Tuesday, 16th May 2000

(9.30 am)

MR JUSTICE COLMAN: Those who find that the tropical conditions are unacceptable and not conducive to the level of hard work that is going to be required today can remove their jackets, as there are no wigs to remove, so far as I know.

Just before you start, Mr Meeson, I would like to ask for some help from Mr Thomas on one thing.

Mr Thomas, do you have any recent report from the experts on wreckage identification and how they are progressing, and whether they anticipate having to be recalled or what?

A. My Lord, the latest report is that they have gone on meeting all day yesterday until quite late. Various topics have been, I think, exhausted from the point of view --

MR JUSTICE COLMAN: Including the experts, I should imagine.

MR THOMAS: Possibly the experts as well. Today I think they are directing their attention to minuting, and then I think going on to discuss the starboard windlass, I think, but certainly there is one other topic that they intended to continue to discuss today.

I understand that today may be the last day of the

series of meetings, and then, when this topic is complete, the rules and requirements, I would then wish to recall Mr Williams.

He has first a presentation he would like to make from a video tape that was taken on the Sir Alexander Glen, which highlights a number of details in the wreckage, as it were, on the live sister ship, which is thought will promote clarity of understanding on some matters. Then I would like to call him on the matters on which they are agreed, if there are any, and the matters on which they are disagreed.

MR JUSTICE COLMAN: Is that something which is likely to be manageable at the end of the rule history section?

MR THOMAS: Yes, I would hope so, my Lord. I am assuming that the rule history section will take two or three days, something of that order. Either at the end of this week or the beginning of next, I hope Mr Williams could be recalled to deal with those matters.

MR JUSTICE COLMAN: Thank you very much. Yes, Mr Meeson?

MR MEESON: My Lord, the next topic is rule history, as we have described it, and I have prepared a core bundle together with a written summary which the usher will hand to you. (Handed)

MR JUSTICE COLMAN: Thank you very much.

MR MEESON: My Lord, it will probably be helpful to take the

summary out and have it as a separate document as we go through.

My Lord, my intention is to go through this summary document but not refer to every document in the core bundle. There are footnote references in the document, and it is my intention just to go to some of the perhaps more interesting --

MR JUSTICE COLMAN: That seems a very sensible idea. Just in relation to this presentation, if Mr Meeson is dealing with one of the documents which are flagged up in his footnotes and referring to it specifically and reading from it, if there is anything else in that same document which anybody else wants to be read, could they indicate vigorously, and they will then have an opportunity of reading it in. It is obviously more sensible that I should have my attention directed to all the bits of the document at the same time.

MR MEESON: My Lord, the position really starts with the 1930 Convention, and that Convention did not prescribe freeboards for larger vessels, and in particular for steamers in excess of 750 feet in length. The assignment of freeboards for vessels in excess of that length was left to the discretion, effectively, of the relevant national administrations, and the 1930 Convention did not either prescribe strength standards

for metal hatch covers. It did have some particular requirements concerning the size of hatch beams and wooden hatch covers. Whether that was because there were not any or possibly were not many metal hatch covers and not many, if any, large ships probably does not matter, but for the period that we are concerned with, following the Second World War, there was a development of larger ships, and a development of metal hatch covers, or more widespread use of metal hatch covers, particularly MacGregor hatch covers. It therefore became necessary to take these matters effectively on board at an international level. This was done initially through the classification societies, or rather through the, I think, seven, as it then was, major classification societies.

My Lord, they had met following the 1930 Convention at their first sort of collective meeting, as it were, and they were due to have another one when war broke out, so that did not happen. But in the mid-1950s, there was an institute to revive the meeting of classification societies, and the first revived meeting took place in Paris in 1955. At that meeting, it was noted that several oil tankers had recently been converted into ore carriers and have been given the same freeboard as tankers.

Discussions took place at that conference as to the implications of this development and the need to consider various particular matters, such as longitudinal strength and sub-division, and there was also some discussion about hatch covers on these vessels.

In particular, Bureau Veritas said that it could not be said that hatch covers of an ore carrier must be the same as those of a tanker because they were not built in the same way and they were much larger. Their suggestion was that such hatch covers be strongly built and closed by a sufficient number of swing bolts or similar appliances.

Lloyd's Register said that it was necessary to consider the strength of covers, and in particular the scantlings of steel hatch covers for all carriers should be somewhat greater than those which have been proposed for ordinary dry cargo ships.

RINA said the means of closing the holes of ore carriers when they have a deeper draught must be given the same invulnerability against the sea as the means of closing tankers.

ABS said that they used the same standard metallic hatch covers on all vessels, but they claimed that their standards were 20 to 30 per cent heavier than those

proposed by the other societies. So they suggested that they may need to come down in their standards for ordinary ships, and leave them where they were for ore carriers.

My Lord, one can pick that up in the core bundle at page 6. The pages in the core bundle in the top right-hand corner are numbered consecutively through the core bundle. The footnote references in the summary judgment are to the original source location of those documents, and that is to be found at the bottom right-hand corner.

MR JUSTICE COLMAN: Page 6?

MR MEESON: Page 6. I should also say that we are indeed very fortunate to have a lot of this material because it has come from all sorts of strange sources such as people's personal copies of the minutes of the meeting of classification societies that they happen to have at home, even though the relevant classification society or IACS do not seem to have such records. But fortunately, through various assistance, we have been able to compile a fairly complete history up until 1966.

At page 6, towards the bottom, there is the remark by the Chairman, and halfway through that paragraph it says:

"We may now pass to the fifth point: the hatches

to the ore compartments should be strongly built and closed by means of metallic hatch covers secured by a sufficient number of tightening screws or equivalent appliances. In our opinion, the closing appliances should be equivalent to those provided for in tankers."

Then Bureau Veritas, Monsieur Castex says:

"It cannot be said that the hatch cover of an ore carrier must be the same as those of a tanker. As a matter of fact, the former ones are much larger and not built in the same manner. Therefore, we believe it should be said that the hatch covers must be strongly built and closed by a sufficient number of swing bolts or similar appliances."

Mr Murray of Lloyd's Register then says:

"We think that this matter is bounded by up with a later item, that is the strength of steel hatch covers, which comes later on. We are of the opinion that the scantlings of steel hatch covers for ore carriers should be much greater than those which have been proposed for ordinary dry cargo ships."

Then Mr Solda of RINA says:

"We agree fully with the means of closing the holes for ore carriers when they have a deeper draught must be given the same invulnerability against the sea as the means of closing the tankers."

"Mr Brown of ABS says:

"On hatch covers, I would state this: that in the American Bureau, for all types of vessels, whether ore carriers or not, we have used the same standard metallic hatch covers. But that is a question we can only resolve when we come to that subject later on, because our standards of metallic hatch covers are generally 20 to 30 per cent heavier than those proposed by the other classification societies. If we are going to agree to the scantlings of metallic hatch covers for ordinary cargo ships, the American Bureau will probably have to come down somewhat on their standard for cargo ships, and leave it where it is on ore carriers. In short, we cannot take a decision on this question of the hatch covers of the ore carriers before having come to an agreement on the question of the hatch covers of dry cargo ships."

Then the Chairman says:

"I think the question should be postponed till a later session."

Then it appears that a comparison between the various societies on their strength requirements for steel hatch covers showed that, in fact, NV, NKK and Lloyd's Register were about the same as each other, and that ABS had slightly higher standards. It was agreed

at the end of the meeting that the classification societies should suggest to the administrations that an additional paragraph regarding steel hatch covers be inserted into the Convention, and that special regard should be paid to ore carriers.

One can pick that up at pages 10 and 11 of the core bundle under the heading "Strength of steel hatch covers".

The Chairman says:

"This item deals with the strength of steel hatchway covers. The American Bureau has already pointed out that there is a great variety of steel covers with different strength and tightness qualities. On the other hand, the classification societies all have their practice and their rules for scantlings and the thickness of the plating of these steel hatch covers, and the object of this discussion is to endeavour to find some uniform practice for these scantlings."

Germanischer Lloyd say:

"We think that we cannot agree on any uniform rules for scantlings owing to the different types of steel hatch covers. To our mind, it should be left to the decision of every classification society as regards the strength of steel covers."

Lloyd's Register say that they would like to

support Germanischer Lloyd's suggestion, but at the same time:

"... I think it is of interest to point out that there is, in fact, very close conformity between the practice of the various classification societies. We have analysed the Norske Veritas and NKK figures and find that in general they approximate very closely to what we ourselves ask. American Bureau, I think, require something rather stronger."

Then the Chairman says:

"I think we are all agreed that this meeting is not the place to commence discussing all the formulae and detailed strength of steel hatch covers. It can be left to the classification societies that are responsible for their own approvals, and there is nothing to prevent them from consulting together in an endeavour to get these standards for steel covers into line. I think we might leave that question now and accept the suggestion made by Bureau Veritas that a proposal be forwarded to the administrations that an additional paragraph regarding steel hatchway covers be inserted in the Convention Rules without telling them what that paragraph should consist of."

Then Mr Brown of ABS says:

"I am thoroughly in accord with that suggestion,

but I would also like to suggest that the question of hatch covers for ore vessels should be included, as you will recall was mentioned yesterday. The question is, should there be any increase over the normal standards for ore carrying vessels, and if so, how much?"

The Chairman:

"Mr Brown has reminded me of the additional question referred back from yesterday, and that is that, in considering the standard of strength of steel hatch covers for ordinary cargo ships, the further question arises as to whether these scantlings should be increased in the case of the ore carriers for which tanker freeboards are to be assigned. We probably need not decide how much, but it is essential for us to say if we consider that steel hatch covers should be increased for ore-carrying ships."

Then Norske Veritas ask:

"Will that apply to any height of coamings in an ore carrier if we say that the scantlings of steel hatch covers are to be increased? They should certainly be increased in case of coaming lower than the rule, but I am not sure that an increase is necessary if the coaming is satisfactory."

The Chairman:

"Dr Vedeler's point is, I think, a point of

detail. We are dealing with this question only on the broadest lines. The point is, in recommending to the administrations that they consider and put into the Convention Rules some table or rule regarding the strength of steel hatch covers, we should suggest that they also consider whether the requirements for these hatch covers should be increased when the freeboard is reduced in ore-carrying ships or for any other reason."

RINA:

"We are agreed on this proposal, but we wonder whether we could not indicate to the governments, when transmitting this suggestion, the degree of security that would be necessary for these steel hatch covers, specifying, for instance, the water height which they should resist."

Bureau Veritas:

"We concur with Mr Solda's proposal which, we believe, will give the governments a very useful basis for discussion."

Germanischer Lloyd:

"I think we cannot submit to the governments a definite rule; on studying this question, it appears difficult to set down general rules."

The Chairman:

"Well, it is agreed that we should suggest to the

administrations that an additional paragraph regarding steel covers be inserted in the Convention and that special regard should be paid to ore-carrying ships. On the point of detail concerning the formulae to be used in calculation, I would suggest that in the meantime, the classification should compare the existing formulae with notes and present practice and see if it is possible to arrive at some more or less basic standard which could be said to be an average practice, or the uniform practice of most of the societies, and then forward that to the administrations concerned. I do not think we can reach that point at this conference; we must see what can be done by correspondence or at some other meeting.

"All delegates agree with these proposals."

That was where it was left at the end of the meeting of classification societies in 1955. Subsequent to that conference, correspondence did take place between the societies which revealed certain differences in the various standards applied, although these were not apparently great.

Lloyd's Register suggested a certain minimum standard with the proviso that where tanker freeboards were assigned, the section modulus and thickness was to be increased by 15 per cent, and I there, on the rest of

page 2, summarise that, but it may be more convenient -- I think I will just read out the summary:

"On the Lloyd's Register ..."

MR JUSTICE COLMAN: You are not going into the physics?

MR MEESON: No, I will leave that for later. That was Lloyd's Register's proposal, and the important point was this additional 15 per cent where the freeboard was to be reduced.

ABS said that there was no experience to show any need for this additional 15 per cent. BV were prepared to adopt the standards. Germanischer Lloyd suggested lower standards, but increased thickness for ships having tanker freeboards. DNV said the proposals represented a fair average of current standards, and should be adopted as a minimum, and they suggested the addition to the standard of a minimum moment of inertia for the stiffeners. RINA considered the proposals acceptable, but thought that the proposals should also include a limit of deflection, and NKK also agreed with the proposals.

That was where that was left after the correspondence. In the United Kingdom, presumably because it was a standard applied by Lloyd's Register, there was a requirement that where ships, in particular ore carriers, were assigned tanker freeboards, then they

needed their hatch covers strengthened by this additional 15 per cent over and above that required of ordinary cargo ships, and that certainly appears to have been the position from the mid-1950s, from 1956 onwards, and found its way into what was Rule 109 of the Load Line Rules 1959. Also, the UK Government gave formal notice under the 1930 Convention that that was the course that they were adopting.

That really takes us up to, effectively, the end of the 1950s, with the position that ships were still being given load lines under the 1930 Convention, but a practice had grown up for these larger ships, and in particular ore carriers to be allowed to have a tanker freeboard, a lower freeboard, the trade-off being that they would increase their hatch cover strength by 15 per cent.

Then the next development was that it was intended that there be a new Load Line Convention to replace the 1930 Convention, and the original intention was for the international conference to agree that convention, to take place in 1961. In the event, that conference did not take place for another five years. It was postponed until 1966, but while it was still scheduled for 1961, a further meeting of the classification societies took place in London in 1956, and at that conference ABS put

forward proposals effectively for the draft convention, and in particular put forward proposals regarding hatch cover strength.

There then appeared to be a philosophical difference between some of the classification societies regarding what the purpose of freeboard was, and what the criterion should be for considering freeboard. The basic distinction was between the idea that freeboard related to the vessel in an intact state, and therefore should be governed by external features and strength, and those people who said, "Well, no, you would have to look at what happens, if something happens to the ship", so that it is necessary to look at internal features such as stability and sub-division.

Part of this probably also related to a distinction between matters that had historically been part of the Load Line Convention and matters such as stability and sub-division that were part of the Safety of Life at Sea Convention.

This can be picked up in the core bundle at pages 20 to 21, where Mr Murray of Lloyd's Register sets out their views. This is at the 1959 meeting in London. What he says is:

"I think our views are much more radical than any which have been expressed so far. We think that it is

the external features and the strength which should determine the freeboard and not the internal features such as sub-division. In other words, taking it to the extreme, we think that an ordinary dry cargo ship of adequate strength with steel hatch covers and with other conditions of assignment required for a tanker, such as special freeing ports, special gangways, special coamings to openings and the like, should have a tanker freeboard. We feel that freeboard relates to the ship before a casualty and is not a function of what happens after a casualty. I think the American Bureau view is that there should be more sub-division in a ship having tanker freeboard than there is in an ordinary ship. Our view is that it does not really come into it at all. For that reason, we would be very sorry to have any detailed requirements such as was suggested by Bureau Veritas.

"Now, these views may seem extreme, but it appears to us from the record of casualties that there would be no reduction in the safety of ships as a whole, and furthermore, it is interesting to recall the reason why a differentiation was made between tanker freeboards and cargo freeboards at the last convention. I think it is fair enough to say that the American coastal tankers were being loaded to a greater draught than other ships,

and the experience of American owners was such that they considered that these freeboards should be assigned to all tankers. In point of fact, that was done, and without any increase in damage.

"There is just one other point which I would like to make, and it is a purely practical one. It is a question I have often asked of masters of ships, and it is this, 'Would you rather be in the North Atlantic in a ship with an 11-foot freeboard and with wooden hatch covers or in a ship with steel hatch covers and a 10-foot freeboard'. The answer I have always received is, 'We would prefer to have the latter arrangement', so that is our philosophy on that point."

My Lord, that is perhaps of marginal importance to what we will see happening, but was of great importance to the UK delegation subsequently at the conference, and shaped the UK's approach to this whole area, was this idea that sub-division should not be part of load line, and a lot of energy was directed by the UK Government subsequently at the conference to try to persuade others of their view. Ultimately they failed, but it is of background importance because it probably had a knock-on effect in the sense that because people were happy about sub-division, they concentrated less on increasing hatch cover strength.

Then the other classification societies also indicated their positions. RINA said the justification for lower freeboard for special types of ships was their extra invulnerability against the sea, as compared with an ordinary cargo ship. DNV said that Lloyd's Register's radical ideas would lead to all cargo ships fitted with steel hatch covers and other extras being allowed tanker freeboard. They considered that to be a dangerous position. The ABS proposal which was put forward at that time, with a view to a conference in 1961, was that hatch cover strength should be that the hatches should be capable of sustaining a load of 360 pounds per square foot, with a factor of safety of not less than 4.5 based upon the ultimate strength of the material, with a limit of deflection of 0.0028 times the span under such load. My Lord, that basic formula slightly altered what was ultimately agreed in 1966.

MR JUSTICE COLMAN: Can you just explain this factor of safety business? Perhaps we are coming to that.

MR MEESON: We will come to it. It will ultimately be explained much more competently by Mr Corlett, I think, than myself. When we come and look at the 1966 Convention itself, we will see that there is some discussion about that phrase "factor of safety", because it could be very misleading, but if I have it correct,

the idea is that one starts with the load of 360 pounds per square foot, but then we have a load of four and a half times that should then not exceed the ultimate strength of the material. Anyway, we can come back to that. Lloyd's Register's position was that they were happy with this, if the ultimate strength of steel was 29 tons per square inch, which they considered to be the mean or the average of the usual range of strength of steel.

There was some comment amongst the delegates about whether the factor of safety should be 4, 4.5 or 5, but basically ABS said that they were not particularly concerned one way or the other. All they were trying to do was get some measure of uniformity because of a current variation in practice among the societies.

One can pick up some of these points, and the way they were expressed beginning at page 26 of the core bundle.

The Chairman begins:

"I think we can now discuss the question of hatch covers. As we have already heard, the American Bureau has made a proposal as to how to calculate the dimensions of hatch covers and propose to give us a certain rule for the standard of strength. May I have your comments?"

ABS then say:

"In principle, we do not object strongly to Lloyd's Register's proposal of leaving this to the satisfaction of the assigning authorities. That may be perfectly all right for the convention agreements. But we, as assigning authorities, are going to be faced with the problem of getting some uniformity in the administration so delegated to us.

"Our proposal is an attempt to find agreement among assigning authorities. Even though we accept the proposed wording, what are we going to do with it? Everyone is going to leave a meeting like this and is going to do something different. We are trying to get agreement between the assigning authorities now as to how to administer this particular delegated authority."

That gives a background to why ABS were coming up with this particular proposal.

Then one can perhaps pick it up again at page 28, at the top of the page, where we have a comment from Norske Veritas, who say:

"... I suggest that we use the same factor of safety for steel and for aluminium, but that we specify the factor of safety for the yield point as well as the ultimate strength. The factor of safety for yield point, say 2.8, ultimate strength perhaps 4. Or if we

agree to the proposal of Bureau Veritas, we might use 5 for the beams, 4 for the covers, something like that. But in connection with the yield point, I suggest a factor of safety of 2.8 for steel as well as aluminium."

So clearly there was some discussion at that time of not just steel covers but an idea that there would be aluminium covers.

Then, at the bottom of that page, the comment or response, really, I suppose, from ABS, they say:

"As I said at the beginning, our proposal is merely an attempt to obtain some uniformity of action ..."

MR JUSTICE COLMAN: Sorry, I have lost you. Which page are you on?

MR MEESON: Page 28, ABS at the bottom.

MR JUSTICE COLMAN: I have you, yes.

MR MEESON: "As I said at the beginning, our proposal was merely an attempt to obtain some uniformity of action. I am somewhat fearful that if we go away from a meeting such as this and return to our respective countries with only a few recommendations amounting to 'leave it to us', we are not going to get very far in any new convention. Our proposal was an attempt to do such things as could be done simply. We all agreed yesterday that a standard of strength was so complex and so

involved that it was impossible to sit down and write a simple formula, but we agreed that, with regard to some of the items, it would be quite easy to adopt some standard procedures. Mr Murray has pointed out that, if it becomes a regulation, it is inflexible. That is true to a certain extent, but I do not think it is completely true, and particularly if the new convention comes under the purview of IMCO, the regulations will be under constant review, and any country who wishes may bring them up before the Maritime Safety Committee for plenary action."

My Lord, that is quite an interesting point, that at the background this convention -- I do not know whether it was probably not the first convention to come under IMCO which then became IMO, but simply that was novel. The previous conventions have been not governed by an international body of that sort. So at the back of the delegates' mind, as we will ultimately come to see in 1966, there was this idea that because it was an IMO convention, amendments could be brought up through IMO to be considered at some later time. So it was not fixed rigidly in stone.

MR JUSTICE COLMAN: Can you help me on this, if you can: the relationship between the international powers of IMCO, or now IMO, on the one hand, and the negotiated

convention on the other hand, you have, as I understand it, a standing international organisation which is affiliated to the United Nations, and on the other hand an international treaty, a multiparty international treaty, which has been freely negotiated outside the IMCO regime, is out of the constitution of IMCO or IMO.

Are there any powers assigned by the members of IMCO which would give it some sort of control over the terms of that treaty, or what is meant by it? Is it just a talking shop? If you do not know the answer, perhaps we could come back to that. It is quite useful to know.

MR MACDONALD: My understanding is, no, IMO does not have any control as such. When this convention was made in 1966, the expectation would have been that it would have been difficult to change the convention. Very recently there has been a protocol which gives a fast amendment procedure, at least for technical revisions, and the modern practice is that, if change is in contemplation, it would be discussed at IMO to lay the groundwork for either a diplomatic conference or for minor technical changes to the convention.

MR JUSTICE COLMAN: So it is institutional machinery which would be deployed to facilitate revisions to the International Convention?

MR MACDONALD: Yes.
MR JUSTICE COLMAN: I see.
(10.15 am)
MR MEESON: My Lord, perhaps we could come back and look at the particular provision when we come and look at the convention, because there was a provision relating to amendment of the convention which did involve the Maritime Safety Commission of IMO, but I will address that --
MR JUSTICE COLMAN: Some sort of delegated --
MR MEESON: Yes, the position was:

"... upon the request of a contracting Government, any amendment proposed by it to the present convention will be considered in the organisation [that is IMO]. If adopted by a majority of two-thirds of those present and voting in the Maritime Safety Committee, such amendment shall be communicated to all members of the organisation and all contracting governments at least six months prior to its consideration by the assembly. If adopted by two-thirds majority of those present and voting in the assembly, the amendment shall be communicated by the organisation to all contracting governments for their acceptance. Such amendment shall come into force twelve months after the date on which it is accepted by two-thirds of the contracting

governments."

So there was a built-in procedure, if you like. It may not be very flexible, as Mr MacDonald has pointed out.

MR JUSTICE COLMAN: That is under the Convention?

MR MEESON: That is under the 1966 Convention itself.

MR JUSTICE COLMAN: That is the 1966 Convention, I see. So there was a sort of negotiating machinery procedure?

MR MEESON: I think the idea was that, whereas the 1930 Convention was effectively set up as a stand-alone convention -- presumably the UK Government were probably the people who dealt with deposits and what have you, as it was a London convention -- because this was intended to be an IMO convention, at least it did have this internal machinery that you start off with the Maritime Safety Committee, and then it goes up through the process, back to the member governments. Whereas, of course, if one simply had a stand-alone conference, unless there was some specific provision, it would be necessary for there to be a reconvened conference.

MR JUSTICE COLMAN: Just for the purposes of the record, the provision of the 1966 Convention --

MR MEESON: Was Article 29.

MR JUSTICE COLMAN: Thank you very much.

MR MEESON: My Lord, finally on this little point, page 31

of the core bundle, about three-quarters of the way down the page, American Bureau of shipping, Mr David P Brown, really summarising the discussion that has gone on about factors of safety and what have you, says:

"We have no particular feeling for 4, 4.5 or 5. We are only trying to get some kind of a formula. I do not think it is of tremendous importance, but if the feeling is that it should be 4 (or 5 or what have you) we would agree. We only put this on the table in the hope that we could get some uniformity of action among the different societies because we see such a wide variance in actual practice."

So one can see there that the idea behind this was uniformity of action amongst the classification societies, because they were going to be effectively the delegated authority for deciding these things, and they considered that they ought to perhaps decide these questions in a similar way.

The next stage is that the conference was rescheduled for 1966, and the US Government tabled proposals for a new convention. They effectively put forward a draft text to this convention, largely based upon the work of ABS that we have just been looking at. This formed the basis of discussions both prior to and at the conference.

There was also a draft convention put forward by the USSR, presumably because it would be politically unacceptable for them simply to go to a conference to discuss a US proposal in the mid-1960s, but that seems to have been largely ignored. I think lip service was paid to the fact that there was a draft USSR convention, but as far as one can tell, everyone was simply concentrating on the American version.

Once the proposal had been tabled, the UK Government set up a Load Line Working Party to consider the proposals, and this contained a wide section of industry, including representatives of the Ministry of Transport, Lloyd's Register, Bureau Veritas, ABS, DNV, the Met Office, the Chamber of Shipping, the Shipbuilding Conference and the Merchant Navy and Airline Officers' Association.

The sort of starting point for the UK's consideration was a document presented by Lloyd's Register, which commented upon the proposed hatch cover strength standard which they considered to be inadequate, because they themselves had higher standards and they said that practical experience gives no reason to reduce the present standards. One can find this in the core bundle at tab 4, page 33.

MR JUSTICE COLMAN: The ABS proposal did involve a

reduction.

MR MEESON: It involved a reduction so far as Lloyd's was concerned, although part of this may have been more apparent than real in that it seems that Lloyd's and the Americans may have been using a different standard of tensile strength of steel, in that Lloyd's appear to have been using an average value and ABS appear to have been using possibly a minimum value. When one puts those two together, it rather reduces the difference between them.

At page 33 of the core bundle, this is comments by Lloyd's Register on the US proposals, "Strength of steel hatchway covers and portable beams". It says:

"In considering the strength of steel hatchway covers, watertight steel covers and steel portable hatch beams, the current practice adopted in Lloyd's Register of Shipping is equivalent to that required by the Load Line Convention and has proved to be a reasonable standard. In general, the American proposals are considerably less than those at present incorporated in the society's rules. Practical experience gives no reason to reduce the present standards.

"The current practice of the society is shown below, and it is suggested that the proposed standards be increased to these figures to maintain the standard

of strength required by the present convention. For ease of reference, the numbering corresponds to that used in the American proposals."

I think the relevant one for our purposes is on the next page towards the bottom:

"Regulation 15(b) Prescribes the strength standard for steel watertight hatch covers.

"The practice in this society is to assume a loading of 370 pounds per square foot with a factor of safety of 4.75 for class 1 hatchways."

Those were the relevant ones, and then they go on at the top of the next page to say:

"The proposed thickness of plating is acceptable."

That was Lloyd's position.

MR EDER: My Lord, I do not know whether it is helpful, but that is obviously a commentary, as Mr Meeson has said, on the draft US proposal. Your Lordship sees that on the heading at the top of page 33. I do not know whether your Lordship wants to see the actual formal proposal of the draft presented before then, because your Lordship has not yet been shown that, I think, and just simply for the record -- I do not know whether your Lordship wants to see it -- it is in AG8.1 at tab 8.

MR JUSTICE COLMAN: Thank you.

MR EDER: It is quite important, my Lord, on the question

that your Lordship asked about the factor of safety, looking at the draft that the US proposed and the final wording that came into the convention.

MR JUSTICE COLMAN: Maybe we had better look at it.

MR EDER: I hesitate to interrupt, my Lord. I am happy for Mr Meeson show you this, but at tab 8 you have the draft International Convention, as proposed by the US, and I will be corrected if I am wrong, but also starting, my Lord -- if your Lordship turns around the bundle, so to speak, at page 152 -- on the left-hand side your Lordship sees all the, as I understand it, regulations as proposed by the United States. In relevant respects, starting at page 154, your Lordship should see, I hope, regulation 14, and across the page your Lordship will find, from time to time, under various headings, the counterproposals made by various of the other governments.

So the first one there is Denmark, but in relevant respects the document that Mr Meeson has shown you now is commenting in particular under regulation 4 -- I am looking at the left-hand column -- under (b), hatchway covers -- does your Lordship see that? In particular 14(b)(iii), which is over the page on page 155.

My Lord, again I will sit down in a moment, but your Lordship will see the other governments then

commenting on certain of those regulations. So far as the United Kingdom are concerned, they appear at page 162, and all I wanted to point out, my Lord, was that the document that Mr Meeson is referring to at the core bundle at page 33 is, as I understand it, a response in a way to the proposed wording that your Lordship sees at page AG8.1/155:

MR JUSTICE COLMAN: I am grateful.

MR MEESON: My Lord, I think that is nearly correct. My understanding was that it is actually a response to page 164, which is also in the core bundle at tab 8, page 161, which is regulation 15(b), because regulation 14 deals with hatchway closed by tarpaulins --

MR JUSTICE COLMAN: I think you are right, because we are not concerned here with things closed by tarpaulins and battening devices.

MR MEESON: It is in the core bundle. If I can give you the reference to the core bundle, it is core bundle page 161, which is just behind tab 8, and B is:

"Metal watertight covers are to be capable of sustaining a load of 360 pounds per square foot on class 1 hatchways", which is the ones we are concerned about, "with a factor of safety of 4.25 based on the ultimate strength of the material. They are to be so designed to limit the deflection to not more than 0.0028

times the span under these loads. Steel plating forming the tops of covers is not to be less in thickness than 0.0085 times the spacing of the stiffeners in inches plus 0.04 inches. Where materials other than steel is used, thickness is to be specially considered."

Lloyd's comment on that is that their practice was 370 pounds per square foot instead of 360, and a factor of safety of 4.75 instead of 4.25.

MR JUSTICE COLMAN: Where is that? What I am looking at is page 167. Is that the UK response?

MR MEESON: Yes, my Lord, we have not quite got there in the chronology yet, but that is the UK response at the convention.

MR JUSTICE COLMAN: I see. Anyhow, the American proposals are those on page 164.

MR MEESON: Yes.

MR EDER: My Lord, it may not matter, but in the core bundle that my learned friend, Mr Meeson, has shown your Lordship, at page 161, at the top --

MR JUSTICE COLMAN: 164 at the bottom.

MR EDER: 164 at the bottom, it is headed under Regulation 15, and has a single subparagraph (b) that Mr Meeson has referred your Lordship to. The commentary that Mr Meeson was referring your Lordship to in the core bundle at page 33 at the top is to

regulation 14(b)(iii).
MR MEESON: No, my Lord, because I was referring your Lordship to page 34 at 15(b).
MR JUSTICE COLMAN: I think Mr Meeson is right, Mr Eder.
MR EDER: I am sorry.
MR JUSTICE COLMAN: The bottom of page 34 in the core bundle, and it all locks together.
(10.30 am)
MR MEESON: I think we have done that to death at the moment. The next feature of significance was some work carried out by Mr Goodrich, now merited as Professor Goodrich, I suppose, who was then working at the National Physical Laboratory, which I now understand to be a supermarket car park. The National Physical Laboratory had some facilities in West London at which a lot of important work was carried out in the 1960s. One of the reasons, of course, that we ended up going to Marin was because the UK does not have such facilities any more, and I understand that those particular facilities are now a supermarket car park.
MR JUSTICE COLMAN: I see.
MR MEESON: A bit of an in joke.

In September 1964, Mr Goodrich presented an important paper called "The influence of freeboard on wetness", and what he showed in that paper was that as

the length of the ship increased, it was not necessary to, if you like, increase the freeboard directly proportional to the increase in length to maintain the same degree of wetness, because, if you like, a longer ship was proportionately less wet than a shorter ship, and that was important work that was carried out in England. At the same time, there was work being carried out in Europe that seems to suggest the same things, and this was important in people's thinking for the Load Line Convention for very large ships, because the UK proposal eventually reached the idea of having a constant freeboard above a certain length, and other proposals did not go quite that far but certainly had a radical sort of tailing off. It was not a straight line increase in freeboard for length. As the length got longer and longer, there needed to be a much less increase in freeboard.

It is important to note that Professor Goodrich's work was only considering the number of wetness events, so how many times a wave comes over the front of the ship. It was not considering how much load was placed on the ship by those wetness events. Part of that may well have been that there was not the sophisticated data collection machinery available to carry out such tests. Anyway, that was what he was looking at.

One can, I think, next pick up the story in December 1964, when, at the 18th meeting of the Load Line Working Party, a number of pertinent comments were made. I have summarised them on the rest of this page, but I think it may be better to look at them in their original. We can pick this up at page 55 of the core bundle.

Item number 18, about two-thirds of the way down:

"Mr Buchanan said that Lloyd's Register's records did not support the Ministry's proposal that ore carriers should in future not be assigned tanker freeboards. They had no evidence to show that the large metal hatch covers fitted on these ships were in any way inadequate.

"Captain Baird added that the Ministry's proposals would mean larger freeboards for a number of existing ore carriers in the 400 to 500 foot length range which had operated perfectly safely with tanker freeboards.

"Mr Weir said the Ministry considered that ore carriers had been assigned tanker freeboards for the wrong reason. In the Ministry's view, the highest standard of deck integrity was the only relevant criterion for the assignment of smaller freeboards to tankers, and it was therefore important in the new convention to omit any reference to sub-division or

other irrelevant factors.

"Mr Slater said the seafarers' organisations had carefully examined the Ministry's proposals. They were concerned at the size of the proposed freeboard reductions and would be unable to support these proposals unless they could be assured that adequate consideration had been given to the following important points."

They then list those over the page:

"(a) The possibility of increasing the freeboard assigned to tankers to compensate for deterioration of strength with time.

"(b) The need to increase the strength of the superstructures due to the decrease in freeboard.

"(c) The safeguarding of lifeboats and other life-saving appliances from damage ...

"(d) The protection and siting of ventilators."

Then finally:

"The safety of personnel having to work on deck on ships other than tankers.

"In relation to the last point, Mr Slater went on to say that the seafarers' organisations were greatly in favour of the fitting of metal hatch covers to remove the hazard to men who had to be sent on deck to secure or repair tarpaulins and wood hatch covers in times of

emergency in heavy weather."

Then Mr Weir, in paragraph 23, if we pick it up at the very bottom of that paragraph, said:

"Vents would be required to be of adequate strength to withstand the conditions to which they would be subjected."

Then, as a result of the various discussions that had taken place on the Ministry's proposals, there were modified proposals by the Ministry that we have at page 59 of the core bundle, and this considers ships fitted with gasketed metal hatch covers, and says in paragraph 2:

"The view was expressed, virtually unanimously, that compared with the traditional wood hatch and tarpaulin, gasketed metal hatch covers provide increased structural integrity of the deck and therefore a better protection from the sea. The Ministry were particularly impressed by the arguments of the seafarers' unions that the metal hatch covers greatly reduced the number of occasions when it might be necessary to send a man on deck in rough weather. The Ministry see no reason why gasketed metal hatch covers should be made mandatory, but it is conceded that, if the ship is fitted only with gasketed metal hatch covers, some advantage in freeboard should be given over the ship fitted with wood hatch

covers and tarpaulins.

"3. The Ministry now suggest, therefore, that there should be three tables of basic freeboard: one for 'tankers' (line A); one for ships fitted on the freeboard deck with large adequately strong and gasketed metal hatch covers only (line B); and a third for other ships. The 'tanker' proposals (line A) are unchanged. The proposals for ships with large metal hatch covers (line B) are that their basic freeboard should be identical with the present freeboard assigned to tankers for ships up to 530 feet in length. Above this length of ship, the freeboards are reduced by comparison with the existing freeboards until a common constant freeboard of 126 inches is reached for ships of 950 feet in length or more. This arrangement has the advantage that these ore carriers, which have hitherto been assigned a tanker load line, will not be assigned any increased freeboard, and above 530 feet in length they may be given considerable reduction in proportion to their length."

Then it goes on to say:

"It is a condition at present that if an ore carrier is assigned a tanker freeboard, a hatch cover should be 15 per cent stronger than the present standards of strength for metal hatch covers which have

been applied in the United Kingdom. The Ministry consider, therefore, that the proposal to reduce freeboards of all ships with metal hatch covers should be dependent on the achievement of this extra degree of strength. In regulation 15(b) of Chapter II of the US proposals, the Americans have suggested that dry cargo freeboards remaining unchanged, standards of strength of class 1 hatchways, which at 360 pounds per square foot are slightly below the UK standards. The working party have subsequently agreed to proposals submitted by Lloyd's Register that the present standard strength of 370 pounds per square foot for class 1 hatchways should be reinstated. This proposal was incorporated in Load Line Working Party document 27. But to qualify for the freeboards now proposed for ships with gasketed metal covers, all hatchways required to meet the standards prescribed for Class I should have their strength increased by 15 per cent."

So that was where it was taken by the UK Government at that time, and then at the 19th meeting of the Load Line Working Party in February 1965 there was still some concern being expressed by the unions about deeper loading in relation to the strength of the ventilators. We see that on page 70 of the core bundle, where at paragraph 17 Mr Slater said:

"... the seafarers' unions were pleased that the Ministry did not now propose such large reductions in freeboard for ships with wood hatch covers. They were nevertheless still concerned about the extent of deeper loading proposed, particularly in relation to the strength of superstructures and ventilators and the possibility of damage to life saving appliances."

Then Mr Weir from the Ministry responds to that and says:

"... superstructure strength had always been a matter of experience and that in the case of ore carriers operating at tanker draughts there was no evidence to suggest that the scantlings proposed for superstructures would be inadequate at the freeboards now envisaged. Mr Macmillan added that the classification societies did not foresee any greater incidence of heavy weather damage at the freeboards now suggested by the Ministry. Mr Weir said that the Ministry did not consider that, at the length of ship where the reductions in freeboard were proposed, lifeboats were likely to suffer heavy weather damage. As to ventilators, there was no evidence of weakness in existing conditions and in any case their strength could always be looked at if necessary."

Then in 1965, prior to the convention, the

classification societies met yet again, this time in New York, hosted by ABS, and they also considered the US draft proposal. The position there was effectively as I have summarised:

"DNV said that they had carried out investigations into wetness, which suggested basic freeboards for smaller ships were too small, but they were too large for larger ships. Lloyd's Register said that for larger ships there is no necessity to increase freeboard after a certain length is reached. Germanischer Lloyd said that they had also carried out model tests showing that the 1930 freeboards were too small for smaller ships but could be reduced for larger ships."

A couple of general points that one can pick up from this conference of classification societies, page 89 of the core bundle. This is at the very beginning of the meeting, the Chairman, Mr Bannerman says:

"First off, as I mentioned in the correspondence, we intend to discuss principles here and not words. We cannot edit the United States proposal, or any other proposal, for that matter, line by line and dot the i's and cross the t's, or we would be here all summer."

That was the basic framework under which they considered that they were operating. Then to go back to

a point that we looked at a little while ago about the convention being under the auspices of IMCO, at page 96 of the core bundle, there is another comment by the Chairman, Mr Bannerman, at the top of the page , who says:

"It must be remembered, of course, that with the new convention being under IMCO, it will be possible to make amendments from time to time, even of a rather important nature, and we need not feel that the convention is frozen for the next 35 years as the 1930 Convention was", although as we know the convention has been frozen for the next 35 years after 1966. That is certainly the basis upon which they were considering things at that time.

Then, with particular reference to bad weather and how people perceived ships coping with bad weather, there are two remarks on page 100 of the core bundle which were not made in the context of hatch cover strength or freeboards or anything else in particular, but were really to do with the question of seasonal marks and zones. Here ABS say:

"In our proposals we are talking about shifting the basic freeboard by a greater or lesser amount. Generally, our United States proposal for tankers is essentially one season deeper.

"The thinking on increasing freeboard for small ships, if we are allowed to do it, would encompass a great deal more, probably, than the sum total of the seasonal marks from tropical down to Winter North Atlantic.

"The seasonal adjustments, then, are very small, it seems to us, relative to the draught of the ship; relative to some of the proposed changes in freeboard; relative to the adjustments which are allowed under the present calculation, and furthermore, they are based almost entirely on the likelihood of encountering bad weather.

"We pretty much expect that a ship loaded to its tropical mark caught in the lower Atlantic during a hurricane will survive the hurricane, and with this in mind we wonder if there is really any need for seasonal marks."

They suggest that it might be simpler to abolish them. Then Lloyd's Register say:

"We agree that from the point of view of smaller ships. But when we come to bigger ships with constant freeboards, the seasonal marks mean little. The fact that we have a constant freeboard would obviate the necessity for the very small changes in the draught which would result.

"The other point of view is that of bad weather. The seasonal marks were made for changes in weather conditions in the various positions in which they occur. Nowadays, we have such good weather reporting conditions that the ship has a greater chance of avoiding any particular storm, any particular bad weather, and from that point of view, again, the seasonal marks are tending to mean less and less."

So obviously, looking forward to the Derbyshire, it was plainly in the minds of people in the mid-1960s both that improvements in weather forecasting would lead to ships not encountering bad weather so often, and secondly it was assumed that ships caught in hurricanes would survive hurricanes.

Then we have also, at that meeting, Lloyd's Register pointing out that they had bulk carriers under construction which could carry oil, and that they had told owners of those vessels that they could have a tanker freeboard in both conditions, although they pointed out that this conflicted with the view of the Board of Trade.

There were then some discussions of hatch cover strength that there had been earlier, where Lloyd's Register suggested that the UK proposals were 15 per cent more than the US proposal, but ABS said that the UK

were using a higher allowable stress, and that it was, in fact, the same as the US proposal because the minimum strength of steel in the ABS rules would give the same result as the UK proposal.

Germanischer Lloyd said that they did not require such loads as the US proposals, and they do not have any trouble with their hatch covers, although they were not against increasing strength.

DNV said it would be preferable to use yield strength rather than ultimate strength when considering the safety against collapse of a structure, and NKK proposed a section modulus and moment of inertia approach, instead of a factor of safety, and Bureau Veritas said that the Convention Rules should only give principles, and the application should be left in the hands of the society.

Then the question of freeboard came up, and the UK -- which was proposing at that time a definition of a tanker which was based upon the size of its hatches -- the UK idea was that a tanker could be a ship which had hatches of less than 15 square feet in area, and there were a number of comments about that.

Lloyd's Register say they never agreed with it because they had no experience to show that there had been any leakage through covers of large bulk carriers

to the extent that it would involve danger to the ship. BV said that on the other hand they did agree with the UK, and the most important feature of a tanker was that it had smaller openings in the deck. They said that, if you gave reduced freeboard to ore carriers, because they have strong hatch covers, then why not for bulk carriers with the same hatch covers, and if bulk carriers, then why not for all ships with the same hatch covers, and, therefore, you ultimately end up with all ships having tanker freeboards.

RINA said that they did not have enough experience to prove that the size of the hatch gives much difference in safety, and DNV said that hatch size was not a good criterion because steel covers may be given the necessary strength whatever their size to withstand sea loads. It is a question of plate thickness, section moduli and stiffeners, and securing arrangements around the coamings, and so they said why not fix freeboards in relation to these parameters, rather than hatch size alone, and NKK also said that the tightness of a hatch does not depend upon size alone.

That was really where things were left by the classification societies. Turning on to 1966, the UK Government, prior to the 1966 Convention, hosted a meeting of Western European maritime countries to sort

of, I think, get a headstart, if you like, and consider the proposals tabled for the international conference. We have that really in tab 6 of the core bundle. There is initially a note from the UK Government, and then there are some minutes or notes of the informal meeting.

The UK's position that it was putting forward was that it was trying to propose a constant freeboard for all ships above 950 feet in length, which was 289 metres. They were proposing reduced freeboards for ships having specially strengthened gasketed metal hatch covers, less reduction in freeboard where there were metal hatch covers which were not specially strengthened, and no reduction in freeboard at all where battens and tarpaulins were used.

Then it is illustrative to look at what was said at the meeting, and we can pick that up at page 141, under the heading "Freeboard for large ships":

"Monsieur Rocquemont said that in his view, there was a case for ceasing to increase freeboards above a certain length of ship. Mr Seefisch agreed and said that, in the German view, freeboards for ships of more than 250 metres or 825 feet might well approach a certain constant value."

MR JUSTICE COLMAN: His experience is presumably confined to trawlers.

MR MEESON: The German view? Mr Seefisch may have had that problem, yes.

Mr Spinelli -- incidentally, Mr Spinelli is somebody we have to thank far having some of these documents, because Mr Spinelli is an elderly Italian gentleman who trawled his attic for us.

"[He] considered that there was insufficient justification for the United Kingdom proposal for a constant freeboard above a certain length of ship. Research in Italy had shown that it was desirable to continue to increase the freeboard in relation to the length of the ship because of the need to balance the dynamic forces due to heaving and pitching. He agreed that once the weather deck of a ship reached a certain height above the water, there was less need for freeboards to be increased proportionately, but that the penalty corrections in the footnotes to regulations 28 should themselves reach a constant value for ships above, say, 250 metres. He also considered the United Kingdom proposals resulted in too small a difference between the freeboards of tankers and the freeboards of other ships with gasketed metal hatch covers.

"In conclusion, Mr Spinelli said that Italy was not opposed in principle to reductions in freeboard, but in the coming years we were likely to learn much more

about the sea forces which should govern freeboards for very large ships. In the meantime, whilst some reduction were clearly justified, it was important not to reduce freeboards to a point where they might go beyond what was later found to be justified."

Quite an important observation.

Mr Weir then said:

"... the United Kingdom proposals for a constant freeboard were based on a study of sea conditions which showed that above a certain length of wave (in the region of 600 feet) the height of the wave ceased to increase proportionately. This coincided with our experience that the length of ship which took on board the greatest amount of green sea was a ship of about 600 feet (183 metres) in length.

"Monsieur Dieudonne said that little was known about freeboards for large ships, but similar research in France had shown that relative to the length of wave, the height of wave did not continue to increase proportionately beyond that associated with waves about 600 feet long. For this reason, France took the view that a constant freeboard was justified for ships of over 280 metres (825 feet).

"Mr Murray said that there were several ships on the United Kingdom register of over 250 metres in

length ... which had been in service for four or five years. They have experienced heavy rolling but there has been no shipping of green seas.

"Mr Spinelli agreed that ships of these lengths with existing freeboards did not ship water and that some reductions were entirely acceptable."

Then at the bottom of page 142, after some formulae proposed by Professor Prohaska, Monsieur Blanc said that he agreed with the Professor's approach, but made this observation:

"However as we know little about sea forces, we must rely on practical experience to justify any changes, and we must beware of formulae which go beyond an empirical approach."

My Lord, that gives some idea into the way people thought at that time in the mid-1960s, and brings us now up to the conference itself.

I am not sure what time your Lordship is intending to have a break.

MR JUSTICE COLMAN: Perhaps that would be a good moment to break. We will have a short break now.

(11.00 am)

(A short break)

(11.18 am)

MR JUSTICE COLMAN: Mr Meeson, just before you start,

remembering the text which you most recently referred me to in the core bundle -- and I am looking in particular at page 142, paragraph 72, at the top of the page -- on the face of it, that assertion in the last sentence one thinks of as being rather surprising.

MR MEESON: Yes.

MR JUSTICE COLMAN: "Several ships" -- we do not know how many "several" are -- "over 825 feet in length which had been in service for four or five years". Let us assume there are six such ships, multiply five by six, that is 30 years. One's own experience suggests that that is a rather surprising statistic. Was Mr Murray drawing on information provided by shipowners? Presumably he was.

MR MEESON: I think he may have been. My Lord, one of the questions I think one has to be slightly careful with is that these are notes of an informal meeting, rather than a verbatim transcript.

MR JUSTICE COLMAN: I appreciate that.

MR MEESON: Whether it was "no shipping of green seas" or whether what was actually said was "no significant shipping of green seas" or --

MR JUSTICE COLMAN: Just remind me, Mr Murray is Lloyd's Register, is he, or is he the Department?

MR MEESON: That is what I am trying to remember. I think

he may have been Lloyd's Register. I cannot remember.
MR JUSTICE COLMAN: If he were Lloyd's Register, he would presumably be relying upon owners' reports.
MR MEESON: My Lord, yes, he is Lloyd's Register.
MR JUSTICE COLMAN: He must have been relying upon owners' reports, and how would Lloyd's Register know, unless there had been some damage to the vessel and a class item had been affected?
MR MEESON: My Lord, it may relate to some -- I hesitate to call it "research", but research perhaps with a little "r" and a large pinch of salt, that was done by the UK Government, that I have not specifically referred your Lordship to, which basically involved asking ship masters how their ships handled on reduced freeboards, to which they get a large number of subjective responses. I cannot immediately put my finger on that research at the moment.
MR JUSTICE COLMAN: It may be because, if one is a maritime lawyer, one only sees the worst experiences in one's practice, but the concept that in 30 ship years none of these vessels had experienced the shipping of green seas strikes one as being, to put it mildly, astonishing.
MR MEESON: Yes. As I say, it may be that it was not literally meant.
MR JUSTICE COLMAN: Maybe green seas that had caused damage

to the fittings or something.

MR MEESON: My Lord, that brings one on to the 1966 Conference itself, and the UK position for the conference was set out in a briefing document that we have at tab 7 of the core bundle. It was the UK's position that load line should be based upon four considerations. The first was the prevention of water ingress from water shipped on deck. The second was the maintenance of sufficient reserve buoyancy. The third was protection of crew moving about or working on deck, and the fourth was provision and maintenance of the structural strength of the hull.

It was the position that improvements in standards of deck integrity meant, as far as the UK was concerned, that there is a case for deeper loading than under the 1930 Convention. The advent of gasketed metal hatch covers had given greater deck integrity, lessened the need for constant attendance by the crew on deck to maintain covers. The movement of accommodation aft had lessened the need for the crew to go on the most vulnerable part of the ship to get to their accommodation, and that was linked in with the removal of the fo'c'sle, if you like. There was not anybody living in the fo'c'sle any more.

What was said -- and I think we can pick this up

from the original at core bundle page 146, where there is a discussion of these principles. At the bottom of that page, paragraph 14, it said this:

"In 1931, the chief surveyor of a British classification society [presumably Lloyd's Register] who played a prominent part in national and international discussions on load line wrote:

"'Maximum load lines for cargo (ships) should be defined as those which correspond to an average of the smallest freeboards at which competent and courageous captains are prepared to take the ordinary risks of familiar voyages on ships of known characteristics, without undue fear of damage to crew, ship or cargo.'".

It is then said:

"Today, while characteristics of ships are changing, this principle remains the same."

They say:

"In our present state of knowledge, the only sure criterion for the determination of a proper freeboard is trial and error. It would be an advantage if proposals for deeper loading could be based on experience, and we claim that to some extent the United Kingdom proposals are so based. It has been our practice in the United Kingdom to assign to ore carriers which comply with a number of requirements, including adequately

strengthened hatch covers, a tanker freeboard. These ships have been operating for nearly ten years at these draughts and have been operating entirely successfully. It is possible that ships of other registers have been operating at these draughts for an even longer period, and no doubt the experience of these ships will be made available to the conference."

So that was the basis, if you like, of the UK's position.

We have already looked briefly at the hatch cover proposals for the conference, which we have in tab 8 of the core bundle, beginning at page 161, and we saw there the proposal of the United States Government, and then, on the right-hand side, there were a number of comments of different nations. One can see the United Kingdom's position on page 164 of the core bundle, which were metal weathertight covers:

"Metal weathertight covers shall be capable of sustaining a load of 425 pounds per square foot on class 1 hatchways ... The factor of safety shall not be less than 4.75 related to mild steel having an ultimate tensile strength of 29 tons per square inch."

Then:

"Steel covers shall be so designed as to limit the deflection to not more than 0.0028 times the span under

these loads."

There were various other proposals, and we also have the UK documents filed. This is the research that I was referring to earlier. At page 170 of the core bundle, there was a paper submitted by the UK Delegation to the Technical Committee, dealing with the UK's experience of ships sailing with increased freeboard. What that says is:

"In order to gain some practical experience of ships sailing at reduced freeboard, the UK Government decided to allow certain selected tankers of 600 feet and over to have load lines assigned in accordance with the UK proposals for this conference.

"The Classification Society, therefore, reassigned load lines to the experimental ships as soon as this could be done, and the ships proceeded on their normal trading voyages. Masters were asked to report on the tests and a copy of the questionnaire which masters were asked to complete is attached.

"The reports received from the ships taking part in the tests have been tabulated on the attached statement.

"The tests were, of course, fortunately conducted in the main in the northern winter, so that, with one exception, all the ships involved have encountered

normal winter weather.

"The information provided on the attached statement has been analysed as follows:

"Amount of water shipped compared with previous freeboard.

"The bulk of the experience indicates that there is no appreciable increase in water shipped over the deck in the deeper laden condition. In one case, it is reported that the vessel shipped a considerable amount of water over the deck, but it must be pointed out that this occurred under exceptionally bad weather conditions. In fact, discussions with the master revealed that the sea conditions, although only described as 25-foot waves, were as bad as he had ever experienced. Further, the master said that at no time did he have any fear at all as to the safety of his ship."

Then there is a discussion about manoeuvrability. It goes on to say:

"Damage. Only one ship sustained damage, and then the damage was confined to deck fittings and would not be regarded as abnormal for ships of normal freeboard."

Then there was "Proposed alterations in the light of the experimentation". It says:

"Two masters proposed an improvement in the

closing appliances in the accommodation ...

"Two masters have made an additional suggestion to have the ship fitted with breakwaters on the freeboard deck, with the object of reducing the force of the seas on after accommodation bulkheads.

"In addition, mention has been made of the desirability of raising sounding and vent pipes."

Then "Opinion with regard to hazard":

"In no case did any of the masters involved in the experimental deeper loading express concern for the safety of the ship or the crew with the reduced freeboard.

"Conclusion.

"The experimental deeper loading has given quite substantial general experience over a fair range of ships' sizes, from 665 feet to almost 900 feet length overall, and, as mentioned at the beginning of this paper, the ships taking part in the test have been sailing through bad weather for some part or most of the voyages. In the opinion of the United Kingdom, the tests establish beyond any reasonable doubt that the reduction in freeboard did not affect the safety of any of the ships or any of their crews."

Then one can see the questionnaire which asks the master -- this is at page 173 -- in question 4:

"The master's considered opinion as to the amount and frequency of water shipped in the deep laden condition as compared with what might have been expected to be shipped at the previously assigned minimum freeboard condition in approximately similar weather and sea conditions."

Then particular comments that the master is asked to record. Then at page 176 to 177 are the various vessels involved in that trial and the masters comments. "Water shipped compared with previously assigned minimum freeboard" are "no different", "no different", "no different", "no different", "very little different, if any", "no different", "no different", "no different", "no different", "no different".

MRS TROY-DAVIES: My Lord, just for the sake of completeness, that table actually starts on page 175.

MR MEESON: Sorry, I turned over two pages by mistake. The first one is "considerably more", the second one is "probably more", and the "considerably more" was the vessel that was specifically mentioned in the text as having encountered 25-foot waves. One has to note that the British Bombardier, vessel number 5, in a trip from Banias to Milford Haven appears to have encountered 30- to 40-foot waves.

MR JUSTICE COLMAN: I would have thought this is conclusive

evidence that these ships were shipping green seas repeatedly.

MR MEESON: Unfortunately on the Mobil Enterprise there was a man overboard.

MR JUSTICE COLMAN: You only have to read the comments.

MR MACDONALD: My Lord, just for the record, the first recorded comment is "consider more", not "considerably more".

MR MEESON: Sorry, yes.

MR JUSTICE COLMAN: Thank you very much.

MR MEESON: I think, my Lord, that may deal with the answer to your Lordship's question earlier. The German Government also tabled a paper supporting reduced freeboards for ships over 100 metres, that is, in fact, based upon model tests.

Perhaps the more interesting part of the convention are the next four series of documents. My Lord, I am grateful to Mr Eder for pointing out, first of all, that my chronological order was erroneous, and secondly for two further inclusions which are now included in the core bundles to complete the picture of this area. It is really to do with an Ad Hoc Working Group on the strength of hatch covers. My Lord, one can perhaps pick it up in the core bundle beginning at page 217A.

My Lord, this is a 17th meeting of the Technical Committee, and there is then, at page 217B, a discussion:

"Resumed consideration of regulation 14 of the US text, regulation 35.2 of the Soviet text."

At the bottom of the page:

"The Chairman drew attention to the note by the Secretariat on strength standards for hatchway covers, wherein an attempt has been made to compare the various strength standards proposed by governments. Having regard to the number and variety of parameters used, it would be extremely difficult to reach agreement within a large body, and it might therefore be advisable to establish a small working group comprising the countries that have put forward the proposals, together with Norway, to study the matter and report back to the committee.

"Mr Borsum of Sweden endorsed the suggested procedure. The work might be even more facilitated if the Swedish proposal to delete all details on strength standards were adopted."

That would make their life very short.

"Mr Rocquemont also endorsed the suggested procedure.

"His delegation was opposed to maintaining the

type of calculation for determining strength laid down in the United States text and would prefer to work directly on the design load. The reason for that preference was that recent findings as reported at the Bergen meeting on hydrodynamics held some 18 months previously, indicated that the actual scale of stress to which the material was subjected was such as to warrant a safety factor of 1.06 only, rather than the safety factor of 4.25 laid down in the United States text."

My Lord, we will come back and see where that 1.06 comes from shortly.

The next page, page 218 is a proposal by the French delegation to the Technical Committee concerning regulations 14 and 15. That really follows on from Mr Rocquemont's comments. What is said there is:

"The United States proposal defines the strength of class 1 hatchway covers by taking a load of 360 pounds per square foot (1.75 tons per square metre) and imposing a factor of safety of 4.25. This is equivalent to calculating the scantlings of the covers in such a way that ultimate strength is not reached if pressure on the cover is 7.44 tons per square metre. The French delegation has no objection to the choice of this design load; it would, in fact, have been prepared to accept a slightly lower load. But it cannot agree to

this design load being broken down into the product of a basic load and a factor of safety.

"The design load can be justified by showing that covers constructed to take this load have proved satisfactory in service, but to arrive at a factor of safety it is essential to know the actual loads produced by the action of the sea. Very little documentation is available on this point: the only trials known at present are those which were reported in the Ochi memorandum submitted to the Symposium on Naval Hydrodynamics held at Bergen in 1964 by the Office of Naval Research of the US Navy. That memorandum was submitted in almost identical form to SNAME in November 1965. The trials described were carried out in the David Taylor Model Basin under the following conditions (the values given correspond to actual values):

"Ship: Mariner-type cargo ship with full load sailing at 10 knots with a head sea.

"Sea: Complex wave system with the following conditions:

"Average height: 5.8.

"Significant height: 9.5 metres.

"Average of heights 1 tenth and above: 12.10 metres.

"Period of maximum spectrum: 14 seconds.

"These conditions were fairly severe but not at all exceptional in the large oceans.

"In the course of the tests, maximum pressures of the order of 7 tons per square metre were found fairly frequently, pressures 4 times as great as the basic load given in the United States proposal. The factor of safety of a cover calculated in accordance with that proposal would not have been 4.25 under the test conditions, but only 1.06.

"This single series of tests cannot of course be taken as a basis for establishing international regulations, but it can be concluded from them that, considering only orders of magnitude, the stresses imposed on decks by the impact of the sea are much greater than has been supposed, and that the introduction of a high factor of safety into the calculation gives a very misleading impression of the actual degree of safety achieved, which may lead to dangerous errors of appreciation.

"The French delegation therefore considers that the convention should provide for a design load determined in accordance with the experience gained with existing covers, but should not mention any factor of safety or give any indication concerning the loads actually imposed by the sea."

My Lord, that is the same Ochi that came to give evidence here a little while ago.

My Lord, one next has to go back in the bundle to page 207. This is a report of the Ad Hoc Working Group on the strength of hatch covers. This begins:

"The group has been charged by the Technical Committee with the consideration of regulations 14(b), (c), (d) and 15(b) of [the document]. The following countries were represented at the group: Federal Republic of Germany, France, Japan, Netherlands, Norway, USSR, United Kingdom, and the USA. Mr David Bannerman (USA) was elected Chairman.

"The matter of an assumed loading for all types of hatch covers was first discussed using the proposal of the United States of America as a basis for discussion. France took exception to the use of the words 'factor of safety' and submitted a paper that we have just seen setting out their position. It was ultimately agreed that the loading of hatches of class 1 should be assumed to be 1.75 tons per square metre. These loadings were understood to be in association with the multiplier 4.25 in the case of hinged mild steel covers."

Then there is some discussion. Then it said:

"The matter of testing material was brought up,

and it was agreed that all material of which hatch covers would be made would be tested to the requirements of the Administration or Classification Society. The delegate of the USA pointed out that the yield point is not specified nor determined in the testing of ordinary mild steel for ships and questioned whether a yield point criterion could be used for design purposes.

"It was generally agreed that the covers for ships having freeboards according to the 'B' curve could retain the present standard ... The United Kingdom delegation indicated that those ships approaching the 'A' curve [that is the tanker freeboard] might require an increase in strength in their hatch covers."

Then there is further discussion, and then I think one can pick it up again at 209, paragraph 13:

"Regarding covers made of other materials than mild steel, it was agreed that these should be covered by a sentence to the effect that they should be at least equivalent to the strength and effectiveness laid down for covers of mild steel to the satisfaction of the administration.

"It was recommended by the group that hatch covers for those 'B' type ships which may be entitled to a freeboard less than that based on the basic 'B' type freeboard table should be increased in strength in view

of the considerable reductions in freeboard which are being put forward by the Ad Hoc Working Group on Freeboard Computations. The exact amount of this increase must be left over until the Technical Committee decide on the reduced freeboard allowed."

(11.45 am)

That was where that got to. Then it appears that that was not then gone back to, for whatever reason, after the Ad Hoc Working Group on Freeboard had decided, so that this matter of increasing the strength for what came to be B minus 60 and B minus 100 ships does not appear to have been readdressed at the convention.

Then --

MR JUSTICE COLMAN: Just before you go on, sorry, I may be jumping ahead, the proposal that was put in paragraph 15 at the bottom of page 209 then set out a text.

MR MEESON: Yes.

MR JUSTICE COLMAN: The text, if you follow it through to 211, regulation 15(b), steel watertight covers, as I understand it, that is the proposal that is being put forward by this hatch cover working party.

MR MEESON: Yes, that is right.

MR JUSTICE COLMAN: But, when you look at the proposal, one finds that they are still basically working on the same parameters. If you look at class 1 hatchways and

class 2 hatchways --
MR MEESON: Nothing changes.
MR JUSTICE COLMAN: It is very odd that this text should be here side by side with and part of the same report as paragraph 14 on page 209, which leaves it all open. One wonders whether the document was prepared before they had their meeting, and they inserted the text in it simply on the basis that it might have to be changed subsequently. I just do not know. It seems very odd.
MR MEESON: My Lord, what has changed is it is now referred to as not a factor of safety but a factor of 4.25.
MR JUSTICE COLMAN: They have dropped the word "safety".
MR MEESON: "Safety" seems to have been dropped. But as far as the --
MR JUSTICE COLMAN: The whole point about the issue that had been raised by the hatch cover committee, as I understand it, was the whole concept needed looking at again of this 4.25 safety factor.
MR MEESON: No, my Lord. I think the French said "We are quite happy with the standard, but we do not like the phrase 'factor of safety' because it suggests something that is not necessarily there". There was never really any discussion that the basic proposal of, if you like, 1.75 times 4.25 was inadequate. The only discussion was really in relation to this UK proposal that we start

with the freeboards for ordinary cargo ships with a 'B' line freeboard line, but then, if you are going to allow a reduction below that, you should increase the strength of hatch covers. That is what we have here in paragraph 14.

This is recommended by the committee, but then not carried forward because they put it to one side by saying, "Yes, we think there should be an increase, but we cannot decide how much, because we do not know how much the reduction of freeboard is going to be, and the one should follow the other. So we will have to come back to it when the Ad Hoc Working Group on Freeboard Computations reports. In actual fact, they never do seem to come back to it, as far as one can tell. So one simply then ends up with the final position --

MR EDER: My Lord, I do not want to interrupt again, but I think my learned friend is wrong. I think Miss Blanchard has pointed out a passage when they do come back to paragraph 14 that your Lordship has drawn attention to. I do not think that is in the core bundle. They come back to it on 21st March.

MR JUSTICE COLMAN: Right at the end of the meeting, is it not? I seem to remember having read the text weeks and weeks ago of the discussions which took place.

MR EDER: I can take your Lordship to this. This is when

everyone is in London, and there are various meetings going on, and this is all happening within a relatively short period of time.

MR JUSTICE COLMAN: It is about 25th March.

MR EDER: It starts on 3rd March, my Lord. That is when everyone comes to London. It goes on to some time in early April. The period we are looking at at the moment started -- I think, the first document that Mr Meeson referred your Lordship to was the one for this clutch of documents, starting on 15th March. I do not know whether your Lordship wants to see this one now, or at some other stage, but they do come back to consider paragraph 14, I think, within a few days.

MR JUSTICE COLMAN: If you like, you can take that separately. If you have a reference for it --

MR EDER: I can take your Lordship to that now, if I am not interrupting too much.

MR JUSTICE COLMAN: Let us deal with that.

MR EDER: It is AG8.2.

MR JUSTICE COLMAN: We can always insert it in the core bundle. What page?

MR EDER: It is page 215. This appears to be a meeting on 21st March.

MR JUSTICE COLMAN: Three days later?

MR EDER: Something like that. If your Lordship goes to

page 216, you will see about a quarter of the way down the heading:

"Report of the Ad Hoc Working Group on the strength of hatch covers."

The cross-reference there, the LL/CONF/C.2/17 is the document that your Lordship has been referred to.

MR JUSTICE COLMAN: Did you say 216?

MR EDER: AG8.2, page 216.

MR JUSTICE COLMAN: LL/CONF/C.2/SR.18.

MR EDER: We have different numbering. Maybe Mr Meeson can help me, LL/CONF/C.2/SR.26. I do not know whether Mr Meeson may be coming to it.

MR JUSTICE COLMAN: Just a moment.

MR MEESON: 222, I think, possibly.

MR JUSTICE COLMAN: It is 223 in my bundle. The first gentleman to contribute on this page is no less than Mr Yamagata from Japan. Does that coincide with yours?

MR EDER: No, my Lord. I am sorry, my Lord, it appears as though Mr Meeson does not have this at all. I do not want to waste time. It may be that we will get my document photocopied, and come back to the point that your Lordship has made.

MR JUSTICE COLMAN: It is very strange that your bundle and Mr Meeson's bundle and my bundle do not seem to be consistent at all in numbering or content.

MR BRYAN: My Lord, I have the same bundle as Mr Eder. I do have the document.

MRS TROY-DAVIES: My Lord, I also have the same bundle as Mr Eder. If it assists, if we are dealing with a limited number of pages, I have two sets of those bundles in court.

MR JUSTICE COLMAN: It is obvious that some parties here have an unfair advantage over the court. I think the best thing to do is probably to sort it out -- rather than waste time now, I think we will sort it out over the adjournment.

What you can do, Mr Eder, it might be useful for the record and for people's notes if you just have a sort of thumbnail content of what it says. It could go into the record at this stage.

MR COOPER: My Lord, I think the page Mr Eder is looking at is in other people's bundles at page 135.

MR JUSTICE COLMAN: In the same bundle, in 8.2?

MR COOPER: In 8.2.

MR JUSTICE COLMAN: At 135?

MR MEESON: I think that is right, if you have the advantage of having your bundle prepared by the Treasury Solicitor.

MR COOPER: The record of that session begins on page 134 and then goes over to 135, continues through to 145 and

then leaps to page 222.

MR JUSTICE COLMAN: I am very grateful, yes. This is the right reference number. It is SR.26 certainly, and it refers to the meeting held on 21st March which fits in.

MR EDER: My Lord, therefore the document I wanted just to show your Lordship in answer to your Lordship's question, I think, is then at page 135 which should start off at the top:

"Agenda item 5."

Then a quarter of the way down your Lordship should see a heading:

"Report of the Ad Hoc Working Group on strength of hatch covers (LL/CONF/C.2/17)."

Your Lordship has that?

MR JUSTICE COLMAN: Yes.

MR EDER: That numbering corresponds to the document which your Lordship was looking at a moment ago in the core bundle at page 209. Your Lordship will then see:

"Mr Bannerman (USA) presenting the report of the Ad Hoc Working Group on strength of hatch covers, drew attention to the recommendation that hatch covers for ships assigned a freeboard less than that of class 'B' should be increased in strength (paragraph (14))."

Then it continues:

"The United States delegation had not supported

that recommendation.

"Mr Borsum (Sweden) said that although the report was valuable, he doubted whether it was necessary to include in the convention such detailed regulations on hatch covers. The committee had already agreed to delete all detailed regulations on superstructures, machinery casings, hatch coamings and clamping devices, and hatch covers would therefore be the only item of the entire hull structure subject to such requirements.

"Mr Jansen (Norway), Mr Spinelli (Italy), and Mr Yamagata (Japan) supported the working group's recommendations as formulated in LL/CONF/C.2/17.

"The Chairman, noting that no questions had been raised as to the details of the report, put to the vote regulations 14 and 15 as set out in paragraph (15) of LL/CONF/C.2/17.

"Regulations 14 and 15 ... were approved by 33 votes to none."

MR JUSTICE COLMAN: So there it is, the draft to which I drew attention was the one that was approved.

MR EDER: It was.

MR MEESON: My Lord, just to make it clear, this document that we have just this moment looked at is a report of the Technical Committee, and what appears to have happened is that the Ad Hoc Working Group which

recommended that this matter be revisited, for whatever reason, never got the chance to revisit it. It may be something to do with the fact that the 18th March -- that was the date when that Ad Hoc Working Group reported on a Friday, and the Technical Committee met on the Monday.

One then sees that, as your Lordship pointed out, the Technical Committee approving the text put forward by the Ad Hoc Working Group, and then this finally making its way into the conference. The last two documents to look at are 231A, 231B, and we have -- the numbering of the regulations has moved on one, I cannot remember why, but there was a reason for it. So the regulation that we have been looking at, I think, has now become regulation 17, "Hatchways closed by weathertight covers of steel or other equivalent material fitted with gaskets and clamping devices". On 231B, one sees:

"The Chairman suggested that the committee should approve regulation 17, and the amendments proposed were purely textual and could be entrusted to the drafting committee."

That was dealt with there, but immediately prior to that, in the context of the earlier regulation relating to hatchways closed by portable covers and

secured weathertight by tarpaulins and battening devices, there is a short discussion about the factor.

At the top of 231B:

"Mr Robertson of the USA thought that if the factor of 4.25 corresponded to a concept of safety, that concept should be defined.

"Monsieur Dieudonne of France reminded the committee that his delegation had always been opposed to the adoption of formulae which might be understood as corresponding to factors of safety.

"The Chairman thought it desirable that the English text should be brought into line with the French text, which seemed clearer,, and proposed that the drafting committee should be asked to amend the English text accordingly."

So it appears that the safety part of it is removed ultimately.

For the record, that was 27th March, that decision.

My Lord, the position then was that effectively the standards of hatch cover strength coming out of the convention were pretty much the same as those that went in at the beginning with the draft text.

After the convention had been agreed, Sir Gilmour Jenkins, who was the leader of the United Kingdom

delegation, reported both formally and less formally on the results of the convention from the UK point of view. His basic conclusions were that what was finally agreed at the conference, as far as deeper loading of ships was concerned, was not substantially different from the UK proposals. He pointed out that the UK had been defeated in its attempt to resist the introduction of sub-division concept into load line, that the deeper loading for what I have referred to as B minus ships was to be allowed on the basis of sub-division, whereas the UK had intended to base it on stronger covers, and that the UK did not succeed in requiring extra strengthened hatch covers for B minus ships, and only succeeded in inserting the words "and have adequate strength" in what became regulation 27(7)(c).

We can see his very short discussion of that at page 239 of the core bundle, in paragraph 17:

"There was considerable discussion on the kinds of type 'B' ships which should be allowed to load part or the whole of the way to an 'A' draught. The Americans fought hard, (though possibly not as hard as in the interests of the combined tanker and bulk carrier their shipowners would have liked) for bulk carriers to be assigned a full 'A' draught. We opposed this on the grounds that, since it was virtually impossible to

define what was meant by a bulk carrier, it would be difficult at these deeper draughts adequately to protect the crew on, for example, a tramp ship which merely met the sub-division requirement. At one time it looked as if regulation 27(7) would be applied to bulk carriers which did not carry deck cargo, but this was ultimately considered to be impracticable. As an alternative, this regulation allows ships which meet a broadly similar sub-division requirement to that applicable of ships of type 'A' a freeboard which is 60 per cent of the difference between the freeboard calculated from table B of regulation 28 and the freeboard calculated from table A. It is, however, a condition that in relation to the amount of extra draught granted, the administration is satisfied that (a) there is adequate protection for the crew, (b) there are adequate freeing arrangements and (c) steel hatchway covers have adequate strength (that is in addition to compliance with regulation 16) and special care is given to their sealing and securing arrangements.

"Regulation 27(9) allows ships which comply with a two-compartment standard of sub-division (i.e. an ore carrier) to be assigned an 'A' freeboard on compliance with all but one of the special conditions of assignment in regulation 26 applicable to a ship of type 'A'. The

exception is a requirement relating to a tanker's watertight hatch covers. For ships of over 225 metres in length, for the purpose of flooding calculations the machinery space counts as two floodable compartments.

"The actual definitions of sub-division in regulation 27 were inserted in somewhat general terms because it was not possible to agree upon greater detail, and no one wanted to anticipate the eventual findings of the IMCO subcommittee on sub-division and stability."

What then happened was that after the convention had been agreed, obviously --

MR EDER: My Lord, it may be useful for your Lordship just to look, I think, at page 237 of the core bundle at paragraphs 6 and 7 and 8, in particular paragraph 7, my Lord, which may be of considerable importance. 6 under the heading:

"Deeper loading for ships with steel hatch covers.

"6. For type 'B' ships of over 100 metres in length freeboards have also been reduced. For ships of about 150 metres in length or more this reduction is of the order of 10 per cent. This reduction, especially for the larger ships, is less than we had ourselves proposed for ships with strengthened gasketed metal hatch covers, but is not very different from our

proposals for ships with normal gasketed steel hatch covers."

Then 7:

"It can be said that the original United Kingdom proposals were largely accepted, but that, whereas we had proposed deeper loading beyond the 'B' line for ships with extra strong hatch covers, the conference allowed this deeper loading for ships which meet certain sub-division requirements."

8:

"Regulation 27(8) allows a ship which is subdivided ..."

It goes on, my Lord. I do not think that matters particularly.

MR MEESON: My Lord, on page 240 of the core bundle, paragraph 24, it was said:

"The strength of hatch covers under regulations 15 and 16 was determined for ships assigned freeboards from table 'B' of regulation 28. Our view was that ships which, under regulations 27(8) or 27(9), are assigned smaller freeboards should have their hatch covers strengthened. We were not successful in having our views accepted, largely through American opposition, and we succeeded only in inserting the words 'and have adequate strength' in regulation 27(7)(c)."

MR JUSTICE COLMAN: The final text of that regulation, just remind me, is where? Just for cross-reference purposes.

MR MEESON: I am not sure where we put it, actually, if we put it anywhere.

MR EDER: My Lord, I think it is AG23. The position, therefore, after the convention, was that there was a period of time before the convention came into force. It ultimately came into force in about mid-1968. So from effectively the middle of 1966 through to the middle of 1968, one had a situation where there was the new 1966 Convention, which had been agreed but not yet in force, and the old 1930 Convention that was still in force but did not cover explicitly ships or tankers in excess of 600 feet, steamers in excess of 750 feet. Therefore, ships of that size were left to the -- the administration had discretion as to how to treat those ships.

After the convention, the UK proposed that for steamers in excess of 750 feet, they ought to be allowed to take advantage of the new 1966 rules which were not yet in force for the B minus 60 and B minus 100 ships. But the UK proposed that they be allowed to do so on condition that they strengthen their hatches by 10 per cent for B minus 60 ships and 20 per cent for B minus

100 ships.

My Lord, that was a matter of some discussion with various parties in the UK during, effectively, the rest of that year. ABS said that this additional strengthening was not required by rule 27(7)(c), and they said the rule was aimed at sealing and securing arrangements and not strength.

The reference for that, my Lord, is page 270 of the core bundle where -- sorry, this is Bureau Veritas. This is from Bureau Veritas to the UK Ministry of Transport. Over the page, at 88, in paragraph 3, they say:

"We noticed the proposed increases in strength for hatch covers for (B minus 60 per cent) ships and (B minus 100 per cent) ships, respectively 10 and 20 per cent. It seemed to us that the rule 27(7)(c) wording did not require such an increase. 'The covers must comply with the provisions of regulation 16 and have adequate strength.' Attention is specially drawn on the sealing and securing arrangements and not on the strength. In our meaning, it will be preferable to precise these arrangements such the spacing of clamping devices (swing bolts)."

That is the gallic interpretation of the words "and have adequate strength".

The ABS position was set out at the document that we have at 274 to 275 of the core bundle. There were various other matters. The Chamber of Shipping was prepared to accept increases on the assumption that they had the approval of the classification societies, and it was then pointed out by Lloyd's Register that this matter was going to be considered by a working party from the seven major classification societies, but they also pointed out that their information was that BV, RINA, DNV and ABS would not be requiring an increase in hatch cover strength,, thereby leaving Lloyd's Register and NKK in a minority.

Nevertheless, it does appear that in September 1966 the UK Government gave notice under the 1930 Convention that they would apply 1966 load lines to steamers in excess of 750 feet, provided the hatches were strengthened by 10 per cent for B minus 60 ships and 20 per cent for B minus 100 ships.

It also appears that at about that time the Dutch Government also were requiring additional strengthening by way of 15 per cent for B minus 60 ships and 30 per cent for B minus 100 ships. The picture then becomes rather hazy, but we do know that once the 1966 Convention was, in fact, implemented in the UK in 1968, with the 1968 load line regulations, the additional

10 per cent/20 per cent strengthening requirement was dropped.

Indeed, it also appears to be the case that the load line regulations did not even include the words "and have adequate strength", as had been agreed at the convention allegedly by Sir Gilmour Jenkins at the UK's behest.

MR JUSTICE COLMAN: Why?

MR MEESON: The "why" we have not been able to get to the bottom of.

MR JUSTICE COLMAN: Really?

MR MEESON: No. We have assumed that the reason is that when the major classification societies met, that the majority view was plainly in favour of the fact that there was no need for any additional strengthening. I suppose, effectively, Lloyd's Register and NKK were, if you like, outvoted, or persuaded away from their view, and so Lloyd's Register and the UK Government fell into line with everybody else, although, interestingly enough, NKK did not. They went on applying an additional requirement.

MR JUSTICE COLMAN: There was no reason under the convention why they had to comply with everybody else, was there?

MR MEESON: No.

MR JUSTICE COLMAN: If they were more strict, that was not

in any way a breach of the convention.

MR MEESON: No, it was not a breach of the convention, but it would probably have been considered bad for British shipping and British shipbuilders to require them to do more than other people. As I say, we were unable to get precisely to the bottom of what caused that change. The assumption is because the major classification societies took one decision, the UK Government followed.

MR JUSTICE COLMAN: Did the Netherlands, who were the only country who was going for a specific percentage increase -- they did, as you say, maintain their 15 per cent for B60 ships. What about the other countries who simply supported the convention? Do we know whether they too dropped "and have adequate strength"?

MR MEESON: My Lord, no, we do not. As far as the Netherlands is concerned, the document that we have from the Netherlands actually relates to the period prior to the implementation of the 1966 Convention. Whether they were persuaded out of that view by the classification societies in due course as well, we do not know.

MR JUSTICE COLMAN: I misunderstood you. I am afraid I thought you said that the Netherlands not only did it in the interim period, but they maintained it thereafter.

MR MEESON: No. The only people we definitely know maintained it thereafter are NKK, the Japanese

classification society. My Lord, that covers basically the basic materials on 1966. The NKK materials, I was not intending to go through them in any great detail. They are to be found in bundle AG2A, page 283.9 to 283.44. I am grateful to a Mr Sone of NKK who has assisted us in both producing these documents and in checking our translation. We had some difficulty obtaining the Japanese rules because they were in Japanese. Although the rules do not contain many pages in Japanese, they took a lot more pages when they were translated into English. What we were provided with by NKK was a commentary on the amendments that they made to their rules in 1968, consequent upon the coming into force of the 1966 Convention.

Perhaps, for our purposes, the real point to look at is at page 283.24. This is the translation that we had back from the translation agency, and then at 283.39 is Mr Sone's corrigenda for the translation agency, because we asked him to look at our translation to see if it was correct. What he has changed is -- they are fairly minor, but we can pick them up.

MR JUSTICE COLMAN: So you have to have these two documents, have you? There is not a composite?

MR MEESON: There is not a composite document. The translations came in very late. We just had to try to

put them into the bundle. It is article 6, "hatch beams". It says:

"In the new convention, the strength of hatch beams is regulated in the form of assigning load, stress and deflection ... In the present clause, cross-sectional coefficients and cross-sectional secondary moments have been assigned ..."

Then it goes on in the next paragraph to say:

"In addition to shear strength, three items have been regulated above those required by the convention. These are ..."

Then it says:

"The strengthening of hatches in the bow section ..."

What Mr Sone says is strengthening of the forward hatches.

" ... in cases where the freeboard is small, and where cargo is placed on top of the hatch. Strengthening of hatch covers in the bow section [forward hatches] has hitherto been required of vessels over 100 metres in length, and this regulation has been retained because of the results of damage sustained suggests that it is still necessary."

Then it says:

"Approximately 8 per cent strengthening of small

freeboard is required under the current regulations as a condition for the acquisition of tanker freeboard. However, it is believed to be irrational to determine the need for strengthening on the basis of type of freeboard as this does not directly reveal whether or not it is small, and it should be sufficient to strengthen [forward] hatches ... in cases where the freeboard is approximately that of a tanker according to the 1930 Convention. Accordingly, it had been resolved to establish a basic freeboard and to strengthen hatch covers where the draught exceeds this. The basic freeboard provides a minimum level for each type of freeboard according to the 1930 Convention ... In other words, strengthening is implemented only in cases of small freeboard which have come to light freshly as a result of the new convention."

So NKK adopted a rather different approach to people in Western Europe.

As far as we have been able to ascertain, they were the only people that did so. It may well be that the USSR also had significantly higher standards. In terms of Western European countries, it does not appear that anybody else did.

My Lord, finally, for the sake of completeness for the record, there is a statement from a Mr Frank Harvey

contained in AG3 beginning at page 1. Mr Harvey was really the only living English person that we were able to find who attended the 1966 Convention, but he did so in a fairly junior capacity at that time. You will see from the statement he does not really have anything of great importance to contribute, unfortunately, in our understanding.

MR JUSTICE COLMAN: There is nothing in it that is material, you say?

MR MEESON: Not really. There is a statement from Mr Noble at AG3, beginning at page 42, who is or was a departmental surveyor, who assisted by tracking down departmental files and obtaining much of the information, in particular what went on as a result of the convention. The very last two documents in the core bundle, page 293 and 294, are from his statement, and 294 is his calculation. At 293 is his summary really of how the hatch cover strength changed from before the convention, the UK proposals at the convention, the UK interim regulations between 1966 and 1968, and then finally the current load line regulations.

So one can see for a B minus 60 ship, one starts off prior to the convention. He says it has to meet 412 pounds per square foot. At the convention, the UK proposed 425 pounds per square foot. The conference

accepted 358 pounds per square foot. In the interim period, 1966 to 1968, the UK applied a standard of 394, and then obviously the current load line regulations in the UK are, in fact, the same as the convention, which is 358.

Although that does seem to make clear that standards were reduced as a result of the convention, it does have to be said that nobody is suggesting that the increased standards would have made any difference to the loss of the Derbyshire.

My Lord, is that a convenient moment for lunch?

MR JUSTICE COLMAN: Yes, indeed. Where are we going subsequently, Mr Meeson?

MR MEESON: Mr Corlett.

MR JUSTICE COLMAN: He is going to give evidence after lunch?

MR MEESON: He is going to give evidence after lunch.

MR JUSTICE COLMAN: Very good. 1.30.

(12.30 pm)

(Luncheon adjournment)

(1.30 pm)

MR MEESON: My Lord, the next witness is Mr Corlett.

MR JUSTICE COLMAN: I have just got these two additional pages which have emerged from somewhere, 212A and 212B.

MR MEESON: My Lord, they go in the core bundle. Those are

the pages that we looked at when we were going through. Could Mr Corlett be sworn?

MR MACDONALD: My Lord, just before Mr Corlett is sworn, may I put down a marker for the Department? We have seen the curriculum vitae of Mr Corlett in the Swan Hunter bundle, and it would appear that he has no experience of diplomatic conferences, or of the legal regulation of merchant shipping. His report, as your Lordship will know, comments freely on the conduct of the 1966 diplomatic conference, and also seeks to answer question 9 which, amongst other things, involves consideration of the adequacy of laws. For example, why were the words "adequate strength" omitted from the 1968 Merchant Shipping Load Line Rules?

I assume that my learned friend, Mr Meeson, will adduce evidence-in-chief of the basis on which it is said that Mr Corlett can speak to these matters. If there is none, on behalf of the Department I reserve the right to rely on that in submissions in due course.

MR JUSTICE COLMAN: Thank you.

BRIAN JAMES CORLETT (sworn)

Examination-in-chief by MR MEESON

MR MEESON: Mr Corlett, can you tell the court your full name and address?

A. My name is Brian James Corlett. My address is Mona

House, Jurby Road, Lezayre, Isle of Man.
Q. You have prepared for us a number of reports, the first of which we have in bundle AG2A, beginning at page 199 which you are about to get, dated December 1999.
A. What was the tab number again?
Q. It is tab 11, and that was a first report. There is then at page 283.2 a fax to Mr Jan Gladysz of the Treasury Solicitor, in response to a letter from Elborne Mitchell to him, which we have at 283.1.
A. Yes.
Q. And then, in --
MR EDER: My Lord, I am not sure it matters, but that is not my numbering.
MR JUSTICE COLMAN: It is not my numbering.
MR EDER: I start with 283.1 with Mr Corlett's fax.
MR JUSTICE COLMAN: I start at exactly the same place.
MR MEESON: I do not. Never mind.
MR JUSTICE COLMAN: Let us retrieve the position, shall we, Mr Meeson? There is, up to 283, the references section of the first report which starts at 199. Then there is 283.1, which is Mr Corlett's fax transmission, and that goes on, as far as I can see, to 283.7. The message to which you refer is, I think, to be found at 283.10. No, wait a minute, it is not.
MR MEESON: No, I do not think so.

MR JUSTICE COLMAN: It is not in the bundle.
MR MEESON: I do not think we need worry about it too much for the moment. I will have to arrange --
MR JUSTICE COLMAN: The important thing so far as you are concerned, though, is 283.1, which is Mr Corlett's subsequent report of 17th January.
MR MEESON: Then, in another bundle, AG2B, there is a supplementary report, which in my bundle at least begins at page 406?
A. It does in mine.
Q. This is dated April 2000. There is, again, hopefully behind tab 21.1, a letter from Mr MacDonald asking various questions, to which you have provided an answer at 449.3 and following through to 449.6. With the exception -- you have corrected, I think, one detail in your first report that we have at AG2A, page 255, which is a table of hatch cover regulations and comparative rule requirements 1974?
A. Yes.
Q. And in the top right-hand corner under "GL", the first entry there, as it reads here, is "2.66", and I think in your supplementary report you have corrected that, have you not, to "1.75"?
A. Yes, I have.
Q. My Lord, it may be useful to make that amendment, the

top right-hand corner, "2.66" becomes "1.75".

If we could turn to page 200 of bundle AG2A, we have the contents page for that report, and just to make it clear, the parts that we are concerned with at this part of the inquiry are really parts 3, 4 and part of 5, and you heard Mr MacDonald's comments. You have reviewed for us, in section 4 of this report, the various documentation that I went through, really, this morning, and have commented upon it. On what criteria did you base your comments when you were commenting on that historical material?

A. I was asked to provide a technical overview, presumably on the basis of my general experience as a naval architect and reasonable degree of familiarity with the interpretation of certification and classification regulations.

Q. Apart from the material that we have in the bundles and that I reviewed this morning, did you have any other materials upon which you relied on carrying out that review?

A. There are some technical papers which are referenced in the list of references at the back of the report which give an overview of the development and content of the 1930 and 1966 conventions.

Q. My Lord, I was not intending to take Mr Corlett through

that part of his report, and indeed, in my submission, we have looked at the material, or most of the relevant material, this morning, and one can see what it says. I am not sure anything will be gained from going over that in greater detail.

For our part, Mr Corlett has made various comments at various places, such as in his view the convention was rushed, and things that I know exception has been taken to by, for example, the Department, but, my Lord, in my submission, two things: first of all, the convention ended up with the results that it ended up with, whether it was rushed or it took a long time to reach those conclusions, and secondly, whether it was rushed or not is perhaps a judgment that anybody can make looking at the documents and the dates as to whether one thinks it is important.

Certainly, for our part, we do not consider that it is important. We consider that what is important is the standards that were implemented at the convention and the basis upon which those standards were derived.

What I would like to do is to look at the period after 1966 up until, really, effectively, the building of the Derbyshire in the mid-1970s, and look at that, if you like, that ten-year period post-convention, and see if there is anything during that period that could lead

one to consider that the regulations were not adequate, obviously trying to avoid the application of hindsight.

This is the section that you have considered in your report, section 5, beginning at page 233, and I think it is correct to say from this that your review of the published materials during the late 1960s and late 1970s really focuses upon a very few pieces of research in particular that affect the question of hatch cover standards. Is that correct?

A. Yes.

Q. Of those, what do you think are the most important ones that we need to be concerned with?

A. I think there are two important references. One is the 1973 ISSC, International Ship Structures Congress, which, following on the start of work at the 1970 ISSC, considered slamming and impact, and in particular gave some consideration to green water loading.

(1.45 pm)

Q. That we have in our bundle in AG2B at tab 22.1, page 455 onwards. This is your reference 11.

A. Yes.

Q. It is headed "5th International Ship Structures Congress 1973. Report of Committee 8. Slamming and impact."

Could you just tell us what the International Ship Structures Congress is or was?

A. It is an international collaborative organisation between academic institutions, research institutions, the classification societies and other interested organisations which meet on a periodic basis. I think it is every three years, and it acts as a forum for liaison and coordination, exchange of ideas on particular topics relevant to ship structures.

Q. What sort of people or bodies would attend that sort of conference?

A. Well, as I say, it is academic institutions, research institutions, classification societies and so on. On page 456, you can see the list of members of the slamming and impact committee, and Abramson I think is DNV, obviously Professor Ochi at the bottom there, who was an academic, and the other people -- Lewison I think was an academic at the time.

MR JUSTICE COLMAN: He is at the International Physical Laboratory, somebody I know.

A. Thank you, my Lord.

MR MEESON: In this report, Report of Committee 8, if we look at page 458, section 1 is headed:

"Hydrodynamic aspects of slamming and deck wetness."

It says:

"This section discusses a state of the art review

of the hydrodynamic aspects of ship slamming and deck wetness phenomena. It outlines the present state of the art on three specific subjects: (a) hydrodynamic impact pressures, (b) threshold relative velocity, and (c) bow flare impact and deck wetness, followed by recommendations for further research and development on each subject."

Which of those three are relevant to the questions that we are considering?

A. Well, the most relevant is item (c), bow flare impact and deck wetness.

Q. I think we have that part of the report at 463.3?

A. Yes.

Q. Under the section 1.3.1, "Damage due to shipping green water and design standard", it says:

"Many examples of serious structural damage associated with impacts at the ship bow have been reported. These include deformation of the forecastle deck, buckling of pillars between decks, falling of hatch covers into the holds, collapse of the bridge front walls, et cetera. The damage is caused by heavy water spray and green water crashing on the deck or by the submergence of the ship bow into waves under severe motions in rough seas, and the extent of the damage increases with increase in ship speed. Several studies

on this subject have been carried out by a subcommittee of the Ship Structure Committee of West Japan", then there are three references given, "and results of the studies are outlined as follows ..."

Do you have any particular comment to make upon that part of the report?

A. This work that is being reported here would appear to be based on a unspecified concern about damage to ships and, as is clearly stated, apparent damage to hatch covers. This is one of a small number of references that appears here and elsewhere in the various documents relating to the Load Line Convention, where there are references to reports of hatch cover damages, but there are no details given.

This section of the report then goes on to describe in summary form the work that has been carried out and has been considered here. This, I think, as Mr Sole has pointed out, cannot be considered as definitive in the sense that the estimates of strength that are made are on an approximate basis, and the loads are, if you like, reverse engineered. From the damage they have worked out what the load must have been, so they cannot be considered precise. But they do indicate quite significant load magnitudes, well above the rule figures as being possible. If one looks at the

conclusions and recommendations at the end, there is a clear recommendation that this is an area that does need further research, and in particular a study of what real loads are at full scale.

MR JUSTICE COLMAN: Is the involvement of NKK in that, which as you recall was one of the classification societies which was insisting on increased hatch cover strength in the 1966 meetings, and the fact that this evidence emanated from the Ship Structure Committee of West Japan coincidence, or is one thing connected to the other, so far as you know?

A. I do not know, as a matter of fact. I think it probably indicates that this was a matter that the Japanese were particularly concerned about. The Japanese shipbuilding industry over this period was growing very rapidly, and they were carrying out a lot of research into various aspects of the design, particularly of large ships. I think it probably is more a reflection of that, rather than a direct association with NK.

MR JUSTICE COLMAN: I was concerned in particular with the reference to "actual damage" at the top of page 463, closely associated with the several studies said to have been carried out by a subcommittee of the Ship Structure Committee of West Japan, 463.4.

A. Yes, it does appear that the research was based, or the

stimulus for the research was based, on actual experience. As I say, there are no particulars of what the experiences were that appear in this, or in the earlier 1970 ISSC report.

MR JUSTICE COLMAN: It would obviously be highly material to this inquiry if, in the period up to 1973, Japanese ships had been sustaining substantial hatch cover or foredeck damage because they were encountering typhoons in the North-West Pacific, and the Japanese Classification Society was then embarking upon a research programme to further investigate this problem. You cannot --

A. I cannot provide any more information on that, my Lord. We have had some difficulty in just getting hold of copies of the ISSC reports from this era, let alone finding any working papers or back-up information.

MR MEESON: My Lord, the references, 1.31, 1.32 and 1.33 are to be found at 463.10. The first relates to a report of the Ship Structure Committee of West Japan, entitled "Damage of ship and counterplans" in the reports of the Society of Naval Architects of West Japan, number 8, 1969.

The next one is a subcommittee of Ship Structure Committee of West Japan, "Damage of ship due to slamming and shipping green water in counterplans", a bulletin of

Society of Naval Architects of Japan number 487 in 1970.

The last one is subcommittee of Ship Structure Committee of West Japan, "Damage of upper deck and superstructure caused by wave impact loads", report of the Ship Structure Committee of West Japan in 1971.

MR JUSTICE COLMAN: None of which documents are available?

MR MEESON: No.

A. Some of these papers are available in Japanese.

Q. Do you have them in Japanese?

A. (Pause) I am sorry, I thought I had one of them. They are quite likely to be available in Japanese. I am not sure -- it is just possible I have one or two of them in my office.

Q. My Lord, maybe we will investigate that and see what can be done.

If we can look next in that report at page 463.5, there is a section 1.3.2, "Impact pressure and frequency of occurrence of deck wetness".

That says:

"An experimental study on the fundamental properties of shipping of green water, magnitude of impact pressure and associated longitudinal bending and vibratory stresses (whipping stress) was carried out by Kawakami in regular head waves."

A reference is given there to Kawakami, "On impact strength of ships due to shipping green water", Journal of the Society of Naval Architects of Japan, volume 125.

Then it says:

"It was found through this study that the magnitude of whipping stress was fairly large, and it appears that the effect of shipping green water on main hull girder strength should be considered for ship design in practice. Figure 1.7 shows results of the measured pressure (non-dimensional) at various locations along the ship length as a function of ship speed. As can be seen in the figure, the location of the maximum impact pressure due to shipping of green water shifts aft with increase in ship speed. The magnitude of impact pressure becomes maximum at a certain speed and then reduces significantly at higher speeds. The figure also shows that the magnitude of impact pressure applied to the aft part of the forecastle deck reaches 30 to 50 tons per square metre full scale when the pitching motion becomes large. The pressure magnitude is nearly equal to the value estimated inversely from available data on damaged structures of the foredeck."

How does that relate to the sort of figures laid down in the 1966 Convention?

A. These values are obviously very, very much larger from

the figures taken into account in the Convention. This illustrates that there are a whole range of problems associated with the operation of large ships in waves that are of concern here, green water loading on deck being one of them. There is a reference in here to whipping stresses, to impact, green water impact loading, and so on, which are other phenomena associated with this. It also shows the sensitivity of the loadings to speed.

I mean, I think the significance of this is that, as I said before, it should not be regarded as being definitive, but it does suggest that the loads included in the Load Line Convention Hatch Cover Regulations could be significantly too small.

Q. Although this is not talking about hatch covers as such, is it? It is talking about the aft part of the forecastle deck?

A. It is talking about loads on deck in general, and possibly, in terms of the proportion of the ship's length, somewhat forward of the number 1 hatch covers.

Q. Then you mentioned the "Conclusions and recommendations", and we have those at 463.7, where it says:

"Several important studies have been carried out in the past three years on the hydrodynamic aspect of

slamming and deck wetness, the results of which may significantly contribute to practical design application. There still remains, however, several points to be clarified, and the following recommendation may be given:

"(1) Perhaps one of the most important subjects is the establishment of the correlation between results obtained from model experiments and those from full-scale trials. Frequency of occurrence of slamming and deck wetness, pressure-velocity relationship, threshold velocity, severity of green water and spray, et cetera, should be obtained from well-designed experiments on the full-scale ship, and then from model tests where the wave conditions for the ships are reproduced in the towing tank. Comparison of the test results will provide accurate information on various factors associated with the frequency and severity of slamming and deck wetness."

Then at (2):

"Continuation of comprehensive seakeeping model experiments on slamming and deck wetness on various types of wetness is highly desirable. It is strongly recommended that relative motion (or velocity) be measured directly in the tests so that the pressure-velocity relationship can be clearly

established. Phase between ship motion and waves at the instant of impact should be measured, since it may play a significant role in clarifying the physical properties of the threshold velocity."

Then it goes on to talk about other things, and then finally it says:

"Efforts to study the frequency and severity of deck wetness and bow flare impact should be continued in an attempt to provide useful information for design and for use in future modification of the shear formula given by the International Load Line Convention."

How would you summarise the state of knowledge at this time in 1973?

A. This report is an attempt to summarise the current position at that time. It seems to me that it indicates that the possible loads on foredecks and other structures on the deck of ships could be significantly higher than was currently being allowed for. It is also clear that the research methods are still under development. Things are moving quite fast. As is clearly stated in the recommendations, there is a lack of correlation, of good correlation, between full-scale measurements, model test measurements and analytical predictions, which are one of the recommendations that was made here for further research. So that whilst

there was a potential problem that could have been identified, they were not necessarily in the position to start providing answers.

MR JUSTICE COLMAN: Can you just tell me, Mr Corlett, please, whether, in view of the recommendations which one finds here about a continuation of comprehensive seakeeping model experiments, firstly one can assume that anybody, except the Japanese, was carrying out comprehensive seakeeping model experiments at that time?

A. There were other people carrying out research in this area, my Lord.

MR JUSTICE COLMAN: In the UK?

A. Yes, I think so, my Lord, certainly on the basis of published information we know that there are references in papers produced by Dr Hansen of Germanischer Lloyd at about this time to experimental work that he was reviewing and considering along with analytical studies. There was certainly the capability in the UK. I would be very surprised if there was not research in this sort of area going on.

MR JUSTICE COLMAN: But you do not know whether anybody was availing themselves of the capability?

A. Not directly, no, my Lord.

MR JUSTICE COLMAN: So what it amounts to is, so far as you are aware, there was actual experimental work in Japan,

there was actual experimental work in Germany, we do not know about the UK, and was the position that, in consequence of that experimental work, any further papers of the kind we have seen here listed in these references were produced by anybody?

A. I am sure there were, in fact, many more papers than we see here on the subject. We have carried out a literature search and have not been able to identify a significant number of other references of a scientific nature. Many of them are dealing with some of the more narrow technical issues raised, such as the nature of hydrodynamic impact. So they will be of a narrower nature.

MR JUSTICE COLMAN: Have you looked at page 463.18?

A. Yes, I have.

MR JUSTICE COLMAN: Is what is illustrated there, by these various calculations and graphs, and so on, indicative of a very substantial disparity between what was there being found and what was contemplated as an international requirement by the Load Line Convention in 1966?

A. What is shown on this page and what is shown on the previous page shows the possibility. This does not provide -- I do not think it can be said to provide certainty, and I do not think it -- I am sure it does

not provide enough information on which one could base a new standard or reach a consensus on a new standard.

MR JUSTICE COLMAN: These experiments that were being conducted at this time were, as I understand it, or one infers from what one finds on page 463.8, presumably being conducted by reference to sea conditions which were not totally unrealistic?

A. Yes, I mean, some of these experiments in here that are reported are being carried out in regular waves, as opposed to realistic sea states, but some of them are being carried out in long-crested sea states.

MR JUSTICE COLMAN: In extreme conditions?

A. In a variety of conditions.

MR JUSTICE COLMAN: What I am saying is, can one tell from looking at this material that the experiments that were being carried out were being carried out by reference to conditions which were a possibility?

A. I think it is implicit in what is being done here that they were being carried out in realistic conditions, in possible conditions.

MR MEESON: You mentioned a second piece of research that you thought was important at this time.

A. Yes, there is a paper published by Dr Hansen of Germanischer Lloyd in 1972. The paper is in German, and we have what I am afraid is a rough translation of it.

Q. We have that at tab 22.8 of this bundle. The German is at 551. Then we have the rough translation that begins at page 555.1. It is "On the prediction of deck loads by 'green water'", by Hans-J Hansen, published in Schiff und Hafen in 1972. It says there:

"The aim of this work is the determination of the water pressure, with which the deck is loaded by ships steaming into heavy seas, if 'green water' comes on deck. Since in a swell or in a sea-area with significant changing swell large and small pressure loads -- depending on the quantity of water coming at deck -- can occur, as load characteristic value the pressure is determined, which is exceeded only in a given small percentage of the period of operation of the ship."

What in particular do we derive from this paper?

A. What this paper indicates is that at this time Germanischer Lloyd, or Dr Hansen, was carrying out work using analytical methods for predicting green water loading and magnitude of green water load. They were using methods that, by modern standards, I think, would be regarded as relatively simple, but it shows the computational methods and capabilities had moved forward to the point where this type of systematic analytical approach was possible, which I think can be contrasted

with the situation in the run-up to the Load Line Convention, when it is clear from much of the discussion that took place that analysis was very much more limited in what could be achieved.

Not long after this, it would appear that Germanischer Lloyd altered their rules in respect of hatch covers at forward locations. Dr Hansen gives some explanation of this in a report he prepared, but it is not a complete explanation and it is a little difficult to interpret. I think there is probably a reasonable assumption that that change, those increases, were based on this sort of research work.

Q. In particular, I think we see, at 555.10, they have what is described as the results of an evaluated calculation, which I took to mean really a sort of worked example?

A. Yes, I think that is correct.

Q. They have chosen a bulk carrier with dimensions, length 221.1 metres, and then a block coefficient of .8, is that what the delta is?

A. I think so, yes.

Q. Then a height of 17.6 metres.

A. I think that is depth of hull.

Q. It says:

"... loads on the deck were determined, which were achieved or exceeded, with a probability of 10 to the

minus 4. For vessel speeds 10, 14 and 16 knots was set. The calculation was not for a sea-area, but for a sea spectrum with significant wave height of 12.5 metres and characteristic period of 10 seconds."

Then it says:

"The results can be found in figure 5, wherein a comparison with [something] reduced relative motion is possible."

Then it says:

"Thus the criteria for the annotation of deck and hatches are to be improved."

I do not know how good your German is, but we have the German for that on 554 --

MR JUSTICE COLMAN: Where is the German for that?

MR MEESON: 554.

MR JUSTICE COLMAN: I see. It has been cut off, has it not?

MR MEESON: In the right-hand column it has been cut off. The final sentence is:

"Damit sollen die Kriterien fur die [something] sung von Decks und Luken verbessert werden."

Do you have any idea what they mean by "annotation of the deck and hatches"? It seems a rather strange translation?

A. Yes, I think it is a function of the translation. I

would presume that means the scantling requirements.

MR JUSTICE COLMAN: It is the requirements, is it not? It means "requirements", "Kriterien".

MR MEESON: Would it be correct to say that this paper is suggesting that deck and hatch strength, for want of a better phrase, are to be improved?

A. Yes, I think that is correct. If one looks at figure 5, which is on the bottom of page 553, one will see that the speeds are actually quite high, 10 knots, 14 knots and 16 knots. I think that the solid lines are static loads, and the chain-dotted lines include the dynamic effect.

Q. By "dynamic effect" we mean the pitching effect, effectively, the relative motion?

A. Yes, so that they are -- for the sea state that we have been talking about, even a speed of 10 knots would be quite fast.

Q. 16 knots into a sea state with a significant wave height of 12.5 metres would be going it a bit, would it not?

A. I think it is unrealistic.

Q. What we do see, I think, do we not, is that the sort of loads in tons per square metre in figure 5 at 553, the numbers along the bottom of the graph, 5, 6, 7, 8, 9, relate to the picture at the top, do they not, the diagram at the top for the various stations? 9 being

effectively, I suppose, just over the bow, and sort of 6 being back towards the number 1 hatch, I suppose?

A. Yes.

Q. One has values of 10, 12 and above tons per square metre?

A. Yes. Again, this is a linearised analysis. It is based on relative motions. I think it is based on relative motions at the deck edge. So there are various phenomena that are not taken into account in this analysis. The numbers that come out should not be treated as absolute values, but they do tend to indicate that the loads could be significantly higher than the values which are built into the Load Line Convention.

Q. Are those really the two important pieces of research that you think show some development in the early 1970s?

A. Yes, I think they illustrate it. Obviously, the ISSC document refers -- it is based on a review of a large number of other references and is based on them, but they are the principal references that we have identified.

Q. I would like to refer you to another reference that you have given, and that we have at tab 22.5, which is your reference 15, which is a paper called, "Hatch cover design and related experience" by a Mr Lockhart of Lloyd's Register of Shipping, at a conference on hatch

covers' design, installation, operation and maintenance in 1977, which would have been after the Derbyshire had been built?

A. Yes.

Q. At page 479, Mr Lockhart gives a synopsis. He says:

"In 1966, the International Conference on Load Lines was convened in London by the Inter-Governmental Maritime Consultative Organisation (IMCO) with the objective of revising the rules governing the assignment of freeboards in view of the changes in ship design and arrangements which had taken place since the 1930 Convention.

"At the conference, one of the principal topics of interest was the prevention of entry of water through openings in exposed parts of ships, and in the discussion on the relative efficiency of hatchway closing appliances, a significant change in philosophy was in connection with considerations regarding the wider use of steel hatch covers.

"Now, ten years later, responsible bodies within the marine industry are here to debate the lessons learned in the field of hatch cover design and construction during the intervening period.

"Standards of strength and stiffness for metal covers were defined in the 1966 Convention. These were

arrived at from the experience of classification societies and governmental authorities, and there is little doubt that they are adequate from the point of view of overall safety considerations. However, in recent years, most of the criticism directed against metal hatch covers has been related to cargo damage, and as the weathertightness of covers must depend on the sealing and securing arrangements, consideration of these aspects of cover design is fundamental."

Do you have any particular comments on that review?

A. This indicates that at the time, on the basis of the Lloyd's experience, the incidence of significant damage to hatch covers was relatively rare. In other words, there was no substantial body of evidence suggesting that the strength of hatch covers was significantly deficient.

As I mentioned earlier, there are one or two references to there having been problems with hatch covers, both in the ISSC document and also in some of the discussions surrounding the Load Line Convention, but in general there does not appear to have been a pattern of particular problems, and I think Mr Lockhart's paper here seems to confirm that.

Q. There was, if you like, a dissenting opinion expressed

by a Mr MacDuff at page 499, who said that:

"... in this excellent, practical and theoretical paper, the author had been very diplomatic in his references to the strength requirements for hatch covers as required by the 1966 ...", then it says "Internation Load Line Convention", which I think means "International", "but Mr MacDuff feared that he could not be so diplomatic."

MR JUSTICE COLMAN: Where did he express that fear? On page 499?

MR MEESON: 499, in the right-hand column.

MR JUSTICE COLMAN: Yes.

MR MEESON: "It was probably the case today that the development in ship size during the last ten years had outstripped those requirements. Taking the large 120,000 ton dead weight bulk carrier as analysed by Lloyd's Register, it was to be remembered that the thickness of hatch cover plating would be 8 or 9 millimetres, while the hatch coamings would be about 11 millimetres thick, but the deck coamings would certainly be 19 millimetres thick. Therefore, there was a situation with a deep box structure of rather light (almost deckhouse) scantlings located on the weatherdeck and surrounded by much thicker adjacent structure.

"To Mr MacDuff, it was not surprising that damages

occurred in hatch covers because, on the largest ships, they were too thinly constructed.

"It was the case that all of those present in this room today could be comfortably seated within the hatchway coaming and covers on a large bulk carrier and, therefore, the hatchway coamings and covers were, in his opinion, lacking in strength and rigidity at that very large size."

He then discusses cross-joints, and he goes on to say, over the page at 500, in the left-hand column, about halfway down:

"During the past ten years with the extensive advances in seaway motion studies, it was well known that larger ships performed rather as moving islands and were thus liable to the onset of heavy seas, particularly in the forward .3 of the length. It was believed that this was a certain contributory factor to failure in the weathertightness of large area hatchways.

"Today, the sophisticated design of ships with their narrow strength decks and wide openings left the hatch cover manufacturer with ever wider problems."

Then:

"Mr Stewart referred to the position of the bridge, and said that as the bridge went further aft, he

found that in bad weather, with modern engines and hydraulic governers there was more damage forward, because the people on the bridge did not know what was happening so far away."

Then the author replies in the right-hand column, near the bottom:

"Mr MacDuff's opinion that hatchway coamings and covers were generally lacking in strength and rigidity was not really reflected by experience. There have been few, if any, instances where the general strength of construction had been present. There were certainly cases where detail design could have been improved, especially in way of concentrated loadings, but such instances could generally be dealt with at the approval stage.

"Mr MacDuff had compared the deck thickness against the hatches with the thickness of the cover plating and the coamings, but it should not be forgotten that the deck plating between the hatches within the line of openings was more closely related to these thicknesses."

Is there anything that we can derive from Mr MacDuff's comment, whoever he may have been, or may still be?

A. I have a feeling he was a Bureau Veritas surveyor who

has been retired for quite some years now, I think. I suppose he is expressing a different opinion. Mr Lockhart's reply seems to speak for itself. He says that there are not many, if any, instances of significant structural damage, and I think that to some extent is what we would expect.

(2.30 pm)

Q. By the time we got to the mid-1970s and the time of the building of the Derbyshire, was there anything at that stage to suggest that the regulations should have been changed?

A. I think there are two, if not more, sides to it. At one level it seems to me that there is beginning to be a body of scientific opinion, if that is the right word, that hydrodynamic loadings and hydrostatic loadings at the forward end of the ship could be really quite substantial, though the research which was investigating and establishing what those loads could be was far from comprehensive and complete.

On the other hand, there does not appear to have been any body of empirical evidence from ship experience which said that hatch covers were a particular point of risk on large ships, and, as I think we saw in the documents that you referred to this morning, the tendency and the inclination was still towards basing

changes in rules on experience. In other words, there was no experience to give ground for changing rules, and so I think the words I used in my report was "the picture was not complete".

MR JUSTICE COLMAN: You have looked at this document, Mr Corlett, the Lockhart document. We went through it.

A. Yes.

MR JUSTICE COLMAN: Does it refer anywhere to the work done by the Japanese?

A. No, it does not. I think it is essentially a practical review of the situation.

MR MEESON: Presumably it would be fair to say, would it not, that if part of the theoretical research relates to ships going at high speeds in extremely high seas, people might consider that that would be something that the master would take into account at an operational level?

A. Yes. Certainly it is clear that a lot of the concern at this time was in respect of higher speed vessels, such as container ships, which were capable of being driven faster in heavy weather, and I know that there were quite a few incidences, more than a few incidences, of damage to container ships themselves, and to container stacks forward in heavy weather around about this period. So that will have obviously, almost certainly,

have been a much higher priority regardless.
MR MEESON: Thank you. Those are the questions that I have.
MR JUSTICE COLMAN: Would that be a point where we might have a short break? Ten minutes.
(2.33 pm)
(A short break)
(2.43 pm)
MR MEESON: My Lord, there probably is something I should clear up. Mr Corlett, you have obviously prepared a number of reports that I identified at the beginning of your evidence, and you have expressed your views to us without going through those reports in great detail. Do you stand by those reports? Is there anything that you wish to change in them?
A. No, I do not think so. I mean, there are one or two things that, with information subsequently provided, merit a slight correction. For example, I think we only had the 1982 Germanischer Lloyd rules to hand. Dr Hansen has now indicated the Germanischer Lloyd rules changed in 1978, but as far as I am aware everything else of any substance is correct.
MRS TROY-DAVIES: My Lord, sharing Mr Meeson's view that in so far as the historical background really is to be taken from the documents themselves, from the conference and so on, I have no questions for Mr Corlett.

MR BRYAN: My Lord, I have no questions.
MR EDER: My Lord, it has been agreed that Mr MacDonald will ask questions, and I will ask any questions thereafter.
MR JUSTICE COLMAN: I do not suppose Mr Howard has any questions.
MR MACDONALD: If he has, he cannot ask them.

Cross-examination by MR MACDONALD

MR MACDONALD: Mr Corlett, good afternoon.
A. Good afternoon.
Q. I have seen your curriculum vitae in the shipbuilders' bundle, and I noted that you do not state that you have any experience of attending diplomatic conferences or formulating legislative policy in merchant shipping?
A. I have not attended a diplomatic conference. I have been involved in a peripheral way in formulating offshore regulations for the Department of Energy for the stability of semisubmersibles, but a few years back. That is the closest I have got to the formulation of regulations.
Q. Your expertise is confined, I would suggest, to technical issues of naval architecture?
A. I am a naval architect, yes.
Q. You have read the documents which are relevant to the International Convention on Load Lines 1966, and you have made some comments on them, but I suggest that

where you express views about the progress of the diplomatic conference, those views are uninformed. They are inexpert. Would you agree?

A. They are the impression I obtained from the documents. It is not based on my experience of that type of event.

Q. And you are not able to give an informed or expert view to this tribunal on questions of the governmental regulation of merchant shipping?

A. Well, only in so far as, as a naval architect, I have experience of those regulations.

Q. I want to ask you a little about the Load Line Convention of 1966, and to consider with you first question 9A, which addresses the time of design of the Derbyshire.

Would you agree that, in effect, question 9A is the question whether the provisions of the 1966 Convention, as enacted in the UK, were inadequate in relevant respects in the light of the state of knowledge at that time, including what should have been known and anticipated?

A. I do not have it in front of me, but if you are reading from the document, that must be the wording.

Q. What I am interested in establishing is that you do not give any ground, do you, for distinguishing between the position in 1966 and the position in 1968?

A. No, I do not think -- as far as I can see from the documents that are available, the state of knowledge had not moved forward substantially in that period.
Q. Turning to the strength of hatch covers, it may be that you will agree with me on the general background to the 1966 Convention. The first thing to note is that it was not the UK's convention but an international convention, and on some issues the UK was outvoted or outargued, but had to accept the views of others. Is that right?
A. I think that is quite clear, and I think it is very well summarised by Sir Gilmour Jenkins, I think, who says very much that what ended up was a result of a negotiation.
Q. The convention represented the collective wisdom, did it not, of the best informed representatives of 52 countries, including the major maritime nations on the material issues?
A. Yes.
Q. The proceedings at the conference had been in preparation for months or even years by the class societies and the maritime nations?
A. Yes, the preparation started -- I think, on the basis that it was originally intended the conference would take place in 1961 -- more than ten years before the conference.

Q. So you would expect the conference, without any qualification at all, to reflect the best reasonably obtainable standards in the light of the knowledge of the day, would you not?

MR MEESON: My Lord, my learned friend is asking questions about matters that I thought he had intended and had established that the witness was not qualified to answer.

MR JUSTICE COLMAN: Fair point.

MR MACDONALD: The difficulty about that, my Lord --

MR JUSTICE COLMAN: What is the answer to that, Mr MacDonald? Is there one?

MR MACDONALD: The difficulty about that is that the witness has given a great deal of evidence about it in writing, including in reports, which he has, subject to minor corrections, adopted.

MR JUSTICE COLMAN: I think it is a matter for me, really, is it not?

MR MACDONALD: It is a matter for your Lordship. Of course, as of this time --

MR JUSTICE COLMAN: Taking the raw evidence or the primary evidence, which has been the subject of Mr Corlett's reports and his historical account of what was done, and then drawing such inferences from that evidence as seems appropriate -- I mean, the inferences are not really for

him to draw, are they?

MR MACDONALD: Certainly my submission would be that they are not. In addressing your Lordship at the end of the inquiry, I shall be submitting that his interpretation of the proceedings of the diplomatic conference are no more valid than mine or anyone else's in the room.

MR JUSTICE COLMAN: Or even a commercial judge's.

MR MACDONALD: I have no doubt that your Lordship's will be the most valid. The difficulty is that he has given this evidence, and of course, if your Lordship indicates now that your Lordship --

MR JUSTICE COLMAN: I do not think inference is really -- ask him about inferences, by all means, if you like, in so far as they are directly concerned with his technical expertise, but not otherwise.

MR MACDONALD: Let me try to ask a technical question, Mr Corlett. It is, I think, accepted by you that at the time that the convention was done there were not adequate model test data or analytical tools such as computer programmes for finite element analysis to allow hatch cover strength to be set, other than by experience?

A. Yes, I think that is correct. I think that there were the beginnings of methods appearing, and some people wished that it had been possible to do something more

rigorous and analytical, but the facilities just were not available at the time.

Q. I have referred to experience, and in very short summary, would you agree that that experience amounted to this: first of all, that ore carriers had operated successfully as tanker draughts for about ten years?

A. Yes.

Q. Secondly, that the United Kingdom had experienced no failures of steel hatch covers over a period of 25 years?

A. That appears to be the case, yes.

Q. Third, that the United Kingdom had conducted an experiment called the "deeper loading experiment", involving twenty large tankers trading with the proposed new United Kingdom load lines in the northern winter, and had found no appreciable increase in water shipped over deck?

A. Yes, I must submit -- probably with the benefit of hindsight, I am not sure I find that was a very worthwhile, or appears to have been a very worthwhile exercise -- but certainly that was regarded at the time as a significant piece of empirical evidence.

Q. At that time, there were no strain gauges, were there, mounted on the decks of large ships, such as we have now to measure --

A. There were not. There probably could have been, but there were not.
Q. It certainly would not have been a normal approach to assessing a hazard as of the mid-1960s, would it?
A. No, I do not think so. I think the problem, though, is that it is relying on observational information, and we have already had some discussion about the validity and accuracy of observations of sea states, and the same would apply to wave boardings. On a statistical basis, it might be useful, but on a one-off observation basis, it might be questionable.
Q. I see the force of that. But you accept, I understand, that at the time it would have been regarded as a worthwhile exercise?
A. Well, it clearly was.
Q. So in all that, there was nothing to suggest that steel hatch cover strengths were a particular problem?
A. No, and it is quite clear that that is the basis on which the regulations that were written into the Load Line Convention were adopted.
Q. And although you say in your first report that some of the delegates to the 1966 Conference had technical reservations about the safety of reduced freeboard cargo ships, is it right that no delegation opposed the B minus concept as such?

A. I think that is right. The voting figures are in the documents.
Q. Your assessment, as I understand it, is that the question of increased strength for B minus ships' hatch covers was a casualty of shortage of time?
A. Yes, that was certainly one of the significant factors in it.
Q. In support of that, it seems to me that you rely on three matters: first of all, a debriefing note by Sir Gilmour Jenkins, which we have in the papers and which refers to a problem of time; secondly, an absence of time to consider a number of proposed changes to the corrections to basic freeboard. That is the second matter.
A. Yes.
Q. And the third matter is a record of weekend work towards the end of March?
A. Yes, it certainly seems that they were working all the time available towards the end of the conference.
(3.00 pm)
Q. Just shortly on those three points, first of all, as to Sir Gilmour Jenkins' note, that records a concern, but it also records that the concern was met. That is right, is it not?
A. Well, the concern was met in so far as a convention was

achieved at the end of the day, and that was obviously the primary aim.

Q. So far as the proposed changes to the corrections to basic freeboard are concerned, that was a different issue entirely, was it not, from hatch cover strength?

A. Well, it was all rather interrelated because, as we saw this morning, the question of increased hatch cover strength was deferred on the basis that it could not be decided on until you knew what the freeboards were going to be.

Now, the basic hatch cover strength formulation was adopted, but any question of variation to it, my understanding from reading the documents was that that was left in abeyance. It is not quite clear where this adequate strength provision, which made it into a regulation 27(7)(c), I think it is, was introduced, but that must have been right at the end of proceedings.

Q. I would like to look at one or two of the original documents in a moment. Can I just deal with the weekend point first? You, of course, will not know this, but it is, in fact, common for weekend work to be done throughout a diplomatic conference, is it not?

MR JUSTICE COLMAN: Mr MacDonald, I am sure your vast experience of international conferences enables you to put that.

MR MACDONALD: I put it on instructions. I was thinking what a terrible question it was, actually. Let me try again. Mr Cubbin will say, on the basis of his extensive experience of diplomatic conferences --

MR MEESON: This is not actually a question, my Lord.

MR MACDONALD: If you do not interrupt -- weekend work goes on throughout the conference. Now, you are not in a position to gainsay that, are you?

A. No.

Q. It would not be surprising for you, as an intelligent observer, to discover that the proceedings at diplomatic conferences tend to become more active towards the end?

A. It would not surprise me at all.

Q. More significantly, perhaps, I would suggest to you also that there is no evidence in the papers which expressly connects the absence of a provision for increased hatch cover strength for B minus ships with shortage of time. Do you agree?

A. Not explicitly. I think it is implicit in that the freeboard tables were being debated right up to the last moment, which is perhaps not surprising since that was one of the main issues for the convention. By implication, any discussion of increased hatch cover strength would have had to have been left to the very end.

Q. Let us look at the core bundle, can we please, at one or two of the papers? Could you turn to page 220 of the core bundle?
A. Is that 220 at the top?
Q. 220 at the top, yes. I just want to consider with you one or two of the key dates. On this page we are on 17th March, upper right-hand corner, and this is the report of the Ad Hoc Working Group on the strength of hatch covers, which was a working group, as I understand it, which was a subcommittee of the Technical Committee. In the middle of the page we can see that, by this date, the members of that group had agreed on the basic loading value for class 1 and class 2 hatches, and the associated multiplier?
A. Yes.
Q. Presumably that was on an empirical basis?
A. Yes, I think it expressly said it was on an empirical basis elsewhere in the documents.
Q. Over the page , at page 221, at paragraph 6, the second sentence, we see recorded there the UK delegation's opinion that cargo ships which were given a reduced freeboard might require an increase in hatch cover strength?
A. Yes.
Q. That, indeed, was the view of the whole of this working

group, as we can see from the core bundle at page 207. Just flick back, please. This is the next day, 18th March. It is also headed up a report of that working group. At page 209, top right-hand corner, paragraph numbered 14, near the bottom of the page, we see that that working group was of the same view as the UK member of that group?

A. Yes.

Q. Reverting to 17th March, and turning back to page 200, we find that another working group, a Working Group on Freeboard Computation, by 17th March, had established the two ship types, agreed the basic freeboard tables, but adopted a proposal, which I think was a United States proposal for the strength of class 1 hatchways of reduced freeboard ships, that the strength should be left to individual administrations. We see that at page 201, reading at the, I think, second last complete paragraph near the bottom:

"For those 'B' type ships which because of suitable sub-division may be entitled to a freeboard less than that based on basic 'B' type freeboard table, the group considered it advisable for each administration to satisfy itself that the strength and securing arrangements of the hatch covers were in all respects adequate for the lesser freeboard."

A. Yes, I see that.
Q. While we are here, at page 202 of the core bundle, we can see at paragraph 6 of this document a record of the problem about corrections to the basic freeboard. I am not going to read this out, but what it shows is that the group had investigated proposals for seven or so changes to freeboard correction formulae which it was thought that there was not time to cover.
A. Yes, that is what it says here.
Q. You have already pointed that out in your reports. What one does not find in regard to the issue of hatch cover strength for reduced freeboard ships is any similar statement in any proceeding of the Working Group on Hatch Cover Strength or of the Technical Committee itself. That is right, is it not?
A. I am sorry, I am having some difficulty hearing you, Mr MacDonald.
Q. I am sorry. I will put the question again. I pointed out that in relation to this question of the seven new formulae for corrections to basic freeboards, there is an explicit reference -- in fact more than one -- to there not being time to do justice to that.
A. Yes, there is.
Q. What I am putting to you is that no such statement is made anywhere in the papers in relation to the issue of

hatch cover strength for reduced freeboard ships.

A. Yes, but the issue of hatch cover strength for reduced freeboard ships was, as of 17th or 18th March, put off effectively, and as far as I am aware from the documents, apart from the reference to the basic strength formulation being adopted, I am not sure it was raised again.

Q. Let us try to trace that through. I am afraid we will have to leave the core bundle here and go to AG8.2, and turn to page 136. The core bundle now has page 135, but I would like to take you, please, to other pages. We will start, however, in 8.2 at page 135, in fact. Go to page 134, just to remind you that this is summary record 26, dealing with the proceedings of the full Technical Committee on 21st March. So we have moved on three days from the 18th. It is RFI AG8.2. For the benefit of anyone who has different pagination, the document is LL/CONF/C.2/SR.26.

This is a document which records, Mr Corlett, that on 21st March the Technical Committee accepted the report of the Working Group on Hatch Cover Strength. Do you agree with that?

A. Yes.

Q. Thank you. It also shows something else. If we turn over to page 137 of the bundle, the header

page reference in the original document is page 10. We see, in the middle of the page, a paragraph beginning:

"Nevertheless, in the interests of agreement ..."

That is a paragraph which showed that at this stage the UK conceded its point that deck integrity should prevail over sub-division when considering reduced freeboards.

A. Sorry, could you give me the page reference again, Mr MacDonald?

Q. Yes, in bundle AG8.2, bottom right-hand page, page 137. Within the original document, using the pagination at the head of the page, it is page 10.

A. Yes, I have it.

Q. And the paragraph I am interested in is in the middle of the page, which begins "Nevertheless ..."

That was the stage at which the UK conceded in the interests of agreement that it could accept a sub-division concept for reduced freeboard for ships, rather than a deck integrity concept.

A. Yes, that is what appears to be the agreement here.

Q. That was the cue, I would suggest, for the muted requirement for increased hatch cover strength for B minus ships to give way and be replaced by the sub-division concept, which addressed the consequences of any flooding that might occur?

A. Yes, I mean, there has been very extensive discussion of this and the basis on which it could be done, if it was to be done.

MR JUSTICE COLMAN: Could the amplification be turned up if possible?

MR MACDONALD: I hope I need not take you to any documents about this unless you want to look at them, but what happened after that, I suggest, was that after various Technical Committee meetings on 26th March, the Technical Committee received a draft text recommended by the Ad Hoc Group on Basic Freeboards, which contained the wording, amongst others, that "the hatch covers for reduced freeboard ships should have adequate strength and securing arrangements".

A. Yes, I think yes, but that accords with my approximate recollection of the dates.

Q. That was approved by the Technical Committee the next day, which was Sunday, 27th March. So, to summarise, what happened was this: on 21st March, the Technical Committee accepted the report of the Working Group on Hatch Covers, which had recommended increased strength, and on 26th March the recommendation by the Working Group had turned into a requirement for adequate strength. That is what seems to have happened over those five or six days.

A. That is what seems to have happened, yes.
Q. There is no express evidence that this change from increased strength to adequate strength was due to lack of time?
A. No, I do not think so, not directly, no.
Q. There is one other possibility, namely that the requirement of sub-division was what prevailed and was seen as a substitute for increased strength.
A. Yes, I mean, certainly it appears both from what happened at the conference and from the discussion which took place afterwards that there was a difference of philosophy, and that the sub-division was perceived as an adequate substitute for increased hatch cover strength or an alternative.
Q. By what took place afterwards, I imagine that you have in mind the debriefing report of Sir Gilmour Jenkins, which is in -- for the sake of convenience we might take it from this bundle, AG8.2 at page 315. We find it recorded at paragraphs 6, 7 and 8 that what actually happened at the diplomatic conference was that there was a trade-off, if you like, whereby the sub-division requirement was agreed to replace the original proposal for increased hatch cover strength?
A. Yes, except that it would appear that there was still an understanding that the adequate strength expression in

regulation 27(7)(c) would result in some sort of uplift in the strength for reduced freeboard ships, and we see that in the discussion that took place in the transition period from 1966 to 1968.

Q. What we see from that is that the United Kingdom and Lloyd's Register of Shipping were still interested in the concept of increased hatch cover strength for B minus ships, but that they were broadly speaking unsupported in the world, save by NK class?

A. Yes, I think there is a reference to the Dutch for a period going on with this view or a similar view.

Q. Would they have been big players in the large bulk carrier fleet at that time, either in terms of building or owning?

A. Not amongst the big players, the very big players.

Q. That is all I want to ask you about hatch cover strength and the convention. Can I briefly ask you a little bit about bow angles. We accept, as you say, that the principle of replacing the fo'c'sle requirement with a requirement for a minimum bow angle was agreed fairly early on, but the nitty-gritty of the formula were not resolved until a late stage?

A. Yes, I think that is right.

Q. As regards the concept of dispensing with the fo'c'sle, as of that time, 1966, do you say that that was an

unreasonable idea in principle?

A. No, I think, in principle, it was quite a reasonable idea.

Q. Another feature of proceedings at the conference to which you made several references in your reports is the question of the factor on ultimate tensile strength. We know that a factor of 4.25 on UTS was adopted, and we know that the French won an argument on the use of the phrase "of safety".

A. Yes.

Q. So that the phrase "of safety" did not appear in the convention. You make the very fair point that the cover would fail in bending at a lower stress so that the real, if you like, factor of safety in the convention was less than a factor of 4.25?

A. Yes.

Q. So what?

A. The use of a factor of 4.25, or expressing factors of 4.25, tends to imply a margin of safety which was not real. It is apparent from the paper which the French submitted -- I cannot remember the reference of it, but Mr Meeson referred to it this morning -- that there may even have been a misconception that UTS somehow related to the actual collapse strength of the hatch cover and the use of the factor of 4.25 and the use of UTS. There

may be very good reasons why UTS was used, but its use and the use of that factor implied a degree of safety and a reserve of strength in the cover which was not real.

Q. The factor could equally well have been expressed as yield divided by 2.5, could it not?

A. It could have done, yes.

Q. At that time would you agree that the ultimate tensile strength of mild steel was more reliably known as a value for yield stress?

A. It was the defined parameter for grade A steel. I think I am right in saying that the yield strength of grade A steel was not defined at that point, at that time.

Q. Indeed not. That was the very point made by the United States delegation on 17th March, when he said that the yield point was not specified or determined in the testing of ordinary mild steel for ships, and questioned whether a yield point criterion could be used for design purposes. That would tend to support, would it not, the suggestion which, as it happens, is made by Mr Cubbin that the UTS of mild steel was more reliable and appropriate criterion to use at that time?

A. Well, it was an available criteria at the time. I think it probably -- again, from documents that we were taken to this morning, we see that the Japanese suggestion of

a scantling-type formulae was put forward. I would guess that was on the basis that it would have to incorporate what was a potentially misleading formulation.

Q. I take the point you made about the French document, but subject to that, surely those concerned, even in 1966, would know that there was a difference between ultimate tensile strength and yield stress?

A. I am sure they would, yes.

Q. So looking at it as of that time, the use of a factor on UTS was a reasonable course, was it not?

A. It may have been a reasonable course at the time. I do not think it alters the fact that it is potentially misleading, and potentially gives an idea or an impression that there is a greater reserve of strength for the hatch cover than really exists.

Q. Apart, possibly, from the French delegation, that was not going to take in any of the technically expert people there or who would ever have to apply the convention.

A. I am quite certain the people who were there at the time were aware of the implications of what it was about. I am not completely sure that everyone who would have to apply the convention, or interpret the convention, would automatically have realised that the reserves of

strength were much less than they appeared to be.

I think there may be a factor in here that the understanding of structural collapse and the understanding of the limiting strength of structures, certainly in the general design world, was much less in those days than it is now. So the appreciation of the influence of things like buckling and plasticity on ultimate strength was much less. So there was not necessarily an appreciation of the behaviour of structures at the time which would have revealed automatically the difference between the real strength of the structure and the structure that might have been implied by this formulation.

Q. I see, thank you.

MR JUSTICE COLMAN: Can I ask a question in relation to this? As I understand it, there is no necessary defined relationship between the ultimate tensile strength and the yield strength of a given piece of grade A steel?

A. The steel is made of principally iron, but a mixture of other elements, and the recipe for the steel will give an approximate -- a fairly accurate relationship between its yield strength and its ultimate strength.

MR JUSTICE COLMAN: Is it right, then, that if you are dealing with a requirement expressed in UTS, you can, so to speak, by a simple calculation, go into yield

strength simply by knowing what the UTS is?
A. You would have a fairly good idea of what the yield strength was.
MR JUSTICE COLMAN: It would be sufficiently close in result?
A. Yes.
MR JUSTICE COLMAN: So that a requirement which was expressed by applying a factor to a given value by reference to UTS could equally be expressed by applying a different factor to that same value by reference to yield strength?
A. It could, yes, my Lord. At this time, the yield strength of this steel was not specified, and there is a degree of variability in the yield strength. There is generally a minimum value defined, but the mean value across a large number of samples will be somewhat higher.
MR JUSTICE COLMAN: It does not make much difference according to your evidence, in terms of --
A. We would generally be working design terms with the specified minimum values.
MR JUSTICE COLMAN: I see, thank you.
MR MACDONALD: Moving on to the year 1968, when the UK enacted the Merchant Shipping Load Line Regulations, or rules, I am going to summarise the --

MR JUSTICE COLMAN: Mr MacDonald, are you going to be some time now on 1968? It is just that I was going to rise at 3.30.
MR MACDONALD: I am not. I think I can probably cover it in a minute or two.
MR JUSTICE COLMAN: Do that. Go ahead.
MR MACDONALD: I am going try to summarise the documentary evidence, I hope, fairly.

By 1968, was it clear that most class societies were interpreting the phrase "adequate strength" as referring to the sealing and securing arrangements rather than the hatch cover strength?

A. That appears to be the case.

Q. So while it would have been open to the United Kingdom to enact a greater strength requirement than that set by the convention for B minus ships, would that put most competitor merchant fleets at an advantage in respect of any building costs?

A. Yes, for new buildings there would have been a small cost benefit.

Q. We know that NK class apparently required a greater section modulus than other societies, even at this time. Is there any evidence that you are aware of that the law of Japan set a higher standard than that in the convention?

A. I am not aware of any difference, and I think Japan at that time would be something of a special case, because most of the Japanese fleet would have been Japanese flagged and Japanese classed, and vice versa. It was not an international flag in any particular respect.
Q. Am I right in thinking that, as of 1968, all class societies other than NK class used the 1966 design pressure for hatch covers?
A. Yes.
Q. And it is possible that Germanischer Lloyd began to increase their strength rules in 1973, or maybe it was 1978?
A. I think the first definite change comes in the amendment to the 1973 rules, which was introduced in early 1974, where they introduced a requirement for increased top plate thickness. It is not quite clear, from what Dr Hansen has said, whether there were other changes that came in in 1973 and 1974, or whether they waited until 1978.
Q. As of 1968, and indeed today, would you agree with what Mr Squire has said in a supplementary report, namely that such data as exists suggests strongly that in statistical terms occurrences of hatch cover damage due to wave loading are extremely rare events?
A. From the data that I have seen and in the Lloyd's

Register report, it is rare. I am not sure I would put it as extremely rare, but certainly rare.

MR MACDONALD: My Lord, that is perhaps a convenient moment, I hope.

MR JUSTICE COLMAN: Thank you very much, Mr MacDonald. Does that conclude your cross-examination, or do you have more material?

MR MACDONALD: We may have a bit of Hansen and ISSC tomorrow, but I think that would take 30 to 40 minutes maybe.

MR JUSTICE COLMAN: We will adjourn at this point.

(3.33 pm)

(Court adjourned until 9.30 am the following day)