light circuit breakers were damaged.
A. One of those NUC lights.
Q. One of the NUC lights was damaged.
A. Yes.
Q. Can I take it from that that circuit breakers can be damaged through surge in power, even though they're in an "off" position?
A. Yes.
Q. You've also given evidence that it was the stern light, related to the fourth relay, and some other lights that are likely to have caused the navigation circuit breaker to trip?
A. Yes.
Q. Are you able to assist any further in that? Does the tripping or breaking of the circuit breakers on the

Page 77

navigation panel provide any assistance as to which lights, together with the stern light, would have tripped the master or navigation circuit breaker?
A. Well, the fact that there are three circuit breakers on the -- for the seven lights had tripped. So it's most probably those three that caused a large current to flow, to trip the navigation circuit breaker on the 24-volt supply panel.
MR ZIMMERN: I'm grateful. Thank you very much.
THE CHAIRMAN: Ms Lok?
MS LOK: I have no questions.
THE CHAIRMAN: Thank you very much.
MR SHIEH: Can I follow up on one question asked by Mr Zimmern?
THE CHAIRMAN: Yes.
Further examination by MR SHIEH
MR SHIEH: Professor, you answer that it is possible for a circuit breaker to trip even though it is in an open position. Can you help me -- it was in Mr Zimmern's question -- in an "off" position, namely it's open.
A. In the "off" position, the circuit is open.
Q. The circuit is open. If the circuit is open, then how would there be a large current flowing through it to cause it to trip? I thought tripping means that originally it's closed but then somehow, because of

Page 78

a huge surge in current, it caused it to react and therefore opening the circuit?
THE CHAIRMAN: I think the question was directed at damage rather than tripping. So even if it was in the "off" position, it can be damaged.
MR SHIEH: That I can see. But the way it came out actually --
THE CHAIRMAN: I think that was the question.
MR ZIMMERN: It was, yes.
A. Yes, it could be damaged.
MR SHIEH: Yes. So we can have several grades of, let's say, blowing -- let's talk about blowing of a light bulb. Sometimes a light bulb may be blown without causing a circuit breaker to trip.
A. Right.
Q. Sometimes it's blown in circumstances which carry with it a huge surge in electric current, in which case it would jump or trip --
A. Right.
Q. -- but in a normal way. So you can actually set it back.
A. Yes.
Q. Thirdly, there could be --
THE CHAIRMAN: Which circuit breaker are you describing?
MR SHIEH: Generally, one of those seven.

Page 79

THE CHAIRMAN: The one that's the nav light circuit breaker, or the individual one of seven?
MR SHIEH: Individual one. Individual one. I'm talking about the individual one of seven. Because the nav light one has to be very bad before that one would be triggered; correct?
A. Yes.
Q. Yes. One of the seven. We can have different grades of blowing of a light bulb.
A. Yes.
Q. A mild, normal case, only the light bulb blows, without tripping the circuit. That's a mild case, what I would call.
A. Yes.
THE CHAIRMAN: Just pause there. Do you agree with that?
A. Yes.
THE CHAIRMAN: And what would happen is if the indicator light was on, it would go out?
A. If the external lights are blown?
THE CHAIRMAN: Yes.
A. Then the indicator light will come on. Come off, sorry.
MR SHIEH: Switch off?
A. Switch off.
Q. Would switch off. And the buzzer would sound?
A. Right.

Page 80

Q. But the light may be blown in slightly worse circumstances, so that it comes with a high surge of current, so as to trip the circuit breaker into an open circuit?
A. Yes. Well, I think we all have similar experience even at home.
Q. Yes.
A. Because you can have a light bulb. Sometimes it's blown, and then you just replace the light bulb.
Q. Without tripping the box in your kitchen or your master box?
A. Without going to the distribution board and resetting the circuit breaker.
Q. I think was thinking about that, actually.
But sometimes the blowing of the light bulb carries with it the tripping of the circuit breaker, let's say, in the kitchen or somewhere.
A. That's right.
Q. In the master distribution box. So apart from replacing it, you actually have to go and switch it back to the "on" position again?
A. Yes.
Q. Sometimes it is so bad, as you have observed in the case of the Lamma IV, let's say the stern light or one of the two NUC lights, that not only has it jumped, it has

Page 81

jumped to such a case that it's actually no longer resettable?
A. That's right.
Q. So there are different grades of blowing of a light bulb that can occur?
A. Yes.
Q. In the first case, on Lamma IV -- in other words, near blowing of a light bulb, without tripping -- the buzzer would sound?
A. Right.
Q. But in the case where it's tripped, whether it is very badly tripped or just tripped, the buzzer will not sound?
A. In the worst case, yes.
Q. No, but merely by skipping, opening, it won't sound, the buzzer? For that light?
A. Opening of what?
Q. Let's say starboard. Let's take an example. Starboard. Starboard bulb only burnt, without tripping of the circuit, without tripping of the circuit breaker.
A. Then it will sound.
Q. In such a case, it will sound?
A. Yes.
Q. Next scenario: starboard light burnt; surge of current, so that the circuit breaker trips into an open circuit.

Page 82

A. Right.
Q. In such a case, indicator would switch off; correct?
A. Right.
Q. But the buzzer will not sound because the circuit breaker has tripped to an open circuit; correct?
A. It's possible, yes, but the chance is quite slim.
Q. Chances are quite slim? Because?
A. Because when I look at the rating of the circuit breaker, it needs quite a large current to trip open like that.
Q. Okay. But I'm saying that assuming that it is bad enough to cause it to trip --
A. It must be very bad.
Q. Yes. Then the worst scenario would be that it's actually non-resettable?
A. Right.
Q. I want to make sure that we are talking about the same thing. Because even if the circuit breaker were to trip, it can trip in such a way so as to be resettable?
A. Yes.
Q. But it can trip in a really worst case so as not to be resettable; correct?
A. Yes, in the extreme case. Yes.
Q. Yes, but in my simple mind, tripping can carry two consequences. One is resettable tripping; the other is

Page 83

unresettable tripping. Correct?
A. Yes.
Q. In either case, buzzer will not be on. Correct?
A. The resettable case?
Q. Both cases, whether it's resettable or unresettable, as long as it's tripped.
A. The circuit breaker?
Q. Correct.
A. Yes.
Q. But no buzzer?
A. No buzzer.
THE CHAIRMAN: I simply don't follow that, Professor. The starboard light fails. This is one of the seven lamps that has indicator lights. If that individual starboard light circuit breaker trips, are you saying that the audio doesn't sound? In which case, what on earth is the point in having the audio?
A. Well, that's why I said that the chance is quite slim. But if the fault of the light bulb was so serious that it trips the circuit breaker into a scenario which is, say, similar to what I've shown on figure 5 -- here, I've indicated that the 10-amp circuit breaker opens and the buzzer will not sound.
MR SHIEH: Professor, I know what you are trying to get at, but you are bringing in your experience as to the rarity

Page 84

of the tripping of the circuit breaker.
A. Yes.
Q. We know that it's a really bad case before the circuit breaker would trip to open. But I am asking you to assume that in maybe many out of 100 cases, the light would simply blow without tripping of any sort.
A. Right.
Q. Assume that is a normal case of blowing of a light bulb, let's say at home.
A. Yes.
Q. You just replace the light bulb; no need to reset anything.
A. Right.
Q. In that normal case of blowing of a light bulb, buzzer will sound; correct?
A. Right.
Q. In a bad case, and I know it's a bad case -- let's leave aside how bad it is. I know you say it's bad. Rare.
A. Yes.
Q. In a rare case, where the light bulb blowing out is because of, let's say, a huge surge in electrical current, then the light bulb will blow, causing the circuit breaker to jump and, once it jumps, the buzzer will not sound; correct?
A. Right.

Page 85

Q. Let alone how rare it is. I know you say it's rare. Forget about how rare, but we're talking about principles.
A. That's the reason why you have two ways of looking at the status of the lamp. One is the indicator, the other is the buzzer.
Q. Right.
A. So if it happened as what you described, a very bad case, a very bad fault --
Q. The buzzer will not go out --
A. -- the circuit breaker opens, but --
Q. But the indicator light would still be on if it is --
A. The indicator will be off, because there is no power supply altogether.
Q. Off, yes, I'm sorry.
A. So either audio or visual --
Q. Will be gone? Will be gone?
A. Both will be gone.
Q. I see. So I think that answers Mr Chairman's question. In the sense that the buzzer will only give out an audio warning in the case of a blown light if the blown light is not so serious as to cause a tripping of the circuit breaker; is that a way of putting it?
A. Yes.
Q. Because once the circuit breaker is tripped open, then

Page 86

no buzzer?
A. Right.
THE CHAIRMAN: I thought you told us earlier that that's not what happened, because there are these other sources of power coming from the other lights, which allows the audio alarm to work. Didn't you tell us that earlier?
A. The power to the buzzer will also come from other circuits as well. But the tripping open of this particular circuit breaker --
THE CHAIRMAN: Which circuit breaker are we talking about?
A. For example, for starboard.
THE CHAIRMAN: Starboard light, yes.
A. For the starboard light, the 10-amp circuit breaker was tripped open, then the power to that circuit would disappear. So there's no light, no indicator light.
THE CHAIRMAN: So the indicator light goes out, and the audio buzzer?
A. The audio buzzer would not sound because of this tripping open. But then if there are other faults in the remaining six circuits, the buzzer would still give out the sound.
MR SHIEH: Yes. I think what Professor Ho was trying to say is that even though one light, let's say starboard light, has blown really badly, so that the starboard circuit breaker opens -- no electricity going through --

Page 87

A. To that circuit.
MR SHIEH: -- no indicator light, no buzzer. It doesn't affect the buzzing of other lights --
A. Right.
Q. -- in case there is a normal blowing of a light bulb for the others.
A. Right. Unless that blowing opens also the master switch.
Q. I know, I know. Oh, I see.
A. Then that will be very, very bad.
Q. Yes. Yes. Because once the master switch, or, as we call it, the navigation light circuit breaker in the 24-volt box, which is the one under, once that one jumps, that is like cutting off the power from the power plant?
A. To all the -- yes.
Q. To all seven lights?
A. That's right, yes.
Q. So, looking at the matter this way, the buzzer does not actually provide a good deal of comfort if the surge in electrical power is bad enough to trip the circuit breaker of a particular light?
A. Right.
Q. Is that correct?
A. You cannot relay on it 100 per cent, put it that way.

Page 88

Q. So let's say if the coxswain is in the wheelhouse navigating, he has checked everything, okay, switching the switch to "2", for example, "battery", so lowering the risk of too high an electrical power if he had used "generator", okay, switched to "2", he switches on the buzzer --
A. Yes.
Q. -- he switches on the --
A. Indicator lights.
Q. -- indicator light button, doesn't dim it.
A. No.
Q. But if a light blows in circumstances which --
A. External lights, you mean?
Q. If the external light bulb blows, one of them, let's say starboard, were to blow, in circumstances so bad which carries with it a huge surge of current which causes the circuit breaker to jump or, in technical language, which causes the 10-amp breaker to open, that would first of all put out the external light?
A. Yes.
Q. But that would also disconnect that circuit, it would open that circuit, so that in the wheelhouse they would not know that that was what happened outside?
A. Right.
Q. Because they would not see the indicator light?

Page 89

A. No.
Q. And they would not be able to hear the buzzer?
A. No.
THE CHAIRMAN: They would know from the indicator light going out that the bulb had failed, would they not?
MR SHIEH: Yes, sorry. I see. Sorry.
By not seeing the indicator --
THE CHAIRMAN: Is that right?
A. Yes.
MR SHIEH: I'm sorry. Yes.
A. The indicator light will not be lit.
THE CHAIRMAN: But the other consequence --
A. But one point I forgot to mention is before we go into all this, we have to assume that the officers have tested the indicator lights are healthy. Because there's one button on the panel which --
THE CHAIRMAN: Test button?
A. Test button. They have to press the test button to light up the bulbs, to make sure they are healthy. And then you can rely on the lights, the indicator lights to indicate the status of the external lights.
MR SHIEH: Yes. Yes.
Sorry, it was my mistake. Mr Chairman is correct. The buzzer will not light, but the indicator light will not light up as well. So that is the only way in which

Page 90

somebody would be able to tell that an external light has gone off?
A. Yes.
Q. He can't rely on hearing; he would only have to rely on seeing that --
A. He cannot rely on hearing only.
Q. Thank you. He would have to notice that the corresponding indicator light has gone out. Thank you.
THE CHAIRMAN: Thank you, Professor, for assisting us with your evidence and in particular for doing so at very short notice, and fitting us in to your busy schedule. Your evidence is finished now, and you're free to go. Thank you very much.
A. Thank you. You're welcome.
(The witness withdrew)
MR BERESFORD: Mr Chairman, the next matter is for Dr Armstrong to return.
DR NEVILLE ANTHONY ARMSTRONG (on former oath)
THE CHAIRMAN: Thank you for waiting so patiently, Dr Armstrong. We're ready to resume your testimony.
A. Good morning, Mr Chairman, Mr Commissioner.
Examination by MR BERESFORD (continued)
MR BERESFORD: Good morning, Dr Armstrong. Perhaps the first place to start is just to pick up a couple of matters from yesterday where some documents have come in

Page 91

overnight.
At page 124, line 8 of yesterday's transcript, my learned friend Mr Mok said he would supply a copy of the IMO Standard relating to life-saving appliances. That may now be found in expert bundle 3, pages 1742-2 to 1742-4. I think we can see there at paragraph 2.2.1.2 the requirement that life jackets should be provided in three sizes.
But I think that you have provided us with a more authoritative version, which is the resolution MSC.207(81), which may be found in the same bundle at page 1742-6. Is that right, Dr Armstrong?
A. Correct, yes.
Q. We see the same provision over the page. Paragraph 2.2.1.2:
"Life jackets shall be provided in three sizes in accordance with table 2.1. If a life jacket fully complies with the requirements of two adjacent size ranges, it may be marked with both size ranges, but the specified ranges shall not be divided. Life jackets shall be marked by either weight or height, or by both weight and height, according to table 2.1."
Then we see the table at the top of the next page, with four columns headed "Life jacket marking", "Infant", "Child" and "Adult".

Page 92

In the "Infant" column, we see the user's size given as "less than 15 kg". A child, "15 or more but less than 43 kg". Adult, "43 or more". In terms of height: infant, "less than 100 cm"; child, "100 or more but less than 155 cm"; adult, "155 cm or more".
Then we see provision in paragraph 2.2.1.3 for large persons, and the requirement for suitable accessories. In paragraph 2.2.1.4:
"The in-water performance of a life jacket shall be evaluated by comparison to the performance of a suitable size standard reference life jacket, ie reference test device (RTD) complying with the recommendations of the Organisation."
And there's a reference in the footnote to resolution MSC.81(70).
Then we have certain parameters set out in paragraph 2.2.1.5:
"An adult life jacket shall be so constructed that:
.1 at least 75% of persons who are completely unfamiliar with the life jacket can correctly don it within a period of 1 minute without assistance, guidance or prior demonstration ..."
THE CHAIRMAN: What do you understand to be the conditions in which that is to be fulfilled?
A. My understanding is it's done inside a room which is

Page 93

stationary.
THE CHAIRMAN: Yes. Not done on a vessel that's tilting in the dark?
A. Correct.
MR BERESFORD: At .2:
"after demonstration, all persons can correctly don it within a period of 1 minute without assistance;
.3 it is clearly capable of being worn in only one way or inside-out, and, if donned incorrectly, it is not injurious to the wearer;
.4 the method of securing the life jacket to the wearer has quick and positive means of closure that do not require tying of knots ..."
THE CHAIRMAN: The ones on Lamma IV required knots, did they not?
A. That is my understanding, yes.
MR BERESFORD: Does the provision of tapes necessarily imply a requirement of tying of knots?
A. That was why I worded my response the way I did when I said "that's my understanding". I don't know the answer to that question.
I would also comment that I don't know when this requirement in subparagraph .4 came in. I think it may have been 2006, in May. Before that, it may have been acceptable to have tapes.

Page 94

THE CHAIRMAN: We have the life jacket, or one of them, if you need to confirm that it needs to be secured by tying a knot.
A. Yes. I can't imagine how else you could get the tapes to go --
THE CHAIRMAN: No. With tapes. No.
Yes, Mr Beresford.
MR BERESFORD: ".5 it is comfortable to wear; and
.6 it allows the wearer to jump into the water from a height of at least 4.5 metres while holding on to the life jacket, and from a height of at least 1 metre with arms held overhead, without injury and without dislodging or damaging the life jacket or its attachments."
Then there are buoyancy requirements set out in paragraph 2.2.1.6.
At paragraph 2.2.1.7, there's this requirement:
"An adult life jacket shall allow the person wearing it to swim a short distance and to board a survival craft."
Paragraph 2.2.1.8 makes provision for infant or child life jackets. It says:
"An infant or child life jacket shall perform the same as an adult life jacket except as follows:
.1 donning assistance is permitted for small

Page 95

children and infants;
.2 the appropriate child or infant RTD shall be used in place of the adult RTD ..."
THE CHAIRMAN: What's an RTD, Dr Armstrong?
A. It's a "reference test device". It is a standard life jacket.
THE CHAIRMAN: Thank you.
MR BERESFORD: ".3 assistance may be given to board a survival craft, but wearer mobility shall not be reduced to any greater extent than by the appropriate size RTD."
Then in paragraph 2.2.1.9, it says:
"With the exception of freeboard and self-righting" --
THE CHAIRMAN: I don't think we need to go through all of this. We can pursue this later.
Unless there's something particular, Dr Armstrong, you want to draw to our attention?
A. I would like to draw to your attention, Mr Chairman, that these are for seagoing ships, seagoing life jackets where you may be anticipated to survive in the water in quite bad weather conditions.
THE CHAIRMAN: Where do we pick that up?
A. That is what a SOLAS life jacket is defined to do. SOLAS is for a vessel on an international voyage, which

Page 96

implies deep water.
THE CHAIRMAN: Thank you.
A. And I'm not convinced that the standards here are necessarily suitable for Hong Kong. They may be too high a standard. But that is, of course, not for me to judge.
THE CHAIRMAN: Yes.
MR BERESFORD: So when you were talking yesterday about coastal life jackets, you would expect some of the standards to be relaxed somewhat?
A. Correct.
Q. That's no doubt something that can be looked into.
Then overnight, in response to the Chairman's question, you have produced a further report, have you not, dated 6 March 2013, which is at page 1804 of expert bundle 3? "Report on the distance between two vessels using Mardep radar data."
A. Correct, yes.
Q. You've reproduced the locations that you took from the source in appendix A, and that simply sets out the time, the label of the vessel as contained in the Mardep spreadsheet, and the positions in latitude and longitude. These are all radar positions, as I understand it?
A. Yes. That was the input to my calculation.

Page 97

Q. With the assistance of an Australian government geoscience department spreadsheet, which you've referenced at page 1805 of your report, you have set out a table at page 1806 giving the times and the distance apart in metres in one column, and nautical miles in another column.
A. Correct, yes.
THE CHAIRMAN: So from a radar perspective, on Lamma IV, the vessels came within 1 nautical mile by 20:18:41?
A. Correct.
THE CHAIRMAN: And from Sea Smooth's perspective of three-quarter-mile radar, they came within that range by 20:19:08?
A. Correct.
MR BERESFORD: I don't propose to go through all the background data, but I will also note that you have prepared a graph of the distance between the two vessels for the three minutes before the collision at page 1807. And at page 1808, you have made a comment on the accuracy. You conclude that the accuracy must be somewhere between 2 and 10 metres?
A. Correct.
THE CHAIRMAN: Thank you for doing that at our request, Doctor.
A. Thank you.

Page 98

MR BERESFORD: Then also in expert bundle 3, you have produced an additional document at page 1742-16. I'm sorry, I'm going backwards. It should be starting with page 1742-13. Could you explain where this comes from, please?
A. Yes, sir. This is in response to Mr Chairman's question about what are the requirements for seat foundations in Australia.
Q. Yes.
A. In fact, at the present time, technically speaking, there are no requirements for seat foundations in the Australian regulations. There may be in some of the state regulations. But this is a draft of proposed regulation, and I am on the committee that is drafting this. Which is why you see at the top something like "Query: Which clause?" It is a working document. But I thought it would be worthwhile to show, a little further down the page, that in fact it is a very similar table to what I have proposed in my report part 2. That's not entirely coincidental, since I am on the working party.
It talks about consideration and acceleration level of 0.2 G as being the design value for seat foundations.
Q. Yes. Thank you.
Then at page 1742-14, we have an extract from the

Page 99

Australian -- is it -- National Standard for Commercial Vessels?
A. Correct, yes.
Q. This appears to relate to the source of emergency electrical power?
A. Correct.
Q. Would you like to draw our attention to the parts of this that you consider to be relevant?
A. If we can scroll up to just the boxed item. I think it's all contained within the box, Mr Beresford.
Q. So this 5.9.1 says:
"Design and location.
An emergency source of electrical power shall be self-contained. Unless otherwise provided for in clause 5.10.3, the emergency source of electrical power, including any fuel required to supply that source, shall comply with the following:
(a) It shall not be located forward of the collision bulkhead.
(b) It shall be located above the weather-tight deck, or where there is no weather-tight deck then above the waterline, and shall be accessible from the open deck.
(c) It shall be located so that a fire or other unplanned occurrence in the propulsion machinery space

Page 100

will not interfere with the supply or distribution of emergency power outside that space.
(d) The space in which it is located shall be --
(i) protected from exposure to moisture; and
(ii) provided with ventilation sufficient to enable the emergency power source to operate at full power."
A. And I would confirm, Mr Beresford, that this would apply to what in Australia we call a class D vessel.
A class D vessel is one certified to operate in partially smooth waters, which is defined as having waves less than 1.5 metres in height for 90 per cent of the time, and I think that is, from my knowledge, approximately the conditions in Hong Kong waters.
THE CHAIRMAN: Yes. We've received some evidence to that effect. 1.5 metres, I think, resonates with the evidence we've received.
A. Right. So I think this is directly applicable to what I was proposing for consideration in regulations here.
MR BERESFORD: Thank you. Then at page 1742-15 to page 1742-16, we have another extract from the Australian National Standard for Commercial Vessels.
This is headed "Table 2 -- Scales of safety equipment for class 1 vessels". I take it you wish to refer to the section relating to life jackets at the top of page 1742-16?

Page 101

A. Correct, yes. The table shows a number of different classes, but 1D is relevant, as we have just discussed. For life jackets, it's suggesting for 1D "Coastal for 100% complement", and it says "yes" on that line.
Q. Yes, I see.
A. It's interesting that there is no mention there of children's life jacket, just "Coastal for 100% complement". But I would also point out that on the previous page, it's also a requirement to have buoyant appliances, I think it's also for 100 -- just scroll up a little, please. Thank you. You'll see there is a line there, "Life rafts", which I'll come back to, and then another line, "Buoyant appliances (general)". And for a 1D craft greater than 25 metres, you're required to carry a dinghy and then sufficient buoyant appliances for 100 per cent complement. Buoyant appliances are basically just a rectangular cork float, for want of a better description, something to which people can hold on to. So as well as the life jackets, there's support.
You can also see from the table above that, headed "Life rafts and rescue boats", that there is no requirement for a life raft for a 1D vessel. In Australia.
THE CHAIRMAN: Remind me: 1D being a vessel that operates in seas up to 1.5 metres?

Page 102

A. Correct.
THE CHAIRMAN: But no designation as to the number of people it carries?
A. There is a limit of 399, sir.
THE CHAIRMAN: Thank you.
MR BERESFORD: If there are 400 and above, then more stringent conditions apply; is that right?
A. Correct, yes. It's treated more as a SOLAS-type craft, which brings you to table 1A. It's dealt with elsewhere.
Q. Yes. Thank you.
A. All the information on the Australian regulations is readily available on the internet.
MR BERESFORD: Then there was one other question that you were going to look at, and that was the position in New Zealand relating to the attachment of seats. Did you manage to find anything on that?
A. I have attempted to, Mr Beresford, but I have been somewhat frustrated by the fact that the government website in New Zealand appears to be down at the moment. I'm not sure why.
THE CHAIRMAN: There's a Test match on, perhaps.
A. I'm sure you're right, Mr Chairman.
THE CHAIRMAN: There is, and England aren't doing very well.
MR BERESFORD: Probably responsible for blacking out the

Page 103

communications.
Returning, then, to your report, your main report on part 2 at page 1655, issue (xi), headed "Built in accordance with the approved plans". The issue that you've identified in paragraph A-68:
"there may be a lack of communication between the drawing approval process and the survey process."
You've noted that the current requirements are "unclear".
Your consideration 20 suggests:
"That the certificate of survey or certificate of inspection contains a statement signed by the surveyor that the vessel has been built in accordance with the approved plans."
A. Yes.
THE CHAIRMAN: Yesterday, I asked that we be reminded of the page numbers of the drawings that come from Hongkong Electric of the vessel as-built.
MR BERESFORD: I've got those, Mr Chairman, and for your reference, they are at RSRB2, page 1531. But the question of as-built plans is a different issue which in fact Dr Armstrong deals with at B-24.
THE CHAIRMAN: Just give us a moment to locate this first.
So what is the difference between as-fitted and as-built, Dr Armstrong?

Page 104

A. No essential difference as far as I'm aware, Mr Chairman.
THE CHAIRMAN: Thank you.
MR BERESFORD: Now, we've heard from some surveyors that even if the vessel had not been built in accordance with the approved plans, they would have approved it anyway for one reason or another. Is that satisfactory, in your view?
A. I think you're correct, yes.
Q. Is that satisfactory, in your view?
A. Oh, is it satisfactory? Could you just repeat the question, please?
Q. Yes. We've heard evidence from various surveyors to the effect that even if the vessel had not been built in accordance with the approved plans, they would have approved it anyway --
A. Yes.
Q. -- for one reason or another?
A. I remember that being stated, yes. Not very satisfactory, in my opinion.
THE CHAIRMAN: Could you give me a reference to the transcript for one of those witnesses?
MR BERESFORD: I have in mind Mr Wong Chi-kin.
THE CHAIRMAN: Yes. Do you have a reference?
MR BERESFORD: I don't have a reference to hand, no.

Page 105

THE CHAIRMAN: Perhaps you'd come back to me on that.
MR BERESFORD: Yes, I will.
I think we probably covered this yesterday, Dr Armstrong, but the upshot of your evidence is, as I understand it, that if a vessel is not in accordance with approved plans, then plans should be resubmitted and reapproved --
A. I believe that should happen, yes.
Q. -- to reflect the changes and reflect what is ultimately approved?
A. Yes.
Q. Then going on to issue (xii).
THE CHAIRMAN: Before you do that -- issue (xii) being?
MR BERESFORD: Professional development.
THE CHAIRMAN: Right. Well, could you help us as to these plans that Hongkong Electric have given us?
A. Of course.
THE CHAIRMAN: Reed Smith Richards Butler bundle, page 15 onwards.
Really, the issue is this. The plans that were approved show watertight bulkheads on various plans for this frame 1/2 structure. Is there anything in these plans that indicates that in fact it's been built with an open access and the hitherto watertight bulkhead is not of that status?

Page 106

A. If you give me 30 seconds, please, Mr Chairman.
THE CHAIRMAN: Yes. Take all the time you need.
I'm reminded that we've reached 1 o'clock, so perhaps that's a question that you can respond to after lunch. That might give you a little bit longer to --
A. I think I am in a position to answer right now, Mr Chairman.
THE CHAIRMAN: Please answer.
A. There are no construction or structural drawings in this bundle I have in front of me. However, there are two drawings which do state the bulkhead to be watertight.
THE CHAIRMAN: And they are?
A. Shown at page 1533.
THE CHAIRMAN: The name of that drawing?
A. "Rudder and rudder stock details". Top left-hand corner of the drawing.
THE CHAIRMAN: Sorry, you said the top?
A. Left-hand corner, where it says "bottom plan (partial)". It does not reproduce on the screen very well, but the corrugated bulkhead, the zigzag line going up the page, has "watertight bulkhead" written on it. Maybe it's not "watertight". Maybe it's a bulkhead.
THE CHAIRMAN: Perhaps we ought to give you more time to look at them, and we will take our lunch break now and come back to that this afternoon at 2.30.

Page 107

We'll adjourn now until 2.30 this afternoon.
(1.03 pm)
(The luncheon adjournment)
(2.30 pm)
THE CHAIRMAN: Good afternoon, Dr Armstrong.
A. Good afternoon.
THE CHAIRMAN: Are you able to help us, then, with the question posed before lunch, namely whether there was anything on the drawings provided by Hongkong Electric marked "as fitted" that indicates in any way that the frame 1/2 described in the earlier approved plans as "watertight bulkhead" had not been built as a watertight bulkhead?
A. Thank you, sir. May I talk you through each drawing?
THE CHAIRMAN: Please do.
A. I refer to drawing 1532.
THE CHAIRMAN: That's the one marked "Shafting arrangement and detail"?
A. "As fitted".
THE CHAIRMAN: "As fitted", yes.
A. In the top left-hand corner, there is a reference to "corrugated bulkhead". It does not specifically say "watertight", but it is "corrugated bulkhead", which would indicate, without any other evidence to me, that it was watertight. It is similar to the bulkhead

Page 108

further forward. It is similar to the bulkhead on frame 4, a little further forward, which uses the same words.
THE CHAIRMAN: Yes.
A. On the following drawing, 1533 --
THE CHAIRMAN: Just give me a moment. 1533?
A. 1533.
MR BERESFORD: Pardon me for interrupting, Dr Armstrong, but page 1532, that's a drawing of the "Shafting arrangement and detail". If the bulkhead at frame 1/2 was not intended to be watertight, would you have expected it to have been so marked on such a plan?
A. On this drawing, Mr Beresford, no. I cannot say that. I merely notice that it is marked in exactly the same way as the bulkhead on frame 4.
THE CHAIRMAN: Namely "corrugated bulkhead"?
A. Namely "corrugated bulkhead".
MR BERESFORD: So, page 1533 you were moving on to?
A. 1533. I find this very hard to --
THE CHAIRMAN: This drawing is?
A. I'm sorry. "Rudder and rudder stock details (as fitted)". You'll see in the top left-hand corner a plan view of the corrugated bulkhead. It has some words written at the top. I can make out "BHD", but I cannot tell what is before that. I think it's "WT". Only the

Page 109

left part of the "W" is obvious.
In any case, from the --
THE CHAIRMAN: Mr McGowan, did Hongkong Electric not produce the originals of these?
MR McGOWAN: We did, yes.
THE CHAIRMAN: Are they available?
MR McGOWAN: They're probably back in the office, but we'll try and get them here this afternoon.
THE CHAIRMAN: Thank you very much.
A. I would expect in this drawing, if there was a door, that that would be shown on this drawing as an arc with a line on it, signifying an opening door.
I also believe --
THE CHAIRMAN: Just give me a moment. So if there was a door at that place, you'd expect it to have been marked?
A. I would expect it to have been marked.
THE CHAIRMAN: Thank you.
A. I'd also --
MR BERESFORD: Can I draw your attention, please, to the letter from Cheoy Lee to Mardep at marine bundle 2, page 231. This is not as built or as fitted, but this is the plan that was finally seen by Mardep. The bottom plan appears to be a bit clearer.
A. Yes, somewhat clearer.

Page 110

THE CHAIRMAN: And it is marked as "WT BHD", is it not?
A. Yes.
MR BERESFORD: And that plan is stamped "approved". So that's the approved plan, albeit not the as-fitted or as-built plan.
A. Correct. And I believe the as-fitted is substantially similar; I just can't clearly read it. Whilst we have that plan available, could we go to the top left-hand corner. On the left-hand side, you may see two figures, 450, as being a distance from the centreline.
THE CHAIRMAN: Yes.
A. I don't wish to refer those numbers particularly, but to the right of that is the transom which runs vertically on the page. Fitted to that vertical black line at the back end of the boat, there is a number of what look like Ts, the figure T, lying on their side. They signify stiffeners running vertically on the boat. Then running to the right of the page, of those Ts, there are two lines that suddenly become one line. Have I expressed myself adequately? Running across the page, there are some lines.
THE CHAIRMAN: Yes.
A. When they meet the bulkhead, the watertight bulkhead at frame 1/2 -- these are representatives of stiffeners on the bottom of the boat. When they meet the watertight

Page 111

bulkhead, they become an angle. They're what we call sniped, they're cut back. Because that is how you fit a stiffener to a watertight bulkhead. If this was not a watertight bulkhead, it would make no sense to finish those stiffeners; you would just run them through a hole in the bulkhead. There is a lot of extra work involved in sniping those bottom stiffeners to make it watertight. I have referred to this before, Mr Chairman.
THE CHAIRMAN: Yes.
A. But this drawing clearly shows those sniped stiffeners. So that's an indication to me this is indeed a watertight bulkhead.
THE CHAIRMAN: Because there would be no need to fit them if it was not?
A. Correct. And there's a lot of extra work in doing it.
THE CHAIRMAN: Yes?
A. Drawing 1534.
THE CHAIRMAN: Which is the "Shaft strut"?
A. "Shaft strut (as fitted)", my drawing is marked.
THE CHAIRMAN: Yes.
A. At the bottom of the drawing on the left-hand side, we can see the corrugated bulkhead there and it's clearly marked "WT bulkhead". Again we have the sniped stiffeners in the bottom.

Page 112

A little further up the page in the profile view, it says, I believe, "corrugated bulkhead".
THE CHAIRMAN: Yes.
A. We now come to a number of schematics.
THE CHAIRMAN: Just pause a moment, if you would be kind enough.
MR McGOWAN: Can I just ask, in view of Dr Armstrong's comments on pages 1533 and 1534, whether you'd still want to see page 1532, which was the first one we looked at, where "WT" was not discernible on the scanned copy?
THE CHAIRMAN: I think we should see the one that is in the possession of Hongkong Electric, yes.
MR McGOWAN: Certainly.
THE CHAIRMAN: Dr Armstrong, back to you.
A. Looking at drawing 1535, which is titled "Domestic freshwater and saltwater schematic piping diagram (as fitted)".
I accept that these are schematic drawings and therefore not necessarily representative of the exact structure of the vessel, but nevertheless they do appear to have been drawn on an underlying background of the vessel with its bulkheads. I note that the bulkhead on frame 1/2, on all three views here, is shown as a solid line which would indicate to me this was a watertight bulkhead. If there had been a door in it, I would have

Page 113

expected to see an arc with a line on, representing a door half-open. If there had been an opening in it, I would have expected to see two triangles, as we have seen in other drawings.
MR BERESFORD: Dr Armstrong, you say all three drawings, but the main deck drawing has a dotted line.
A. Correct, yes. But it is representative of the bulkhead on the other side of the deck.
Q. Yes. And the solid lines are shown in the below main deck drawings?
A. Correct.
THE CHAIRMAN: Yes.
A. We have a similar situation on drawing 1536, which is titled "Hydraulic steering gear piping system". However, in this drawing, there is an opening shown on the middle representation, middle plan. If you are able to zoom in at the after end.
THE CHAIRMAN: The two triangles, the apex of each pointing at the other?
A. Correct. And I believe that has been deliberately put in, because the pipes are shown in the view above as running just above that opening. But I would comment it would be very hard for the owner to notice those two triangles and make a conclusion there was an opening there.

Page 114

THE CHAIRMAN: Thank you.
A. I'd then like to refer you to page 1543.
THE CHAIRMAN: That is the "Fuel oil piping diagrammatic"?
A. "As fitted", correct. Which just shows a straight line at frame 1/2. Probably no conclusions can be drawn from that, except as a naval architect, I would assume that was watertight. There's nothing to indicate the contrary.
THE CHAIRMAN: Thank you.
A. Drawing 1544, titled "Fire line & bilge piping diagram (as fitted)". It's a similar situation with a solid bulkhead shown.
THE CHAIRMAN: Yes.
A. And drawing 1545, titled "Saltwater engine cooling piping diagrammatic (as fitted)". Also shows a solid line which I would take to mean a watertight bulkhead.
THE CHAIRMAN: Yes.
A. That concludes all of the as-fitted drawings that I have in this file.
MR BERESFORD: There's one more at page 1546, Dr Armstrong.
A. Yes, there is. Page 1546 is basically the general arrangement, Mr Beresford, and shows the opening in the bottom left-hand corner. "Docking plan (as fitted)", this is titled.
Q. Yes. I was going to say, this is called "Docking plan".

Page 115

What's the difference between docking plan and general arrangement?
A. Not a lot, Mr Beresford. It is usually a general arrangement on which additional information is added to help somebody who is docking a boat, for example the position of the zinc anodes, you can see in the bottom, and quite often there will be heights and widths. You can see some widths shown on the right of the plan, showing how far apart the propellers are. And I would expect to see -- I've just spotted something else too. You would expect to see vertical heights given of the underside of the keel.
I draw your attention to immediately below the propeller.
THE CHAIRMAN: Yes.
A. Where it's "WT bulkhead".
THE CHAIRMAN: Yes. Apparently with reference to the dotted line that lies at the top of the propeller blade?
A. There would be no other interpretation, Mr Chairman, yes, I believe so.
MR BERESFORD: Is that not the same annotation as appears below frames 4, 9, 13 and 18?
A. Thank you, Mr Beresford. Yes, it is.
THE CHAIRMAN: Thank you.
MR BERESFORD: Mr Chairman, you asked for the reference to

Page 116

Wong Chi-kin's evidence in the transcript.
THE CHAIRMAN: Yes.
MR BERESFORD: The reference is Day 17, page 34, line 1.
THE CHAIRMAN: Perhaps you'd just read out what you say is relevant.
MR BERESFORD: He said:
"The owner/builder of vessel is expected to build the vessel in accordance with the approved plans. However, this does not mean that if there is any aspect of the vessel which departs from the approved plans, a certificate of survey must necessarily be denied."
That was a quotation from his statement.
THE CHAIRMAN: Yes.
MR BERESFORD: Then a little further down, at line 12, he said:
"For example, if a bulkhead which is shown to be watertight on the approved plans turns out not to be watertight, such alteration will be disallowed unless the absence of the watertight nature of the bulkhead would in no way compromise the safety of the vessel. This could be determined by examining the shipyard's submission of its calculation of floodable length or damage stability."
THE CHAIRMAN: Thank you.
MR BERESFORD: Mr Chairman, it's important also to take into

Page 117

account his evidence at pages 83 and 84, starting at page 83, line 20.
THE CHAIRMAN: Yes.
MR BERESFORD: I asked him in further examination:
"Question: At the time when you were inspecting the plans, you did not treat the bulkhead at the aft of the engine room, the bulkhead between the engine room and the tank room, as the aft watertight bulkhead?
Answer: Yes."
Question: Because the bulkhead behind that, further aft, between the tank room and the steerage gear compartment, was marked on the plan as being watertight?
Answer: Yes."
THE CHAIRMAN: Yes. Thank you.
MR BERESFORD: Dr Armstrong, that concludes issue (xi), "Built in accordance with the approved plans", I think.
We move on to your issue (xii), headed "Ongoing professional development of Marine Department Ship Surveyors and Inspectors". Here you identify the issue as being:
"As outlined in paragraph 3 of this report, during the time of construction of Lamma IV (1995) there was reliance on passing on knowledge from more experienced persons (on-the-job training) without necessarily backing this up with more formal professional

Page 118

development."
Your consideration 20 that you propose in this regard is:
"That opportunity be provided for the ongoing formal professional development of ship surveyors and ship inspectors within the Marine Department, in addition to their on-the-job training."
I'm not sure there's much more that can be said about that. So unless you have anything to add, Dr Armstrong, then I'd propose to move on to the next issue.
A. Perhaps I should say I am not familiar with whether they actually do have that opportunity at the present time, but it was apparent when Lamma IV was being built that they did not.
Q. Yes. What's the position in the UK and Australia, if you know?
A. There are courses run, I know, in the UK because I used to be a UK surveyor, and also in Australia. There are surveying courses run by various organisations, and the opportunities to spend time with classification societies, and the opportunities visit other organisations, other authorities, I should say, in other countries, to exchange ideas.
Q. Then your last issue in part A of your report is issue

Page 119

(xiii), headed "Voyage Data Recorders". You describe the issue as follows. You say:
"There has been some difficulty with understanding the exact situation between the two craft involved in the collision in the period immediately before the collision."
Can you clarify what you mean by that exactly, Dr Armstrong? You say "There has been some difficulty with understanding the exact situation". Do you mean that the craft themselves and their crew didn't understand the exact situation?
A. No, Mr Beresford. I was merely referring to an observation that there had been considerable discussion about whether one boat was where it said it was, or people thought it was, where the two boats were relative to one another, and the relative bearings of them. It struck me that there were methods by which the exact locations of something could be known and may be of value following an accident. I'm not suggesting voice data recorders are of much value if there is no accident. I don't think it's an operational tool. It's something that is useful in case there is a problem.
THE CHAIRMAN: What information would be recorded on such a device?
A. There are two standards for VDRs, Mr Chairman. One of

Page 120

them that I'm recommending is simplified voyage data recorders. In the appendix to my report, it actually does list out exactly what is recommended to be recorded. Of course, like black boxes on aircraft, you can actually record whatever you want to. But in this case there are recommendations, I remember, for speed and heading and course.
MR BERESFORD: Could you just help us with that, please, Dr Armstrong. Appendix IV, which you've referenced in consideration 22 starts at page 1681. But I wasn't able to identify these two documents that you refer to. I just wonder if they've got left out somehow, or if I'm looking at the wrong thing.
A. I understand your comment. They appear to have been omitted, Mr Beresford.
THE CHAIRMAN: We can add them. But you say one is a simplified version, and that's the one you're recommending: speed, heading, course over the ground?
A. My apologies, Mr Chairman. The wrong annex is in the report. There is not a lot of information in it, but I think there are about six things that are suggested to be recorded. I can only remember those three.
THE CHAIRMAN: And would the information come from a GPS?
A. Usually, yes.
THE CHAIRMAN: Yes.

Page 121

Yes, Mr Beresford.
MR BERESFORD: So your proposed consideration 22 is as follows:
"It is suggested that consideration be given to the fitting of voyage data recorders to all class I ferries and launches carrying in excess of 100 passengers, similar to those devices (VDRs) required for SOLAS passenger craft. IMO has published two relevant documents, resolution MSC.163(78) dated 17 May 2004 covering simplified voyage data recorders (S-VDRs) and assembly resolution A.861(20) adopted 27 November 1997 titled Performance Standards for Shipborne Voyage Data Recorders (VDRs)."
Perhaps you can provide us with copies of those documents in due course.
A. Yes.
THE CHAIRMAN: Are these devices ever used for enforcement purposes?
A. I do not know, Mr Chairman.
THE CHAIRMAN: For example, the observance of speed limits?
A. Yes, I'm not aware of anything.
THE CHAIRMAN: Yes.
MR BERESFORD: So that concludes part A of your report, Dr Armstrong.
Then we come on to part B.

Page 122

A. Mr Beresford, if I may just add something to the Chairman's remark?
MR BERESFORD: Yes, please do.
A. I am aware, Mr Chairman, they have been used to prove where a vessel has come from, what country a vessel has come from. So the answer could be "yes" to your question.
THE CHAIRMAN: Thank you.
A. Sorry, Mr Beresford.
MR BERESFORD: Well, it's inevitable that they would be used for such purposes, isn't it?
A. I suspect so.
Q. If the information is there, it will be used.
"Part B: Current Safety Issues not related to the loss of Lamma IV."
You've listed out a number of issues here, numbered from (xiv) to (xxviii), picking up various things that you've noticed in the course of your engagement in this case.
A. Some of which are quite trivial but I thought I would document.
Q. Yes. Perhaps we can just run through them quickly then.
Issue (xiv) is headed "Plan approval". The issue that you've identified is section 7 in Cap 548G defines the term "plan", contains a definition, but the term is

Page 123

also used in several other places without definition for example section 22, section 76 and schedule 3.
So in consideration 23, you've suggested that the definition be moved to section 2, the general interpretation section, so that unless the context otherwise requires, "plan" would include drawings, details, diagrams, calculations and other documentation.
A. Yes, sir.
Q. Then another issue in relation to plan approval relates to section 9 of Cap 548G, which requires the approval of stability, but you point out the meaning of the term "stability" is not defined.
"... specifically in this context it is unclear whether it means intact stability or damage stability or both."
A. Yes.
Q. So in consideration 24, you suggest:
"That the term 'stability' be clarified. I believe that it should include a reference to both intact and damage stability."
A. Yes.
Q. Also under the head "Plan approval", a third issue arises in relation to section 9 of Cap 548G, in that section 9(1)(i) contains, in your view, too many disparate systems in the phrase "fuel, machinery,

Page 124

shafting and electrical systems".
A. Yes.
Q. So in consideration 25, you suggest that this be separated out into five separate subsections. Firstly:
"Fuel system including pipework and tank details."
THE CHAIRMAN: I don't think we need to go through each item. It's obvious what they are.
MR BERESFORD: Very well, Mr Chairman.
THE CHAIRMAN: We're very grateful you've condescended to such great particularity, and no doubt in due course this will be thought-provoking for those that have to give more detailed thought to how to implement an improvement in systems, but for the purposes of the Commission, our recommendations, if any, are going to be broader-based, as you'll appreciate.
A. Yes, sir.
MR BERESFORD: You've also noted, in section 9, the same section, the absence of any reference to radio communications, including VHF, which is a matter that arises out of our experience with Lamma IV.
You've proposed that section 9(1), as well as section 13(4)(i), be modified to read "navigational and communication equipment, including radio communications, lights, shapes and sound signals".
A. Yes.

Page 125

Q. That is your consideration 26.
You've also noted:
"Section 9(1) does not contain any information that [prescribes] the vessel shape."
So consideration 27 is the suggestion that there is an addition of subparagraph (p), a lines plan.
Paragraph B-6 of your report raises a question of interpretation of schedule 2 to Cap 548G. You've suggested that this be clarified as to -- I think you mean whether they are alternative or cumulative.
A. Correct, yes.
Q. That's your consideration 28.
At paragraph B-7 -- I think that's really -- consideration 29 is really the same issue as consideration 28.
A. It is.
Q. Paragraph B-8 of your report, you've noticed in the code of practice, at page 3447 of our bundle, chapter II, section 4.2, the term "not classed vessel", you say, is confusing when under the regulations local vessels are divided into classes I, II, III and IV.
On the assumption that this refers to an approval process not being done through a classification society, you've suggested that that term be deleted and replaced with "vessel not classed with a classification society".

Page 126

A. Yes.
Q. That's your consideration 30.
The next issue relates to plan approval by classification societies, and you've noticed:
"Plan approval by a classification society (attracting a once-off fee) is not the same thing as the vessel being constructed to class society requirements and receiving a classification certificate, which attracts annual fees."
The code of practice in chapter II, section 4 perhaps doesn't make it clear which is required.
A. I think this is quite an important point, because I'm not sure what is meant when it says "vessels that are classed". To me, something that is classed means that plan approval is done by the class society, the survey is done by the class society, and the ongoing maintenance and survey of the vessel is done by the classification society, and thereby the owner reaps the rewards from the insurance point of view of having it held within class.
But I think that is a different meaning to what is written in the code of practice, but I'm a little unsure what is meant by the code of practice. It is also possible to get the drawings approved by class and then get it surveyed within Marine Department, I believe -- I

Page 127

could be wrong -- and in that case the vessel could not be thought of --
Q. Sorry, I didn't catch that, Dr Armstrong. You believe? Oh, but could be wrong. Okay.
A. In that case, I would not consider the vessel to be classed at all.
Q. So your consideration 31 is that the code of practice should be clarified as to what is meant by "classed" and "not classed" on an ongoing basis?
A. And I'm sure the Marine Department have got this to work in some way, and they perhaps understand what they mean, but I would like to see that obvious to everybody.
Q. Yes. Then paragraph B-12, you've noticed in chapter II, sections 4.2 and 4.3, a term "marked with @" --
THE CHAIRMAN: I don't think we need to condescend to that detail, Mr Beresford.
MR BERESFORD: Very well.
The next heading, issue (xv) is headed "Life-saving". You refer to Cap 548G, schedule 3, section 3, which contains "requirements for plans to be kept on board". And although it's headed "Provision of life-saving appliances", this paragraph includes several other matters, including fire-fighting apparatus, navigational equipment and stability. This is your view:

Page 128

"These items should be moved to the appropriate sections rather than listed under life-saving appliances ..."
A. Yes, sir.
Q. "... otherwise there is the risk of them being missed."
So that's your consideration 33: to add a new section to the schedule.
The next issue arises in relation to Cap 548G, schedule 3, part 2 in table 4 and table 6, and concerns the carrying of rocket parachute flares. You note:
"... there is no such requirement [in relation to] class I (passenger-carrying) craft ..."
So consideration 34 is:
"Given the very low cost of flares and their ability to attract attention ... I would suggest that they be required for class I craft as well."
A. I was very surprised, Mr Beresford, they weren't included. As well parachute flares, I should have added orange smoke and handheld flares, which are certainly required for class I craft in other countries.
THE CHAIRMAN: On this occasion, if parachute flares had been on board, that would have enabled those on Lamma IV to light up the night sky so it would be apparent where people were in the vicinity of the vessel.
A. Indeed. That's one of the purposes of them.

Page 129

THE CHAIRMAN: And similarly would have allowed Lamma II to do the same thing when she arrived on the screen.
A. Yes.
THE CHAIRMAN: And if Sea Smooth had stayed on the scene, she could have done likewise?
A. Yes, sir. The reliance on mobile phones to call somebody up and say there's a problem is not very satisfactory at all because there's only one person receiving a mobile phone call. Whereas a parachute flare lets everybody know in the immediate vicinity.
THE CHAIRMAN: And is very distinctive.
A. Indeed.
MR BERESFORD: Well, the point about reliance on mobile telephones is a point that I wanted to highlight, because that also relates to the VHF issue.
A. Yes.
Q. It appears in the present case that there was reliance upon mobile telephones. In fact, there's even, I think, some guidance that mobile telephones can be used in case of an emergency. And there was no VHF on board the Lamma IV.
A. No.
Q. You make the point here that the reason mobile phones are not to be recommended is because the nearest rescuers would not be aware of the need for assistance.

Page 130

A. Correct.
Q. As with flares, so with VHF: if an emergency call, a mayday, is put out on VHF, then all of the vessels in the vicinity will be aware of it.
A. Should be, yes.
THE CHAIRMAN: And there is a requirement for flares in both Australia and the United Kingdom for vessels of the size and carrying capacity of Lamma IV and Sea Smooth?
A. I have checked up on that, and that is the case, yes.
MR BERESFORD: Your next issue relates to noise on board, and you've noticed that the maximum noise level specified in section 74 in Cap 548G is a very high value and represents the upper limit of damage to hearing without protection.
So your consideration 35 suggests reducing it from 85 to 70 decibels.
A. It's a very large reduction, Mr Beresford, but passenger vessels under IMO are required to meet 60. So it's not as low as other vessels.
Q. Well, this is Hong Kong, Dr Armstrong. We like a lot of noise to keep the bad spirits away.
A. I still think 85 is a dangerous issue.
Q. Your next issue, (xvii), relates to the category of vessels or the classification of vessels. You've noticed that Cap 548G, schedule 1, does not contain any

Page 131

reference to a class IV vessel in the table, which is confusing, and you say it's unclear as to whether it's category A or category B, and which for example is required by table 3 in schedule 4, part 2. And you note that under schedule 3, part 2, class IV vessels may carry more than 60 passengers.
So your consideration 36 is that reference be added to schedule 1 to class IV being an auxiliary powered yacht, cruiser or open cruiser.
A. Yes, Mr Beresford. It's somewhat confusing because the title of the code of practice only refers to class I, II and III. But within it there are various recommendations for class IV as well, so I think that should just be tidied up a little.
Q. So that's the code of practice as well as Cap 548G?
A. Yes.
Q. The point is if class IV vessels can carry more than 60 passengers, then they're relatively high-risk?
A. Correct.
Q. Issue (xviii) relates to fire-fighting. You note that section 2(1)(a)(i) of Cap 548G requires fire pumps to be driven by means other than the vessel's main engine, whereas footnote (5) to part 2, table 1, and footnote 6 to table 3, and footnote 3 to table 6, all state that the fire pump may be propulsion engine driven.

Page 132

So in consideration 37, you suggest that the inconsistency be resolved.
A. Yes.
Q. Also in relation to fire-fighting, you note that section 2(2)(c) of schedule 4, Cap 548G, permits the use of bilge pumps as fire pumps. And you warn that it's possible that they could take water from the bilge of a compartment, and there's then the possibility of pumping spilt oil or fuel onto the fire.
A. Yes.
Q. So you suggest, as consideration 38:
"Deletion of the use of the bilge pump as a fire pump."
A. Correct.
Q. Issue (xix) you've headed "General", and you refer here to code of practice, chapter I, section 7.2 on exemptions, and you state that you consider "Reasons for exemptions should be documented by the surveying authority, traceable and available for any future analysis into their effectiveness, or in case of failure."
In consideration 39 you suggest an addition to give effect to that view.
A. Yes. Exemptions and equivalences give the Director of Marine the opportunity to allow unusual vessels.

Page 133

They're not uncommon. They're included in SOLAS, exemptions and equivalences. But in SOLAS, there is the requirement that all details are passed on to all other administrations; that means every country involved in SOLAS. So what they're trying to do is make all those exemptions and equivalences known to people. So there is no possibility of creating some accident due some inefficiency or misunderstanding; and everything is traceable.

Q. The main point is to add something that requires Mardep to document the exemption, to the extent necessary to understand the rationale behind the exemption?

A. Yes. So if there is an accident and a Court of Inquiry, then people can understand why it didn't meet the regulation.

Q. And the next issue is really the same point, but in relation to section 8.2 on equivalences.

A. Correct.

Q. So consideration 40 is basically in the same terms as consideration 39.

Now, issue (xx) concerns plans to be displayed on board. You refer to the code of practice at page 3451, and you note that it requires rather a lot of things to be shown on the plans that are required to be displayed. As far as you're aware, there's no international

Page 134

equivalent and you can't see the value in it.

A. Not quite, Mr Beresford. I agree with the first part of your comment. I think there's far too much information on the plans to be displayed, or on one plan. I think they would be quite confusing if, for example, there was a fire on board whilst the boat was tied up alongside, and the Fire Department arrived and, trying to understand the vessel and what to do, they found information on there about the sizes of the black balls that are hoisted up the mast, as well as the location of the VHF and various other information such as the width of the escapes. There's too much information.

Q. We can see the safety plan -- perhaps it would be worth having a quick look -- at marine bundle 2, page 263.

A. Thank you.

MR BERESFORD: Mr Chairman, for your cross-reference, the as-fitted safety plan is at RSRB2, page 1539.

THE CHAIRMAN: Thank you.

A. The Fire Department is not really interested in where the life-saving appliances are, for example, and it's normal, in other administrations, to have two plans, one of which is a fire-fighting plan and the other is an evacuation and safety plan, which would show you all the life-saving appliances.

In addition, the regulation here requires details of

Page 135

the navigation shapes, and I'm not sure exactly what that means, because the navigation shapes are hoisted up the mast. So why do we need a plan of them?

And if it's referring to where they're stored, I think that's a matter for the crew to know where they are stored, and not for the public to know where they are stored. So I see little value, as I've said in this particular paragraph, to having information on there that clutters up the plan with information that's not needed.

This is information that's needed in a panic situation. People need to know where things are.

THE CHAIRMAN: Do we have photographs of such a plan displayed on either of the vessels?

MR BERESFORD: Yes, we do, Mr Chairman. If you'll just give me a moment, I'll turn it up.

Expert bundle 1, page 398-7.

THE CHAIRMAN: Thank you.

MR BERESFORD: I think we also heard evidence from one of the surveyors, the ship inspectors, that this was one of the items checked in the annual survey. In the last final inspection record, there's an item C8, drawings retained on board, confirmation of numbers and content.

THE CHAIRMAN: Thank you.

MR BERESFORD: So you have three considerations out of this.

Page 136

41:

"Delete light, shape, sound signals and radio communications from section 6.1(b) and also the equivalent in section 6.2."

A. Yes.

THE CHAIRMAN: On these sorts of vessels, the radio is always going to be in the wheelhouse, is it not?

A. Indeed. And why would the public need to know where it was?

MR BERESFORD: Consideration 42, you've already described:

"That safety information be presented in two plans ..."

A fire plan and an escape plan.

A. Usually you would have one or the other of those scenarios, either a fire or a need to evacuate. I can't imagine you'd necessarily have both at the same time. Maybe you'd need to evacuate after a fire. But the value of two plans has been showed in other incidents. Simplified information that you can read easily.

THE CHAIRMAN: The two plans being fire-fighting and?

A. Escape plan showing all fire-fighting equipment.

MR BERESFORD: "A fire plan showing the location of all fire-fight appliances, the structural fire protection boundaries and the location of fire detection and fire alarms", is how you put it.

Page 137

A. Yes.
Q. And:
"An escape plan showing the location and arrangement of all life-saving appliances, and all means of escape and all escape arrangements."
A. Correct, and could I just add, under the current regulations, somewhat more onerous, there's more to show on the plans than there is, for example, on a vessel built to the instructions, such as Lamma IV. There's more information needed.
Q. Your third consideration, consideration 43, is that there should be a requirement that the latest available plans are the plans that are kept on board.
A. Indeed.
Q. You then come on to the consideration of as-built or as-fitted plans, in paragraph B-24. You note:
"As-built plans may be required by a shipowner for their own record purposes under the terms of the building contract with the shipbuilder, but otherwise there is no mandatory requirement for the shipowner or shipbuilder to draw as-built plans."
We know, of course, that there was a contractual requirement in the present case.
A. Yes.
Q. We've been looking at the as-fitted plans that were

Page 138

provided to the owner. So far as I'm aware, there was only one as-fitted plan provided to the Marine Department, and that was under cover of a letter dated 20 December 1996, which is in marine bundle 2 at page 386.
THE CHAIRMAN: Do we have that plan?
MR BERESFORD: We do, Mr Chairman. Marine bundle 2, page 386. This is the Sections and Bulkheads (as fitted) sheet 2 of 2. So not sheet 1 of 2, which we've been concerned with.
THE CHAIRMAN: Have you seen this drawing before?
A. I have, Mr Chairman, yes.
THE CHAIRMAN: Does it describe the as-fitted build as having a watertight bulkhead at frame 1/2?
A. There's nothing on this particular drawing that would indicate frame 1/2, Mr Chairman. It's a rather obscure drawing to have an as-fitted of.
MR BERESFORD: Anyway, as you've noted:
"... there is no mandatory requirement for the shipowner or the shipbuilder to draw as-built plans. It might be useful for Mardep to maintain a record of as-built plans as well as the approved plans, but this will take up space and may cause confusion in the future unless the as-built plans are also to be approved."
There's a question as to whether this might be

Page 139

desirable. But you've suggested it might capture issues such as shell plating being approved at one thickness but the boat being built at another.
So for consideration 44, you suggest:
"As-built plans should be provided by the shipowner to Mardep."
A. Yes.
THE CHAIRMAN: But if at the survey stage the Marine Department were not to approve a vessel that hasn't been built to the plans that it has hitherto approved, but to require the plans to be amended, you would pick this up anyhow, would you not?
A. You would think so, that if they wanted to change something, they would ask the new drawings to be submitted for approval.
THE CHAIRMAN: "When we surveyed we found there was an access opening in the frame 1/2 panel but all these other drawings say that that's a watertight bulkhead. We're not approving this vessel until all these drawings are amended, if we are prepared to take the opening."
A. That is certainly the approach that I would take if I was a surveyor.
THE CHAIRMAN: That's the safe approach, is it not?
A. Indeed.
MR BERESFORD: Under your next head, (xxi), headed "Survey",

Page 140

Dr Armstrong, correct me if I'm wrong, but I think these are all drafting points?
A. They are indeed. You may skim over them, I suggest.
Q. Thank you. Which leads us to issue (xxiii), "Machinery Installation". The first issue relates to escapes from an engine room, and you note:
"International regulations require that there be two escapes ... and that they be as widely separated as possible."
So you suggest a modification in consideration 51 to read "Two means of escape including suitable permanent ladders and exits should be provided for the engine room, as widely separated as possible, as required by chapter VI paragraph 13.4.3".
THE CHAIRMAN: There were two entry points in the engine room of Lamma IV, were there not?
A. There was a main entrance on the port side for it, and you could also escape through a hatch. I'd have to refer to the drawing, Mr Chairman.
THE CHAIRMAN: Which drawing would you like to see?
A. The general arrangement would have been a good one.
MR BERESFORD: That's at page 172. Perhaps easier would be Wilkinson & Grist, page 43.
A. There is an engine room access on both sides, Mr Chairman.

Page 141

THE CHAIRMAN: Port and starboard?
A. Port and starboard, correct.
THE CHAIRMAN: Shown in the main deck plan?
A. Correct.
MR BERESFORD: Then in the code of practice, chapter IIIA, part 3, you've noticed that there's reference to a flash point above 61 degrees Celsius, and you suggest that this be changed to 60 degrees.
A. Yes, Mr Beresford.
Q. You've also noticed no requirements relating to the steering gear being capable of operating the rudder when going astern, and you've suggested in consideration 53 a modification to the code of practice, chapter IIIA, part 3, paragraph 17, to read:
"The main steering gear should also be capable of returning the rudder from hard over to the midships position when the vessel is operating astern at maximum permitted speed. An emergency means of steering should also be provided, which may be either powered or manually operated."
A. It can be quite an important factor, because there are many vessels out there that cannot steer going astern.
Q. That leads us to issue (xxiv), headed "Electrical installation", and in consideration 54, you recommend --
A. It basically appears twice, Mr Beresford.

Page 142

Q. Yes, okay. So it's a drafting point, really.
A. Yes.
Q. A duplication in the code of practice.
Issue (xxv) relates to "Stability". You refer to chapter IV, "Freeboard and Stability", paragraph 3.2(b), which provides exemption from inclining experiments for certain vessels, and you note that it's particularly the case for catamarans that accurate results cannot be obtained. So you've made a suggestion in consideration 55 that amendment be made to refer to them particularly.
A. The High-Speed Craft Code of IMO does permit exemptions for catamarans.
Q. Yes. Consideration 56 contains a suggestion that the person who approves the stability booklet should be indicated, identified.
A. It was not clear to me.
Q. Issue (xxvi) concerns structural fire protection.
A. That's another drafting comment, really.
Q. Right. And issue (xxvii) concerns high-speed and DSC craft. You note an incorrect reference to intact stability.
So this is all of a one with your earlier theme.
You say:
"Chapter XI section 3 paragraph 3.1 concerns damage

Page 143

stability of the HSC Code craft. There would appear to be an incorrect reference to intact stability in annex 7 ..."
So consideration 58 suggests an amendment by replacing "annex 7 (except paragraph 1.5) of the HSC Code" with "annex 7, section 2 of the HSC Code".
A. Yes. Again, I think another drafting mistake.
Q. Yes, it's drafting, but perhaps it is all of a one with the apparent muddling up of "intact" and "damage stability"?
A. Could well be.
Q. In consideration 59, you suggest that the IMO convention distinguishing between mandatory provisions and information provided for guidance be adopted in the code of practice?
A. Yes.
Q. Well, thank you for identifying those. I have no doubt that they will be studied with care by those responsible for these documents.
But for us, we move on to part C, which is "Potential Safety Issues for Vessels certified before 1 January 2007".
You say at paragraph C.1 of your report on page 1667:
"The intention of this part is to identify potential

Page 144

safety issues for passenger vessels which were certified under the previous Instructions [which you identified as the Blue Book and the 1995 Instructions], that is, prior to the issue of Cap 548 and Cap 548G, and which are still in service. The aim is to suggest improved safety measures, learning from the loss of Lamma IV and the consequent investigations."
Paragraph C.2, you say:
"Currently there appears to be no documented 'Statement of Safety Objectives' which would help to identify the intentions and outcomes of the Merchant Shipping (Local Vessels) Ordinance and subordinate regulations. Without understanding how passenger safety is intended to be ensured over a range of topics, some of which are interdependent, it is difficult to offer comprehensive advice on what standard is required of ships built to previous regulations. A starting point in addressing this issue would therefore be to discuss with Mardep whether they have existing high-level 'safety aims', and if not, then to provide assistance to them to retrospectively develop such aims."
You note the existence of the Local Vessels Advisory Committee, and you say:
"Without a Statement of Safety Objectives providing a high-level scope of work, it must be difficult for

Page 145

this committee a operate cohesively and rapidly."
THE CHAIRMAN: Where would you expect this Statement of Safety Objectives to be stipulated, Dr Armstrong?
A. Mr Chairman, if I can refer you to page 1730 of my report. This is taken from the Australian regulations, and it is on page 7 of the regulations. It's right at the beginning, in the preamble. In the middle of this triangle it gives you the standards that you have to meet, and then gives you two methods of finding solutions, one of which is prescriptive and one of which is performance-based. But that's probably irrelevant because sitting over the top of all that is the safety obligations. It tells you what is expected of the operator, the shipbuilder, the surveying authority, the various suppliers of equipment, how they identify the hazards involved, how they identify the risks involved.
As I say, that appears right at the beginning of the regulations.
Following on from this particular page, Mr Chairman, there is a list of the safety obligations in the Australian jurisdiction which list all of those items that I've just commented on; the specific duties of the various parties involved in building a ship and --
MR BERESFORD: Page 1734 in the contents, is it not?
A. Yes, correct.

Page 146

THE CHAIRMAN: Yes, and then page 1735 stipulates the objective, and page 1736 gives us the ambit of the various duties.
A. I thought this might be useful, following the line of questioning of Mr Beresford of Mr Wong last week.
THE CHAIRMAN: And there is nothing in a similar vein in Hong Kong's legislation?
A. Not that I'm aware of at all, sir.
MR BERESFORD: The equivalent document in Hong Kong would be the code of practice, would it, Dr Armstrong?
A. But I don't see anything in there, Mr Beresford, that suggests what the overall safety objectives are of having --
Q. No, indeed. But if you were going to put it anywhere, you would put it in the code of practice, would you? Or would you put it in the legislations, or the regulations?
A. Well, the safety objectives really start at the top. They have to be owned by the Director of Marine, I would respectfully suggest, and therefore you might want to consider some higher-powered documentation than the code of practice.
Q. Yes. So the section of Cap 548 authorising the issue of the code of practice could perhaps usefully contain a statement --

Page 147

A. I think that would be a good place for it.
Q. -- of the safety objectives, the general principles, general duties, and such specific duties as it were thought necessary to specify?
A. Yes.
Q. We can see from the synopsis provided at page 1734, which is the list of contents of part A, we get an overview. After the objective in paragraph 1.3, chapter 2 is headed "Duties" and includes general principles, general duties, and then specific duties, including specific duties of designers, builders, suppliers, owners and employers, masters and other supervising persons on the vessel, and specific duties of employees.
A. Yes. Each of which identifies the hazards and the risks involved in their part in the whole process. It is quite difficult to implement quite a lot of this in an existing regime because of the cost involved, and I've also suggested in various parts, which you probably will come to shortly, that these sorts of issues should be considered along with a regulatory impact statement. In other words, identify what is actually involved in making suggested changes.
Q. That is exactly the point that you're coming to in the next paragraph of your report, paragraph C.4.

Page 148

A. Yes.
Q. Where you suggest:
"A regulatory impact assessment should be commissioned by Mardep to assess the cost and risk implications and benefits to safety of any proposed changes.
A. Yes.
Q. So that this can be submitted to the LVAC.
Then you have suggested certain items worthy of immediate consideration.
At C.6, you deal with the issue of life-saving appliances. You've proposed some changes there to update the references to the LSA Code. You've suggested that the required standard for life jackets for all passenger vessels should be upgraded to an agreed standard in accordance with consideration 8 following a regulatory impact assessment.
You suggest:
"A requirement for children's life jackets on all passenger craft should be 5% children's life jackets or such greater number as may be required to provide a life jacket for each child on board, in line with SOLAS requirements as given under consideration 10 ..."
A. Yes.
THE CHAIRMAN: Where did we see the 10 per cent figure for

Page 149

life jackets for children?
A. 10 per cent, Mr Chairman, is contained within SOLAS. It is also required of Australian vessels operating outside partially smooth waters with a significant wave height of 1.5 metres.
THE CHAIRMAN: But, of course, children fall into a category of particularly vulnerable persons on a vessel, do they not, in the circumstances, for example, obtaining when Lamma IV sank?
A. Particularly precious cargo, yes, Mr Chairman.
THE CHAIRMAN: It's difficult to see any justification for not having a regime where it is required that there be a life jacket for every single child on board.
A. But that is proposed in the words, Mr Chairman.
MR BERESFORD: That is Dr Armstrong's recommendation, Mr Chairman.
THE CHAIRMAN: I see the "or". I don't understand why we can't get to that requirement simpliciter.
A. Yes.
MR BERESFORD: Is it proposed as a back-stop to ensure that there's a minimum number of children's life jackets on board at all times?
A. That was my intention of suggesting 5 per cent should remain within there.
Q. Yes. Because if there's such a requirement, then it

Page 150

also would assist, would it not, with the policing of the requirement? So if a vessel were to be stopped by the Harbour Patrol Section and it had no children on board, nevertheless it would be required to have 5 per cent, or 10 per cent as the case may be, children's life jackets, regardless. But if there were more than that children on board, then of course they would be required to have the requisite number of life jackets: 100 per cent. But if they were sailing without children, they couldn't say, "Well, we don't have children today so we don't have any children's life jackets today".
A. It's a little impractical, of course, I accept that, to say you should have as many as you need for each child on board, because it implies that they would count how many children for each voyage. I think that's something that could happen, for example on National Day, when a vessel was doing a special voyage with children on board. But not in day-to-day operation. So maybe whoever considers this would need to think about whether it was 5 per cent or 10 per cent as a back-stop.
THE CHAIRMAN: They've already been considering 5 per cent as being inadequate in the Local Vessels Safety Committee, have they not?
A. I didn't know that, Mr Chairman.
MR BERESFORD: But it remains important, in your view, to

Page 151

have a two-pronged requirement?
A. Yes, sir.
Q. One specifying a percentage, whatever that percentage may be, that would be on board at all times; and the other requiring sufficient life jackets for every child on board?
A. Yes.
Q. Then at C.9, you say:
"Dependency on life jackets alone and a very limited number of lifebuoys, in order to provide buoyancy for all passengers and crew is not considered satisfactory, especially in rough weather or strong winds. Consideration should be given to requiring life rafts to a greater capacity, dependent on the area of operation. Life rafts will need to be capable of being launched on either side of the vessel, which may require some major structural changes."
A. I've had some second thoughts about that paragraph, Mr Beresford, I must admit. I probably would want to remove the first sentence, if I may. I think consideration should still be given to life rafts, but life rafts imply training of the crew and understanding of how to use them. They're useful in areas where rescue is not immediately available, and Hong Kong tends to have a lot of traffic and rescue services are

Page 152

generally very good. So maybe life rafts are not so useful in Hong Kong as they are in other countries. They also need to be launched on both sides of the vessel, or either side of the vessel, so it tends to lead to quite a lot of changes on board if you use them. I'm a bit ambivalent about what I wrote there.
Q. It's not a question we went into in great depth in the course of this Inquiry, but it appears that the life raft was of use and was used by the passengers, but I think the Fire Services also put large life rafts in the water very quickly.
A. Yes. I think the Lamma IV life raft did exactly what it was expected to do. It deployed, the hydrostatic release went off. It had obviously been well-maintained and so on. But it only helped a limited number of passengers, from memory. It was just a few.
THE CHAIRMAN: Perhaps a life raft for a dozen people?
A. Well, 12 is a very small number compared to two hundred and --
THE CHAIRMAN: Yes. I'm trying to jog my own memory as to the size of the life raft.
MR McGOWAN: 10-man.
A. 10-man, I think. 10, yes.
THE CHAIRMAN: Yes. So, as you say, very small.
A. Probably not of any value.

Page 153

THE CHAIRMAN: Inconsequential in the broader picture?
A. Indeed.
COMMISSIONER TANG: Dr Armstrong, I want to ask you something about children's life jackets. May I just go back on a very minor point. In Australia, would it be incumbent upon school groups to inform operators about school outings and large groups of children going on journeys on boats, so that the operators concerned can gear up to the number of life jackets being provided?
A. I don't know the answer to that, Mr Commissioner, I'm sorry.
THE CHAIRMAN: We're thinking of the situation where 200 primary school children turn up at the ferry. That presents a difficulty to the ferry operators.
A. I would think that's quite a common scenario, particularly in Sydney Harbour, for example, where there is a lot of commuter traffic on the ferries and there are a lot of schools moving around the harbour, moving their people around the harbour. So I can attempt to find out for you.
THE CHAIRMAN: Thank you.
MR BERESFORD: Then in paragraph C.10, you come on to your suggestion:
"Vessels should be required to carry parachute rocket flares in order to attract attention at

Page 154

nighttime."
You've noted:
"... two rocket flares were carried on board Lamma IV, but these were contained within the sealed life raft container."
THE CHAIRMAN: That, then, is more or less happenstance, is it not? There was no separate requirement for carrying flares; it happened that flares were in the life raft.
A. Yes. The life raft with a standard SOLAS pack, which contains medical equipment and flares and smoke and things like that.
THE CHAIRMAN: So that's just chance, is it not?
A. It was just chance. As I've said elsewhere, I believe they should have flares and smoke and handheld flares.
THE CHAIRMAN: And you get that information from the inventory for the life raft, do you, perhaps from its last survey?
A. Indeed, from its last survey.
THE CHAIRMAN: Thank you.
MR BERESFORD: So you say that it would be more practical to have some available within the wheelhouse?
A. Yes.
Q. In fact, the life raft would need its own flares, wouldn't it? I mean, that's a separate issue.
THE CHAIRMAN: That's why it has the flares, because it is

Page 155

a life raft and that's how they make them, is it not?
A. Yes.
MR BERESFORD: So it's not an alternative; it's an addition?
A. It's an addition; it's not an alternative.
Q. Then you come on to deal with the issue of redundancy of electrical power.
THE CHAIRMAN: Well, we've dealt with both of these items at some length earlier, have we not?
MR BERESFORD: Yes. I think in the nature of a summary highlighting these issues.
THE CHAIRMAN: I see it as a summary, yes.
MR BERESFORD: So electrical power, watertight doors, annual survey, certification and licence. You've suggested some changes to the form of current documents, as far as that's concerned.
Dealing with life-saving appliances, you've suggested:
"Actual numbers should be given of each appliance, including children's life jackets (noting that they may vary depending on the current voyage) and should be clearly stated without a need to consult other documents."
A. This is referring to the asterisk, Mr Beresford.
Q. Yes, indeed. You've also suggested:
"A new paragraph be added stating: 'Watertight doors

Page 156

are fitted at the following locations and are capable of being securely closed:
(Noting here that for new craft proposals, only one watertight door should be permitted per vessel)."
A. (Witness nods).
Q. And thirdly, as we've discussed before, the lightship weight.
A. Yes. In the previous discussions, I was really talking about craft that were -- I think I was talking about new craft, whereas now I'm talking about existing craft.
Q. Yes. So this is a suggested change to a form?
A. Yes.
Q. Yes. I appreciate that.
A. And I think the licence has some rather trivial information on it and misses out on some really important things, and that's why I'm suggesting these should be added to the documentation.
Q. Then at C.14, you suggest:
"During the annual survey of all passenger-carrying craft" the following features should be catalogued:
"(i) All watertight doors and access opening on board in apparent watertight bulkheads;
(i) The location of the emergency battery supply to the navigation lights and other navigational equipment;
(iii) Whether the vessel has decks manufactured from

Page 157

GRP or other composite foam sandwich construction, and having seats fastened to them;

(iv) Note all layout changes that have been made since the original General Arrangement, such as the position and orientation of seats."

Just on that, we had some evidence from passengers that there had been some changes that were not marked on the plans.

A. Yes.

Q. Then:

"(v) In addition, during the annual survey on each vessel certified to carry more than 100 passengers, conduct a lightship check to determine any changes to the vessel weight since the original certification, and thus identify potential watertight subdivision issues. This lightship check need only be done during one survey."

A. These items, Mr Beresford, I'm suggesting, should be done over the next 12 months or some such period of time, so that the Marine Department is able to get a snapshot of how many vessels have these particular issues. It's not suggested to be done for ever; it's just a limited period of time to collect information.

Q. I see. So when you say "during the annual survey", you mean during the next annual survey?

Page 158

A. Yes.

Q. Then you deal with seat foundations, and you suggest:

"... a regulatory impact assessment of craft having GRP foam sandwich construction with seats fixed to them, with the intention of identifying the work and cost required to attach seats more robustly."

You suggest making it a condition of survey that all vessel owners seek approval from Mardep to move seats or make changes to the seating arrangements, except where the seating design is such as to permit simple changes without affecting the attachment to the deck, such as seats fitted to a track connected to the deck. Any changes should be reflected in the escape plan displayed on board.

A. Yes.

Q. "Voyage Data Recorders", we've discussed that. You suggest:

"... A regulatory impact assessment to identify the feasibility and cost of fitting [them] to all passenger craft."

"Further Investigations", you suggest that a workshop or seminar be organised and conducted to identify the standard of watertight subdivision for vessels certified to carry more than 100 passengers, and to identify how many vessels would be affected.

Page 159

Then:

"After a suitable period during which data is gathered from the annual surveys, and from Mardep records, identify the numbers of craft:

carrying more than 100 passengers in which ballast has been added.

carrying more than 100 passengers and in which the lightship check indicates a change in the lightship of more than [5%].

in which modifications have been made or in which the absence of a watertight door may have caused changes to the watertight subdivision."

A. Yes.

Q. And you suggest commencing an independent assessment of the watertight subdivision and damage stability of each craft certified to carry more than 1100 passengers, focusing on those vessels identified from the annual surveys we've just discussed.

A. Yes.

Q. Finally, you've added "A note on Structural Fire Protection". You note, "A major difference between the regulatory requirements prior to 2006 and those subsequent to 2006", especially in relation to structural fire protection around the engine room, and I think you conclude that it's not feasible and would be

Page 160

prohibitively expensive to require this to be fitted to existing craft.

A. Correct.

Q. Then we come to part D, which is a short part dealing with future safety issues. Two of the three paragraphs are a note on life jackets for infants. You say:

"In addition to a number of children's life jackets, SOLAS requires additional infants' life jackets, as stated in regulation 7 ..."

I think we've already looked at that.

You suggest:

"Consideration should be given to the need for infant life jackets. In this regard it is noted that there could be children's life jackets that are certified to also fit infants and that ships certified to SOLAS are generally quite large ships that give sufficient time for the fitting of life jackets to small infants, indeed the premise of SOLAS is that life jackets are donned prior to gathering at muster stations for boarding of life boats or life rafts. On the other hand, local vessels in Hong Kong waters are generally small craft which can sink very quickly, and realistically there may be insufficient time for infant life jackets to be fitted."

THE CHAIRMAN: Is there anything more difficult about

Page 161

fitting a life jacket to an infant rather than to a young child?
A. I don't know, Mr Chairman, because I've never attempted to do it. It can be quite difficult to fit anything to a wriggling infant.
THE CHAIRMAN: Yes. Yes, I take your point.
MR BERESFORD: In Marine Department Notice 131 of 2012, which was the notice, as you may recall, containing guidance as to safety measures that may be taken, which most operators, it seems, regarded as advisory and which could be ignored with impunity, it suggested that children -- I don't think it specified infants -- should wear life jackets at all times. Is that feasible and practicable?
A. I'm aware it's done in other administrations on certain voyages where it's perceived as being a risk, particularly if -- for example, I know of one route in Australia where it's partially smooth waters, but for a very small part of it, it becomes a higher risk; the water level is usually higher. And children are required to wear life jackets at all times when they're crossing that bit of water.
THE CHAIRMAN: Which stretch of water is that?
A. Just across Sydney Heads, which is open to the ocean.
THE CHAIRMAN: Yes.

Page 162

MR BERESFORD: What's the risk there? That it's more bumpy and they may get thrown overboard?
THE CHAIRMAN: It's open to the ocean there, is it not?
A. It's open to the ocean swells, so the boat rolls a lot, because you're running at right angles to the waves.
MR BERESFORD: So whilst it might be regarded as over-regulation to suggest that children should wear life jackets at all times --
A. I'm aware of some private ferry operators who also require children to wear life jackets at all times. But that's because they choose to do so.
THE CHAIRMAN: That's on the basis of "If you wish to be a passenger on our vessel, you put a life jacket on, otherwise you don't travel as a passenger"?
A. Exactly, yes.
THE CHAIRMAN: And that applies to vessels like jet skis going in very shallow water at high speeds, twisting and turning?
A. All jet skis in Australia are required to --
THE CHAIRMAN: I was thinking of New Zealand, actually. Jet skis that they operate there. Jet ski boats, not jet ski --
A. Oh, indeed. That is inherently dangerous of course.
THE CHAIRMAN: Which is why it attracts children.
A. And some grown-ups.

Page 163

MR BERESFORD: The point to which I'm coming is that there is perhaps an additional risk, is there not, Dr Armstrong, on fireworks nights, because of the crowded conditions in the harbour and the heightened risk of collision?
A. And children running from side to side on the vessel. Yes, all sorts of risks.
Q. I think somebody has voiced the objection at some stage during this Inquiry -- I can't quite remember when -- that it's impracticable to require children to wear life jackets at all times. I've been reminded that it's Mr Ng, the Hong Kong & Kowloon Ferry manager.
A. I can see it would be difficult on something like the Star Ferry.
Q. Then finally you come to a heading "Safety Obligations". But I think we've already dealt with that. That's where you've produced the Australian document we've just looked at, identifying the high-level safety aims.
A. Correct, yes.
Q. Page 1730.
I think that brings me to the end of your report, Dr Armstrong. If you'd just wait there, please.
A. Thank you.
THE CHAIRMAN: Mr McGowan, do you have an application?
MR McGOWAN: Yes, I do.

Page 164

THE CHAIRMAN: We'll hear it after the break.
We'll take a 15-minute break now, Dr Armstrong, and then resume with some further questioning.
A. Thank you, sir.
THE CHAIRMAN: 15 minutes.
(4.07 pm)
(A short break)
(4.21 pm)
MR McGOWAN: Mr Chairman, we've now received the original drawings from Lamma Island and they're here. I think the only one we're interested in is the rudder stock arrangements.
THE CHAIRMAN: I think we'd like to see them all, now that you've troubled to bring them.
MR McGOWAN: Yes, they're certainly here.
Sir, I can also confirm that a search has been done for any form of covering letter that came with these, and none has been found.
THE CHAIRMAN: Thank you for that. Remind me in which bundle they are. Obviously RSRB, page 1531?
MR McGOWAN: I think they were earlier than that, sir.
MR BERESFORD: Page 1531.
MR McGOWAN: Page 1531. I believe Mr Beresford has some other questions to just finish off as well.
THE CHAIRMAN: Yes.

Page 165

Now that you've got the originals, is there anything that you're now able to see that you had difficulty with before?
A. A moment, please, Mr Chairman.
THE CHAIRMAN: Yes. Take your time.
So is there anything there that brings out something that you weren't able to see earlier?
A. Just a little more confliction, I'm afraid, Mr Chairman.
THE CHAIRMAN: Yes?
A. I'm not sure of the drawing number. Let me just find the drawing.
THE CHAIRMAN: If you give us the title, we can match it with the page.
A. "Docking plan (as fitted)". I believe it's the last drawing.
THE CHAIRMAN: Just let me check my notes. Page 1546.
A. I noted that "watertight bulkhead" was written in way of the propeller. Mr Beresford noted that "watertight bulkhead" was also written against all the other watertight bulkheads.
THE CHAIRMAN: Yes.
A. But this drawing clearly shows also, on the next deck down, the two triangles indicating an opening.
THE CHAIRMAN: In the underdeck plan?
A. In the underdeck plan.

Page 166

THE CHAIRMAN: Yes.
A. So a bit of a conflict there. Also on drawing "Hydraulic steering gear piping system (as fitted)".
THE CHAIRMAN: Page 1536.
A. Thank you. Whilst I commented that those with good eyesight could see the triangles in the underdeck plan, indicating an opening just there, it's more evident on these drawings. It's also shown on the profile, which is the sketch above where the cursor is now -- thank you -- the profile. Higher up than that. Thank you.
This drawing clearly shows the same two triangles, indicating an opening, in that view.
THE CHAIRMAN: Perhaps we could have a look at the original that you're holding. (Handed).
Perhaps that could be passed to counsel.
A. And maybe, Mr Chairman, I could also pass to you the "Rudder and rudder stock details", which was the one that was questionable and couldn't be read very well.
THE CHAIRMAN: Yes. That's page 1533.
(Handed).
So this is clearly marked, top left, as a corrugated watertight bulkhead.
A. Correct. And on the screen at the moment, you can see the one I had difficulty reading.
THE CHAIRMAN: Yes.

Page 167

MR BERESFORD: May I just ask one follow-up question, Mr Chairman.
THE CHAIRMAN: Yes, please do.
MR BERESFORD: Dr Armstrong, you said just now that you found a conflict.
A. I'm sorry, could you repeat that?
Q. You said you found a conflict.
A. A conflict, yes. Some drawings say "watertight"; some drawings show an opening.
Q. Yes. But it's possible for a watertight bulkhead to have an opening, isn't it?
A. It is, but I would expect it to show an arc with a line on it, indicating an open door. I'm aware that the regulation says an opening should be fitted with a closure.
Q. Yes.
A. And I can see an argument to say that an opening is quite valid, as long as it has a closure on it.
Q. Well, I'm not asking for an argument one way or the other, just what your understanding of those drawings is.
A. My understanding is that it would be watertight.
MR BERESFORD: Thank you.
Mr Chairman, over the break, two matters have come up, one a matter of clarification, and the other is the

Page 168

missing resolutions, which we've now got. I wonder if I could deal with those.
THE CHAIRMAN: Just give me a moment first, please.
MR BERESFORD: Certainly, Mr Chairman.
THE CHAIRMAN: Thank you.
MR BERESFORD: Mr Chairman, when I was asked about who made the comment about children and their life jackets, I mentioned Mr Ng, but I've been corrected. It was Mr Tang Wan-on, and the reference is Day 30.
THE CHAIRMAN: Yes, I remember the reference. He said he thought it would be difficult to get children and their parents to comply with such a directive.
MR BERESFORD: That's right. He said:
"Anyone would know that if you ask a lively child to be bundled up in this life jacket, you could imagine the result of such a request or such a thing."
It's Day 30, page 67.
THE CHAIRMAN: Thank you.
MR BERESFORD: Dr Armstrong, we've now tracked down the two resolutions that were missing from appendix IV. These have been paginated at 1742-17, which is the resolution numbered A.861(20), adopted on 27 November 1997, and the other is paginated at page 1742-24, which is the resolution MSC.163(78), adopted on 17 May 2004.
A. I see those. Thank you.

Page 169

Q. Starting with the earlier one, the 27 November 1997 one, could you please draw our attention to the relevant paragraphs that you wish to refer to?
A. Yes. Thank you, Mr Beresford. This particular resolution is aimed at SOLAS passenger ships under regulation 20 of chapter V of SOLAS, and requires certain data items to be recorded which are listed in paragraph 5.4, Mr Beresford.
Q. So in summary, "Date and time", "Ship's position", "Speed", "Heading", "Bridge Audio", "Communications Audio", "Radar data, post-display selection", "Echo sounder", "Main alarms", "Rudder order and response", "Engine order and response", "Hull openings status", "Watertight and fire door status", "Accelerations and hull stresses"?
A. Correct, yes.
Q. Not all of those would be possible on a vessel like Lamma IV, would they?
A. Nor possibly desirable, Mr Beresford, which is why I had made a suggestion that S-VDRs should be considered, which is the other document.
Q. So that's the document dated 17 May 2004?
THE CHAIRMAN: "S" for "simplified"?
A. That's for "simplified", yes.
MR BERESFORD: Headed "Performance Standards for Shipborne

Page 170

Simplified Voyage Data Recorders (S-VDRs)"?
A. Correct. These regulations were written for cargo vessels under chapter V of regulation 20, but I think may well be considered adequate for smaller vessels in Hong Kong waters. Again in chapter 5.4 it lists a smaller number of items to be recorded.
Q. So here we have "Date and time", "Ship's position", "Speed", "Heading", "Bridge Audio", "Communications Audio", "Radar data, post-display selection", "AIS Data", and other additional data items listed by IMO when the data is available.
A. There is equipment available, commercially, of course, to record these items. But they are required to be in fireproof containers for --
THE CHAIRMAN: So a kind of black box?
A. Like a black box, yes. And they tend to be expensive and quite heavy. I think it would need some considerable consideration as to whether this sort of standard was required on a local craft. I think --
THE CHAIRMAN: Because for this consideration, perhaps, in Hong Kong we have, because of relatively short distances, complete radar coverage.
A. Yes.
THE CHAIRMAN: And an excellent system of tracking vessels --

Page 171

A. Indeed.
THE CHAIRMAN: -- as we've seen. So that information as to speed and course can be distilled and calculated, perhaps, from the raw data, from that?
A. Yes. I think there's great scope for condensing this list in the S-VDRs.
THE CHAIRMAN: And if one had a requirement for AIS, you'd have vessel identification easily done as well?
A. Yes.
MR BERESFORD: I note that paragraph 5.4.4 requires the heading to be given as indicated by the ship's compass. And we had a certain degree of dispute in this case as to whether there was a crossing situation or a head-on situation, as seen from the aspect of the lights.
A. Right.
Q. So had the heading been recorded as indicated by the ship's compass rather than as indicated by Mardep's computers, or Marpol's computers, that might have obviated that dispute?
A. I think a heading could be very useful. But be aware that not all ship's compasses have an electronic output. I don't know what the requirement is for this type of vessel in Hong Kong.
Q. But bridge audio would certainly be very useful in a case such as this?

Page 172

A. I'm sure it would.
MR BERESFORD: Thank you, Dr Armstrong.
THE CHAIRMAN: Mr McGowan?
MR McGOWAN: As I indicated yesterday, sir, I have got some questions, one of which I gave Dr Armstrong prior notice of.
THE CHAIRMAN: Yes.
MR McGOWAN: Perhaps before I get on to that, I wonder if we could have --
THE CHAIRMAN: Just identify the areas on which you wish to pose questions.
MR McGOWAN: Yes. It's the question of relying on surveys and checking done by others, which is the one I referred to yesterday.
THE CHAIRMAN: Yes.
MR McGOWAN: Leading on from that, really, is a question that came up this afternoon about the as-built plans and what they --
THE CHAIRMAN: As-fitted.
MR McGOWAN: As-fitted plans. And lastly, it's a question on lifebuoys, which arises from some of the material put before the Commission this morning by Dr Armstrong.
THE CHAIRMAN: Very well. Please ask those questions.
Examination by MR McGOWAN
MR McGOWAN: Yes. Perhaps I could start with the last one

Page 173

first. Could expert bundle page 1742-15 be put up on the screen, please.

This is an extract from the National Standard for Commercial Vessels, and I believe it's an Australian document; is that correct?

A. Correct, yes.

Q. It's dated September 2010.

A. Yes.

Q. Just very briefly, Dr Armstrong, you referred to table 2. I'd like you to go down and look at note (B4) of table 2, which says:

"Each lifebuoy is assumed to provide support for two (2) persons."

A. I'm aware of that, yes.

Q. That's actually been a standard for a considerable period of time, hasn't it? We've heard that when Lamma IV was originally built and licensed, it had a certain number of lifebuoys and you had to calculate each lifebuoy as supporting two people to get flotation aids for everybody on board, taking into account the life jackets and the life rafts?

A. Two questions there, I think. First of all, no, I was not aware that it had been in regulation for some time. So I was actually quite surprised to read it here. And the second part was, I think in context, Lamma IV needed

Page 174

sufficient lifebuoys and life jackets to cover everybody on board.

Q. Yes. But on the original licence, one could only achieve that by allowing 10 people for the life raft, the 10-man life raft --

A. Yes.

Q. -- 92 life jackets, because that was on the original survey and licence --

A. Yes.

Q. -- and then multiplying the number of lifebuoys on the licence by 2 --

A. Correct.

Q. -- which then produced the overall figure?

A. Correct. And I think I may have been critical at some stage in giving evidence of the use of lifebuoys because you had to be conscious and reasonably fit to hold on to a lifebuoy, whereas a life jacket would allow you to float free, as it were.

Q. Yes.

A. I was a little surprised to read this, but I am conscious in the Australian regulation that you still require 100 per cent life jackets in addition to these lifebuoys.

Q. Yes. And of course we've now caught up here in Hong Kong with our requirements on that.

Page 175

THE CHAIRMAN: So I understand it, Mr McGowan, it's one lifebuoy for two persons, not three lifebuoys for one person?

MR McGOWAN: No. But you'll recollect, I think, in fact the evidence of that particular witness was that he was getting them out and giving them to people.

THE CHAIRMAN: Distributing them.

MR McGOWAN: Yes.

THE CHAIRMAN: And then found himself in the water.

MR McGOWAN: Yes. You'll recollect also how quickly Lamma IV sank.

THE CHAIRMAN: We didn't hear how he got in the water. I've checked the evidence.

A. Lifebuoys are really intended for throwing at people in the water in order to rescue them, and that is covered in the bottom part of this particular page. But it does permit you to use lifebuoys as additional buoyant appliances. I've never noticed them in Australia. Usually buoyant appliances in Australia are large rectangular floats, usually fitted on top of the canopies.

MR McGOWAN: Yes. We hear that effectively on Lamma IV, they were, as we can see on the model, stacked up on the after deck and could either be lifted out or would float free if the water level reached a sufficient height for

Page 176

them to do that.

A. Right.

Q. I think the only other matter I have to deal with or ask you about, Dr Armstrong, is the matter that I touched on yesterday.

Could I ask that RSRB bundle, page 1322, be called up, please.

This was something you were shown by Mr Grossman back when you were originally testifying on Day 27.

A. Correct.

Q. It's a schematic representation of the various stages in which Lamma IV went through from the original tendering process and agreement through the various approvals of the design, the build of the hull, the build of the upper structure, completion of the vessel, and the licensing of the vessel.

A. Yes, Mr McGowan.

THE CHAIRMAN: It's not entirely accurate, though, is it, Mr McGowan?

MR McGOWAN: No. As you pointed out to Mr Grossman, I think the actual upper structure was designed in New Zealand but actually fabricated in Hong Kong.

THE CHAIRMAN: Yes. And also the design had input from Cheoy Lee --

MR McGOWAN: Yes.

Page 177

THE CHAIRMAN: -- as to the foam sandwich.
MR McGOWAN: That's something which, we've heard evidence of that, I accept.
THE CHAIRMAN: Yes. We've seen correspondence of how they asked for it to be considered.
MR McGOWAN: Yes.
THE CHAIRMAN: It was a weight issue, I think, as I recall.
MR McGOWAN: It may well have been, given its location.
So, Dr Armstrong, that vessel, before it eventually was delivered to Hongkong Electric, went through a number of stages of approval, certification, survey and licensing; do you agree with that?
A. It went through a number of processes, yes.
Q. And each of those stages involved the consideration by experts of the various stages of the design and build?
A. I don't have knowledge of how expert they were.
Q. Well, people in the Marine Department and people in Cheoy Lee Shipyard in particular, in Hong Kong.
A. I will accept your comment, yes.
Q. And you've seen the experience and the qualifications, et cetera, of the very many people involved who have given evidence during this Commission?
A. But I don't know the qualifications of the people involved in this particular case of Lamma IV.
Q. Very well.

Page 178

Anyway, at the end of the day, the vessel is delivered to Hongkong Electric, having been built by Cheoy Lee and surveyed, inspected and certified by the Marine Department?
A. Yes.
Q. As we know, Hongkong Electric is a lay client. It's an electrical company rather than a shipowner or a ferry operator, commercial ferry operator.
What I'm suggesting to you is that it would be perfectly proper for Hongkong Electric to accept Lamma IV at the end of that process as being a well-founded vessel fit for purpose, without having to make further enquiries themselves. Do you agree with that?
A. Built by a reputable shipbuilder, yes.
Q. And licensed by the Marine Department?
A. Yes.
Q. Thank you.
A. I'm not too sure how lay Hongkong Electric was. I'm sorry, I have no experience there.
Q. Yes. That really leads me into my next question -- thank you, Dr Armstrong -- which is the plans you've been looking at today, where you've applied your naval architecture qualifications and enormous experience to looking at those plans and particularly the question of

Page 179

the watertight bulkhead, or non-watertight bulkhead, as we now know it is. You've been able, as a result of your experience, to identify that, depending which plan you look at, you've either got a watertight bulkhead there or not.
A. Yes.
Q. Again, that's not something you would expect somebody like Hongkong Electric -- sorry, that level of expertise is not something you'd expect someone like Hongkong Electric to have. Again, they could rely, I suggest, on the reputation of Cheoy Lee as the builder, and the Marine Department as the licensing authority, without needing to go through those plans in detail?
A. May I ask if you had no representative, Hongkong Electric, giving you advice independently, or you weren't relying on your marine superintendents for comments?
Q. Well, the marine officer, who was a deck officer rather than an engineer, was involved. But he's told us that again --
THE CHAIRMAN: Is this not a matter for the Commission to resolve, Mr McGowan?
MR McGOWAN: Very well, sir.
MR SHIEH: I was about to rise and say that insofar is this line of questioning is put on the fear that one day

Page 180

someone is going to say, "You haven't put it", I'm not sure that anyone is going to take that point.
MR McGOWAN: In that case, sir, I shall certainly sit down. Thank you.
THE CHAIRMAN: Thank you.
Mr Zimmern?
MR ZIMMERN: Thank you, Mr Chairman. We have no questions.
THE CHAIRMAN: Mr Mok?
MR MOK: Mr Chairman, I have a number of questions. First of all, in relation to the as-fitted drawings.
Secondly, I have some questions in relation to the two topics covered by Dr Armstrong's third supplemental statement, they are in relation to the aft peak bulkhead and in respect of the question of the watertight bulkhead at frame 1/2.
Finally, I will touch briefly, I hope, on four topics arising from the part 2 report, firstly, relating to whether drawing approval and survey should be done by the same person; secondly, concerning the ballast in Lamma IV; and thirdly, whether floodable length should be calculated if stability calculation is available -- Dr Armstrong had some comment in relation to annex F, I think -- and finally, a short matter concerning the seats.
THE CHAIRMAN: Yes, very well. Please ask those questions.

Page 181

MR MOK: Thank you, Mr Chairman.
Examination by MR MOK
MR MOK: Dr Armstrong, first of all, may I ask you some questions about the as-fitted drawings.
A. Yes.
Q. I think you said that "as-fitted drawings" means the drawings of the vessel as built, as constructed?
A. I think I said I did not know the difference between "as-built" and "as-fitted".
Q. Yes. On the basis that they do show the vessel as-built or as-constructed, you would expect, would you not, that the notations and the lines in the drawing do reflect what should appear in the vessel as constructed?
A. Yes.
Q. So in relation to the two triangles you have spotted, they do show an opening and not a door; correct? If you look at that as a notation.
A. But in context, Mr Mok, from memory it's a schematic of a hydraulic oil system.
Q. On the docking plan.
A. On the docking plan, yes. Not everything is shown on there. It doesn't show the lights, for example. So would it be necessary to show a door? I don't know the answer to my own question. I suspect not.
Q. You did say, Dr Armstrong, that you would expect it to

Page 182

show an arc with a line on it, indicating an open door, if there was an open door.
A. That is how I would have drawn it myself, yes.
Q. Yes. So anyone looking at those plans and seeing those triangles, on the basis that they are as-built or as-fitted, may expect an opening there as opposed to an open door?
A. On the docking plan as fitted, Mr Mok, it on one plan shows those triangles but just a little bit above it it says "watertight bulkhead". So it's a little confusing.
Q. Yes, I understand that. But all I'm asking is, just focusing on the triangles, one might reasonably interpret that as meaning an opening as opposed to a door?
THE CHAIRMAN: Your answer to that is, you look up at the other part of the plan and it says it's a watertight bulkhead.
A. Correct.
THE CHAIRMAN: Is that right? Do I understand you?
A. Correct, Mr Chairman, yes.
THE CHAIRMAN: And one is bigger than the other. If it says "watertight bulkhead", that's what you expect to find?
A. I would be aware that an opening required a watertight door on it, so I would have assumed it was all watertight.

Page 183

THE CHAIRMAN: Have I got that right? To describe something as a watertight bulkhead is the bigger assertion of the two --
A. Oh, yes.
THE CHAIRMAN: -- and therefore the opening, you'd expect to be provided with a watertight seal to it?
A. Correct.
THE CHAIRMAN: What is missing, and what you would have drawn, is if it was a door, you'd have an arc with an angle showing that it was a door?
A. Yes. But that could just be a drafting difference.
THE CHAIRMAN: Yes.
MR MOK: Now, my second area touches on the aft peak bulkhead, Dr Armstrong. I have found a description of an aft peak bulkhead which may hopefully reflect at least part of your earlier explanation. Can I draw your attention to that. This is now paginated in marine bundle 13, I believe, page 5090. This is an extract from the Rules for Classification and Construction issued by the Germanischer Lloyd, and these are in relation to inland navigation vessels. Do you see that?
A. Yes, thank you.
Q. Over the page at 5091, under paragraph 6.2, it is stated:
"The after peak bulkhead is to enclose the stern

Page 184

tube and the rudder trunk in a watertight compartment."
That reflects the function which you described to the Commission in your earlier evidence; correct?
A. Yes.
THE CHAIRMAN: Sorry, which paragraph were we looking at?
MR MOK: Paragraph 6.2, Mr Chairman.
THE CHAIRMAN: Thank you.
MR MOK: Just pausing there. You did say also in your earlier evidence that these days, the two -- that is, the stern tube and the rudder stock or the rudder trunk -- are generally found close together at the after end of a vessel.
A. On a conventional vessel, I think I said.
Q. On a conventional vessel?
A. Yes.
Q. And also I think you said that because most engine rooms nowadays are in the after part of the ship, rather than in the middle of the ship?
A. I did, yes.
Q. Would you agree that this, however, is only the general rule? Because in some cases, the engine room is located further away from the rudder stock, in which case it might be impractical to have the aft peak bulkhead to enclose both the stern tube and the rudder stock?
A. I would have thought, Mr Mok, that if the engine room

Page 185

was further forward, it was easier to enclose the stern tube and rudder trunk in a watertight compartment.
Q. In the same watertight compartment. That's what I meant.
A. Oh, in the same watertight compartment?
Q. Yes.
A. Possibly not. There are many different arrangements of ships, as you've said.
Q. Yes. So, for example, another statement about the aft peak bulkhead we can find at page 5089. Just to put this in context, I understand that these are rules published by the DNV, but they relate to double-hull oil tankers with length of 150 metres and above. This is shown on page 5088. But the statement concerning aft peak bulkhead is useful, if I may suggest, at page 5089, paragraph 2.3.1.1. What is stated there is:
"An aft peak bulkhead, enclosing the stern tube and rudder [stock] in a watertight compartment, is to be provided. Where the shafting arrangements make enclosure of the stern tube in a watertight compartment impractical, alternative arrangements will be specially considered."
Do you see that?
A. I see that, yes.
Q. Would you agree that, for example, Lamma IV might fall

Page 186

into such a situation; that is the shafting arrangement might make the enclosure of stern tube, I understand, in a watertight compartment impractical?
A. Yes, I think it was impractical on Lamma IV to enclose the stern tube and the rudders in one compartment, of course. One big difference is that Lamma IV was a twin-screw vessel, whereas most double-hull oil tankers with a length of 150 metres and above are single-screw. So there is a different layout between the two. But I think the philosophy is acceptable, what is stated here.
Q. Yes. Now, if we can go back to the Germanischer description on page 5091. If I may go on reading that. At paragraph 6.2, it also says there:
"Other measures to minimise the danger of water penetrating into the vessel in case of damage to stern tube arrangements may be taken at the discretion of GL."
A. Yes.
Q. It goes on further to say:
"For vessels less than 65 metres, where the after peak bulkhead is not provided in way of the stern tube stuffing box, the stern tubes are to be enclosed in watertight spaces of moderate volume."
This is a case where the after peak bulkhead does not enclose the stern tube stuffing box; is that

Page 187

correct?
A. That's how I read it, yes.
Q. So that would be the case of Lamma IV too?
A. If Lamma IV was an inland navigation vessel, yes, that would be the case.
Q. Yes. So what this provides is that the stern tubes then have to be enclosed in watertight spaces of moderate volume?
A. I agree.
Q. Although "moderate volume" is not defined.
A. No.
Q. In the case of Lamma IV, the stern tubes are enclosed within the engine room; is that correct?
A. At the very after end of the engine room, yes.
Q. And the watertight space in that case then would be the engine room compartment?
A. Yes, although I'm hesitating because I'm wondering if the arrangement of the stern tube, which has a small volume, would be adequate to meet the definition of a watertight compartment. Is the stern tube itself, which there is on Lamma IV, sufficient? I suspect not, because although it's got a gland at one end, it's also got a stuffing gland on the inboard end. So, yes, you're probably right: the machinery room would be the "moderate volume" required.

Page 188

Q. Should we have a look at the drawing there? Would it help to look at that?
A. It might be useful.
Q. Yes.
I think there's a drawing there. I think it's marine bundle 2, tab 15, page 229.
That's the drawing, right?
A. Yes. If you can scroll down a little. Thank you.
Q. Can you perhaps elaborate on the basis of this drawing? The drawing at the top.
A. I think the view we have is okay. No, the viewing at the top is rather small-scale. But you can see that on frame 4, there is a bulkhead, just about where the cursor is now.
Q. That's the aft bulkhead for the engine room?
A. That's the aft bulkhead for the engine room. Below that there is an inclined tube, and that inclined tube contains the propeller shafting running through it. You can see that the after end of that is in the open water, is underwater, and the forward end is in the engine room.
THE CHAIRMAN: The forward end has got a stuffing box?
A. Then if you scroll down a little on the screen, you'll see the details of the stuffing box. Thank you. It's a little lower down. It's titled "Mid & forward bearing

Page 189

housing and stern tube", and you can see that there are bearings on the left-hand side, in the open, and then on the right-hand side there are also bearings, and around that there is a watertight mechanism called a stuffing box.

My concern was whether that whole stern tube could be considered the watertight space of moderate volume, but it's not, really; it's a stern tube. So it should be enclosed in a watertight space of moderate volume, according to these rules.

MR MOK: Yes. But you wouldn't say, for example, that this particular arrangement, where the stern tube is found inside the engine room, which itself is watertight, would be a violation of that particular rule?

A. I think this is a common arrangement for twin-screw vessels, yes.

Q. Yes.

A. I don't see how that affects the definition of an aft peak, though, Mr Mok.

Q. No. Can we now take a case, for example, Dr Armstrong, of something like --

THE CHAIRMAN: So that I understand -- forgive me from interrupting -- it's a common arrangement in a twin-screw vessel to have the stern tube coming into the vessel in the engine room which itself is

Page 190

a watertight bulkhead?

MR MOK: Compartment.

THE CHAIRMAN: Compartment.

A. Sorry, my comment was meant to cover an arrangement of on a twin-screw vessel with stern tubes coming up through the bottom of the vessel into some compartment which may be a tank room, for example, or an engine room. In this case it is an engine room. I don't find either arrangement unusual. It is advantageous to arrange it such as on Lamma IV because if it was higher up and went through the bottom of the boat in the tank room, there would then be the need to put a watertight gland in the corrugated bulkhead 4. So there's a lot of extra work and cost there. So after due consideration, Mr Chairman, yes, I think probably it's a common arrangement to come into an engine room.

MR MOK: Thank you, Dr Armstrong. In that answer you just gave, you also said that the stern tubes may also come up through the tank room, for example. You said that?

A. Yes.

Q. Let's take that hypothetical case. If the stern tube had come up in the tank room, and then you have the aft bulkhead for the engine room, let's say that bulkhead at frame 4 encloses both the stern tube and the rudder stock, in that case, would you agree that that bulkhead

Page 191

at frame 4 can properly be characterised as an after peak bulkhead?

A. I don't agree, Mr Mok, because of the volume of the space more than anything. And also I personally would not think that was the after part of the vessel.

Q. Well, it encloses both the rudder stock and also the stern tube, right?

A. I think also there are definitions of aft peak spaces as being of a small size somewhere.

Q. Yes. Well, can we look at that, maybe in the SOLAS rules which you have produced to us.

THE CHAIRMAN: Just so I can follow this, it's on the basis of the volume of the area aft of the engine room bulkhead, and the fact that it's so far away from the aft end of the vessel; those two points?

A. After the aft peak bulkhead, not the engine room bulkhead, yes, sir.

MR MOK: Now, the SOLAS rules that you have produced are in the expert bundle, page 956-6 and onwards.

At page 956-7, we have regulation 10, dealing with "Peak and machinery space bulkheads", et cetera. There are two rules which touch on this topic, both of which have some indication concerning the structure involved.

Can I ask you to please turn to page 956-8, regulation 8. Have you got that? It says:

Page 192

"In all cases stern tubes shall be enclosed in watertight spaces of moderate volume."

Again, it's not defined; correct? There's no definition of this?

A. Correct.

Q. It goes on to say:

"The stern gland shall be situated in a watertight shaft tunnel or other watertight space separate from the stern tube compartment and of such volume that, if flooded by leakage through the stern gland, the margin line will not be submerged."

Do you see that?

A. I see that, yes.

Q. That's one indication of the sort of parameters for a structure like this.

Also if you look at the same time in regulation 7, which directly deals with an after peak bulkhead, it says:

"An after peak bulkhead, and bulkheads dividing the machinery space, as defined in regulation 2, from the cargo and passenger spaces forward and aft, shall also be fitted and made watertight up to the bulkhead deck."

Just pausing there. Does this contemplate a bulkhead which goes all the way to the main deck, straight up?

Page 193

A. Correct, yes.
Q. But it goes on to say:
"The after peak bulkhead may, however, be stepped below the bulkhead deck, provided the degree of safety of the ship as regards subdivision is not thereby diminished."
So this last sentence deals with a situation where the bulkhead doesn't go straight up but goes -- it's constructed in steps.
A. Correct. That's quite a common feature on conventional ships.
Q. And again, the guidance on safety there is in general terms. It says:
"... provided the degree of safety of the ship as regards subdivision is not thereby diminished."
A. However, Mr Mok, paragraph 7 makes no references to stern tubes.
Q. No, it doesn't. It's referred to in regulation 8.
A. Yes.
Q. But what I wish to suggest to you is this, Dr Armstrong: that there is really no express requirements concerning what volume or what distance is required, so long as the general rules concerning safety are observed. And one of those rules is that the margin line will not be submerged where there are such structures on board. Do

Page 194

you agree with that?
A. I think we've gone through this before, Mr Mok, and yes, I agree with that one example.
Q. I'm sorry?
A. Yes, I agree. That is one example.
Q. That is one example, but what I'm suggesting is that if you contrast --
MR SHIEH: I think what Mr Mok is trying to get at -- he skilfully used one -- he skilfully said "one of those rules", but the dividing line could well be whether or not that is the be-all and end-all. We come back to the same question.
THE CHAIRMAN: I think what Dr Armstrong was alluding to, and I see him nodding.
But I do think we've dealt with this before, Mr Mok.
MR MOK: Yes.
THE CHAIRMAN: I appreciate it may be that the Marine Department want to have the last word in this matter, but we've dealt with this time and time again.
MR MOK: Yes, Mr Chairman. I take your point.
Dr Armstrong, you said that that is one case, but what I'm suggesting is that rather than having very specific requirements such as in relation to the fore peak bulkhead, as set out in regulation 10, point 1, these requirements concerning the safety of after peak

Page 195

bulkhead or stern tubes are in general terms; that is, providing that the general safety of the ship as regards subdivision or the margin line is not compromised.
A. Yes.
Q. Can I just summarise my point in this way. In contradistinction with the fore peak bulkhead, the location of which is prescribed fairly strictly, the rules concerning aft peak bulkhead generally requires it to be watertight, and if the structure or volume of the watertight spaces are mentioned, they generally take the form of general guidelines to ensure that the vessel is safe when these spaces are flooded. Would you agree with that summary?
A. Yes, I would.
Q. Dr Armstrong, can I now direct you to your third supplemental report at page 1620. In paragraph 5, I think you fairly characterise your evidence in this way, as your observations -- the second line -- that the aft peak bulkhead was normally located at the after end of the vessel and in your experience at about 10 per cent or slightly less from the after end.
A. Yes.
Q. You characterise that as your observation and you use a similar description, for example in paragraph 7, your first sentence and also the last sentence of

Page 196

paragraph 7, all of which is described as being your observations.
A. Which stemmed from an original question that I was asked -- I can't remember who by, it may have been yourself, Mr Mok -- as to where would I expect to see the aft bulkhead.
Q. Yes. But what I'm drawing your attention to is you have used "observations" to describe this matter. In other words, do I correctly understand that you have not read or derived this from any written set of rules or any written set of industry practice or standard?
A. Correct, yes.
Q. If I may in that context direct you back to the Blue Book, instruction 12(iv). This is in bundle 8, page 1769. The relevant rule is 12(iv):
"In all double-ended launches and launches over 70 feet long, peak bulkheads will be required at both ends."
Now, in fairness to the Marine Department, if it takes the view that a bulkhead can be regarded as an after peak bulkhead because it encloses the rudder stock and is watertight, even if the distance is more than 0.1L from the stern or the rudder stock, you would not go so far as to say that this view is either unsustainable or plainly wrong, having regard to the

Page 197

language of this rule, would you?
A. No, I would not use those words.
Q. Right. If I may just ask you now to go to paragraphs 6 to 10 of your third supplemental report, at pages 1621 to 1623. There you are dealing with some of the examples which are cited by Mr Wong Wing-chuen in his fourth supplemental statement.
A. Yes.
Q. These examples are summarised in your table on page 1623.
A. They are.
Q. Now, is it fair to summarise your views in this way, that in the event that the code of practice applies, some of those examples would not have required an aft peak bulkhead according to the code of practice, either because it is less than 24 metres long, or the engine room is at the after end?
A. Could I respectfully ask you to just ask that question again?
Q. In the event -- that is, assuming that the code of practice applies -- then what this summary does is to set out some of the examples where it is said that the after peak bulkhead is not required by reference to the rules in the code of practice.
A. Yes.

Page 198

Q. They are either because the vessel is less than 24 metres long --
A. Yes.
Q. -- or because the engine room is at the after end?
A. Or a double-ended ferry.
Q. Yes. The other examples which you have cited are either work boats or catamarans.
A. Yes.
Q. Yes. Those are, of course, not dealt with specifically in the code of practice.
A. No.
Q. But do you agree that your observations --
A. I'm sorry, I think they are covered in the code of practice because it's --
Q. I mean in the relevant rule. Can I ask you to look at that?
A. Okay, yes.
Q. In the code of practice -- that's marine bundle 11, page 3461. Paragraph 2.1(d):
"Every launch or ferry vessel should be fitting with the following watertight bulkheads:
...
(d) if the vessel exceeds 24 metres in length, an aft peak bulkhead unless the engine room is situated at the aft end of the vessel."

Page 199

A. Yes. Sorry, my point is this only applies to launches or ferry vessels. So it's not work boats. Non-passenger vessels.
Q. Right.
A. It says, 2.1, "Every launch or ferry".
Q. Yes. The point I wish to make is this. Your earlier observations that you made in the various paragraphs in this supplemental report are general observations of all vessels, and they are not observations linked or limited by any particular rules --
THE CHAIRMAN: He's agreed with that several times, Mr Mok.
MR MOK: I'm sorry.
THE CHAIRMAN: We're there already on this point.
MR MOK: Well, Mr Chairman, I'm simply just asking a question concerning this particular report which I know is related to a question I asked before, but this is in relation to his summary.
THE CHAIRMAN: If you feel that you must pursue it, perhaps on instructions, do so. But let me tell you that we don't think that this is assisting us.
MR MOK: Yes. Thank you, Mr Chairman.
Well, perhaps I can ask this. Dr Armstrong, you do accept that the code of practice is not applicable at the time when the Lamma IV was being constructed, because this came after?

Page 200

A. Of course not, yes.
Q. So if you compare the Blue Book, paragraph 12(iv), it has different criteria, such as the length is different, 70 feet rather than 24?
A. Yes.
Q. And also the engine room is not mentioned there?
A. Engine room is not mentioned?
Q. Engine room is not mentioned in rule 12(iv), as opposed to the code of practice.
A. Could I have a look at that, please?
Q. Yes, of course. It's going back to bundle 8, page 1769.
A. And your reference to the machinery space --
Q. Is the machinery space referred to in the rule in the code of practice. Do you remember that? That is in bundle 11, page 3461, paragraph 2.1(d).
A. Okay. You're referring to "situated at the aft end of the vessel"?
Q. Yes. That's another distinction.
A. I thought you were talking about requiring bulkheads at each end of the engine room.
Q. No, no.
A. Thank you.
Q. That is another distinction between that and the Blue Book?
A. Yes.

Page 201

Q. Thank you. Can I now move on to the watertight bulkhead point, which is a reference, first of all, to one of the tables in your second supplemental report. This is expert bundle, page 928, please. I think the table that you commented on in your new supplemental report is the table headed "Tank room only".
A. Yes.
Q. As you see in paragraph 12 of page 928, the table sets out a summary of floodable length calculation for margin line immersion in accordance with schedule 1. I think that is a reference to schedule 1 of Cap 369AM. You can see that on page 925, paragraph 5. That's the reference there.
A. Yes, correct.
Q. So, regulation 6, you remember, if I may just ask you to turn back to it -- if you could go back to page 925, please, paragraph 5.
Paragraph 5 refers to regulation 6, which basically deals with watertight subdivision; right?
A. Regulation 6 requires compliance with schedule 1, yes. Which is watertight subdivision.
Q. Yes. What I wish to suggest is that schedule 1, which sets out the calculation relating to floodable length and the margin line, also includes the 0.1L rule as part and parcel of those regulatory requirements; correct?

Page 202

In paragraph 6(6)?
A. No, Mr Mok. I don't agree with that.
Q. You don't agree with that?
A. No.
Q. Can we have a look at that?
A. The watertight subdivision calculation itself doesn't actually say where the bulkheads are at all. It says the maximum length of a compartment that you can flood without submerging the margin line at that particular location on a ship.
Q. Yes. But in relation to schedule 1, which deals with floodable length, one of the rules is the 0.1L rule in schedule 1 itself.
A. I would like to see that on the screen, please.
THE CHAIRMAN: I think we'll do that tomorrow.
How long do you expect to be, Mr Mok?
MR MOK: Not very long, Mr Chairman.
THE CHAIRMAN: Mr Shieh?
MR SHIEH: There are one or two housekeeping matters that I wish to raise in anticipation of tomorrow.
THE CHAIRMAN: Yes?
MR SHIEH: It would appear that after Dr Armstrong, the next witness is going to be Mr Lee from the trade union, whose statement has already been finalised and found its way into the miscellaneous bundle. It's the very last

Page 203

document in the miscellaneous bundle. So if the Commission wishes to have a look overnight, it's in the miscellaneous bundle.
THE CHAIRMAN: Thank you.
MR SHIEH: Looking forward, if the evidence is likely to be completed tomorrow, then we are going on to the next stage, and that is to say, directions for the precise timetable or deadline of sequential filing and serving of written submissions. Mr Chairman has given directions as to the length and font size and the allocated time, the guillotine time for oral delivery, but we still need to sort out the exact time at which they have to be served. So that will have to be done tomorrow by way of directions.
THE CHAIRMAN: Yes.
MR SHIEH: I've had a word with Mr Grossman, who actually spoke to me on behalf of Mr Sussex as well, that is to say, I understand they are both otherwise engaged on Tuesday and Wednesday, and they have asked that any timetable -- obviously for service, it doesn't require them to be physically present but in terms of oral delivery, Mr Grossman and also Mr Sussex have indicated that they would not be available for oral delivery on Tuesday and Wednesday.
THE CHAIRMAN: If they want to deliver oral speeches,

Page 204

they'll be here.
MR SHIEH: I've been asked to convey that message so in case of any directions for exchange of written submissions --
THE CHAIRMAN: What I have in mind is if evidence finishes tomorrow, you will file your written submission on Saturday and you'll deliver your oral speech on Monday. That will be followed by Mr Grossman, if he's here, and followed by Mr Sussex, if he's here, and then my Mr Pao, if he returns, then by Mr Mok.
MR SHIEH: So Mr Chairman is actually thinking of filing of written submissions on Saturday?
THE CHAIRMAN: Saturday by you, and Monday morning by the others. That's what I had in mind.
MR SHIEH: I see.
THE CHAIRMAN: You would serve first. They'd had a chance to look at your material.
MR SHIEH: Yes.
THE CHAIRMAN: Then they would reply.
MR SHIEH: I see. So that would obviate the worry about them not being available on Tuesday and Wednesday, because at that rate --
THE CHAIRMAN: What I would anticipate is if we do finish tomorrow at some stage, then you'll be delivering our oral address on Monday morning, and Mr Grossman will be delivering it later on Monday morning, Mr Sussex

Page 205

thereafter. Two hours, then one hour each.
MR SHIEH: Yes.
Also, Coxswain Lai indicated, when he was asked about legal representation, that his lawyers asked him that he need not appear by lawyers as yet or at that stage, namely the stage of the evidence.
THE CHAIRMAN: Yes.
MR SHIEH: I believe that since he is actually without a lawyer and his suggestion indicated the possibility that he may well wish to be legally represented at the submission stage, so --
THE CHAIRMAN: He has an open invitation to be legally represented.
MR SHIEH: Yes.
THE CHAIRMAN: We've given that direction. It's a matter for him whether or not he avails himself of that right.
MR SHIEH: Yes. Perhaps Lo & Lo may wish to liaise with him and remind him that --
THE CHAIRMAN: I think it would be helpful for those that are not present, not just Coxswain Lai, but also Mr Yeung and Mr Pao, that they be informed that this is the now anticipated timetable.
MR SHIEH: Very well. That's all.
THE CHAIRMAN: There is one or two other outstanding matters.

Page 206

MR SHIEH: Yes?
THE CHAIRMAN: We would like to receive by way of reading out the statement that Mr Yeung filed on behalf of the China Classification Society.
MR SHIEH: Yes.
THE CHAIRMAN: That's on the basis that nobody wishes to cross-examine them or question them.
We would also like to, by the same method, receive evidence from the Hong Kong Government Flying Service. There's a statement by a witness -- Evans is his name. I refer to that simply because that statement is in English, and therefore I've been able to read it. He addresses the contribution that the Hong Kong Government Flying Service has made to the rescue attempt, and we'd like to receive that material. It's for that reason that we wish to receive it.
So both those statements could be read tomorrow.
MR SHIEH: We'll locate that and have that read tomorrow.
MR MOK: Mr Chairman, there's also going to be a short statement, you remember, relating to the marine investigation section --
THE CHAIRMAN: Yes, I do remember that.
MR MOK: -- that will be coming or has already come.
THE CHAIRMAN: Thank you very much for that. There is the issue of Dr Cheng. You haven't come back --

Page 207

MR SHIEH: We have taken a view that we do not require Dr Peter Cheng to be cross-examined.
THE CHAIRMAN: Very well.
MR SHIEH: That is, of course, on the basis that Dr Cheng's report is adduced for what really would be the material parts, because, Mr Chairman, you would appreciate in terms of the actual calculation of the actual weight and the actual numbers, depending on the different assumptions as to how many kilograms a passenger would weigh, the precise outcome of the numbers could well be different, but for material part, namely whether or not the margin line has been submerged, it's on those parts that we do not require him to be cross-examined. Because we believe those are really the material parts.
THE CHAIRMAN: Very well.
MR SHIEH: We have taken the view that we don't need to quibble with the actual numbers.
THE CHAIRMAN: Thank you for that.
Are there any other matters that counsel wish to raise at this stage?
MR McGOWAN: Only if you don't require the original drawings we gave you this afternoon --
THE CHAIRMAN: I think we would like to keep them for current purposes, simply because they will enable us to be able to read what's written on them, whereas the

Page 208

photocopies don't.
MR McGOWAN: We understand.
THE CHAIRMAN: We'll keep good care of them, I trust. Is there anything else? In which case, 10 o'clock tomorrow.
(5.32 pm)
(The hearing adjourned until 10 am on the following day)

I N D E X