

**RMS "TITANIC"**

Reappraisal of Evidence

Relating to

**SS "CALIFORNIAN"**

Marine Accident Investigation Branch  
5/7 Brunswick Place  
SOUTHAMPTON  
SO1 2AN

London: HMSO

© Crown copyright 1992

Applications for reproduction should be made to HMSO

First published 1992

0 11 551111 3

**Marine Accident Investigation Branch  
Department of Transport  
5/7 Brunswick Place  
Southampton  
Hants SO1 2AN**

**12 March 1992**

*The Right Honourable Malcolm Rifkind QC MP  
Secretary of State for Transport*

Sir

Your predecessor, The Right Honourable Cecil Parkinson MP, determined that MAIB should carry out a reappraisal of the role played by SS CALIFORNIAN at the time RMS TITANIC was lost in 1912.

Clearly, the case was somewhat outside the ordinary run of MAIB investigations and, in order to avoid its clashing with our main work, an Inspector from outside the Branch was appointed to study the evidence and advise me of his conclusions, after which a Report would be prepared. The Officer appointed to this task had recently retired from a post as Principal Nautical Surveyor in the Department of Transport Marine Survey Service and is a very experienced Master Mariner. I do not fully agree with all the Inspector's findings but this does not mean that I have any doubt at all as to either the thoroughness of his enquiries or the fair-mindedness of his approach. It rather serves to emphasize the difficulty of the task he was set and of reaching absolute conclusions.

However, I considered that some further examination was required and I instructed the Deputy Chief Inspector of Marine Accidents to undertake this and report to me. His report, which follows, incorporates his conclusions and those of the appointed Inspector.

I full endorse the Deputy Chief Inspector's report and conclusions.

I am, Sir,  
Your obedient servant

**Captain P B Marriott  
Chief Inspector of Marine Accidents**

## **CONTENTS**

1. **Introduction**
2. **Terms of Reference, Summary of Conclusions and Background**
3. **The Relative Positions of TITANIC and CALIFORNIAN**
4. **Was TITANIC seen by CALIFORNIAN?**
5. **Were TITANIC's Rockets seen?**
6. **Assessment of the action taken by Captain Lord**
7. **Concluding Comments**

## **Annexes**

1. **Extract of Admiralty Routeing Chart**
2. **Extract of Report of Formal Investigation (1912)**
3. **Summary Plan**
4. **Note on Super-Refraction**

## **1. INTRODUCTION**

On 14 April 1912 at about 2340 hrs ship's time the White Star liner TITANIC, on her maiden voyage from Southampton towards New York, struck an iceberg and was severely damaged. She foundered less than two-and-three-quarter hours later, with the loss of 1490 lives. In response to her wireless distress signals various ships attempted to come to her aid but the first to reach the scene, the Cunard liner CARPATHIA, did not arrive until about 0400 hrs, well after TITANIC had sunk.

There is no doubt that other vessels were nearer to hand than CARPATHIA, but in 1912 many ships did not have wireless and those that did, did not necessarily keep continuous watch with their apparatus. One such ship was the British cargo/passenger vessel CALIFORNIAN whose single Wireless Operator had gone off duty shortly before the first distress call was sent. At the Formal Investigation held in London between 2 May and 3 July 1912, evidence was heard from CALIFORNIAN's Master and some of her officers and crew. It was put to the Court that although they had not heard TITANIC's wireless messages, they had seen distress signals which she had fired; and that had they responded to those signals they might have saved many of the lives lost. The Court was asked the specific question (which was added to the original list of questions during the hearing):

"What vessels had the opportunity of rendering assistance to the TITANIC and, if any, how was it that assistance did not reach the TITANIC before the ss CARPATHIA arrived?"

The Court's answer was:

"The CALIFORNIAN. She could have reached the TITANIC if she had made the attempt when she saw the first rocket. She made no attempt."

CALIFORNIAN's Master was Captain Stanley Lord and it was upon him that the great weight of the extremely grave accusation implied by the Court's finding fell. Captain Lord always disputed the justice of the finding and he requested a re-hearing of that part of the Inquiry which concerned his ship; the request was rejected, and as no formal charge had been laid against him, and no action had been taken against his Certificate, he had no right of appeal.

For many years the matter rested, but in the mid-1950's the book "A Night to Remember" written by Walter Lord (no relation to Captain Lord) appeared; it was widely read and a successful film based upon it was made. The allegations against CALIFORNIAN were repeated and this led Captain Lord, by then over 80 years old, to renew his plea for the matter to be re-examined. His case was taken up by others, including especially Mr W L S Harrison who was at that time General Secretary of the Mercantile Marine Service Association, the body representing British shipmasters. In particular, two petitions were made to the Board of Trade asking for the Inquiry to be re-opened; both were rejected.

In 1985 an expedition led by Dr Robert Ballard of the Woods Hole Oceanographic Institute, Massachusetts, discovered the wreck of TITANIC, in a position some 13 miles from that accepted by the 1912 Inquiry as being the position of the casualty. This "new evidence" led to further pressure for the Inquiry to be re-opened, and although initially the Department of Transport (who by now had taken responsibility for shipping matters) refused, in 1990 the Secretary of State for Transport, The Right Honourable Cecil Parkinson MP, determined that the Marine Accident Investigation Branch should make a reappraisal of the relevant evidence.

## **2. TERMS OF REFERENCE, SUMMARY OF CONCLUSIONS AND BACKGROUND**

The terms of reference of the reappraisal were as follows:

1. Taking into account the discovery of the wreckage of TITANIC and other evidence which has become available since the Formal Investigation was held, together with recorded evidence given at the Investigation:
  - a) To establish so far as is now possible the positions of TITANIC when she struck an iceberg on 14 April 1912 and when she subsequently foundered; to estimate the positions of CALIFORNIAN at the same times; and to deduce the distance apart of the two vessels during the period between those times.
  - b) To consider whether TITANIC was seen by CALIFORNIAN during that period, and if so, when and by whom.
  - c) To consider whether distress signals from TITANIC were seen by CALIFORNIAN and if so, whether proper action was taken.
  - d) To assess the action taken by Captain Stanley Lord, Master of CALIFORNIAN, between about 10.00pm ship's time on 14 April and the time on 15 April when passage was resumed.

The conclusions reached are:-

- a) TITANIC was in approximate position 41°47'N 49°55'W when she struck the iceberg at 2345 hrs 14 April, and in position 41°43'.6N 49°56'.9W when she foundered. The position of CALIFORNIAN cannot be deduced so accurately; the Inspector considers she may have been in about 41°50'N 50°07'W at the time TITANIC struck the iceberg, but was probably further East and only 5 to 7 miles off. In my opinion, CALIFORNIAN was in about 42°00'N 50°09'W or a little North of that position, and between 17 and 20 miles from TITANIC - most likely about 18 miles. A current was setting southerly but is likely to have affected both vessels similarly until TITANIC sank, so their distance apart will not have appreciably changed during the period in question. These conclusions are discussed in Section 3.
- b) The Inspector considers that TITANIC was seen by CALIFORNIAN, by her Master and others. I think it possible that she was seen, due to abnormal refraction permitting sight beyond the ordinary visible horizon; but more likely that she was not seen. See Section 4.
- c) The Inspector considers that TITANIC's distress signals were seen, and that proper action was not taken. I agree on both counts. See Sections 5 and 6.
- d) See Section 6.

In order to keep this Report within manageable limits, it is assumed that the reader has at least some knowledge of the circumstances of the TITANIC tragedy; but some background may be helpful and is given in the following paragraphs.

RMS TITANIC was a triple-screw vessel of 46,328 gross tons owned by the Oceanic Steam Navigation Co Ltd (commonly known as White Star Line) and registered in Liverpool. She left Southampton on 10 April 1912 on her maiden voyage bound for New York, calling the following day at Queenstown (Cobh) near Cork. When she left Queenstown on 11 April, she carried some 1316 passengers and 885 crew, a total complement of 2201. Her Master was Captain E C Smith, an officer of great experience who held an Extra Master Certificate. She also carried 7 deck officers, all of whom held either Master or Extra Master Certificates.

TITANIC followed the recommended route agreed by the major transatlantic shipping companies and published by the Admiralty through the Hydrographic Office (see also Section 3) which is a Great Circle to position 42° north, 47° west, and then a Rhumb Line\*. On 14 April, a number of wireless messages were received from other ships warning of ice in the region TITANIC was approaching, and it is clear that Captain Smith and his senior officers realised that encounter with ice was at least quite probable by late evening of that day. At 2200 hrs Mr Murdoch, First Officer, took over the bridge watch; two other officers were on duty (Mr Boxall and Mr Moody) and two lookouts were posted, both in the Crow's Nest. These men were warned to keep a sharp lookout for ice but no other precautions appear to have been taken; the Master was not on the bridge, and normal full speed (about 22 knots) was maintained. The weather was fine and cold with good visibility and no wind.

At about 2340 hrs the lookouts saw an iceberg ahead and immediately reported to the bridge by bell and telephone. Mr Murdoch ordered hard to starboard (the effect of which, because of the helm orders then in use, was to direct the ship's head to port) and rang full astern; but collision with the berg could not be avoided. The ship was grievously damaged and at a time settled by the Court of Formal Investigation as 0220 hrs on 15 April, she foundered.

Between collision and foundering the ship lay stopped. At some time during this period the lights of another vessel were seen, following which a number of distress rockets were fired and an unsuccessful attempt was made to call her up by morse lamp. The evidence of survivors as to the nature of what was seen is rather indeterminate, but it seems that the ship appeared to be approaching and then to turn away.

Some 1490 people lost their lives in the tragedy. These included Captain Smith and Mr Murdoch, but Mr Boxall and both the seamen on lookout survived, and gave evidence at the Formal Investigation. It is of course no part of this reappraisal to consider the conduct of TITANIC or those on board leading up to the collision or, except to the limited extent to which it impinges on CALIFORNIAN, between the collision and sinking.

\* Annex 1 illustrates tracks combining Great Circle and Rhumb Line courses which are suitable for passages across the North Atlantic.

CALIFORNIAN was a steam ship of 6223 gross tons, owned by the Leyland Line. (It is perhaps slightly ironic that both the Leyland and White Star Lines were ultimately controlled by the same conglomerate, the International Mercantile Marine Company; but the two Lines operated independently it is believed so far as the direct management of their ships was concerned.) CALIFORNIAN left London bound for Boston on 5 April; her subsequent voyage is the subject of a good deal of what follows in this Report and need not be further described now. She was primarily a cargo ship and though she had some accommodation for passengers, none were carried on the voyage in question. Her Master, Captain Lord, held an Extra Master Certificate, and she carried three qualified deck officers: Mr Stewart, Chief Officer; Mr Stone, Second Officer; and Mr Groves, Third Officer. Evidence was given to the Formal Investigation by all these officers as well as by Captain Lord, and also by Mr Evans, her Wireless Operator, a Donkeyman (Ernest Gill) and an Apprentice (James Gibson). The evidence made it clear that a ship was seen to approach the ice field and to stop at about the same time as TITANIC struck the iceberg. Later, rockets were seen apparently coming from this ship, but no action was taken except to try, unsuccessfully, to call her up by morse lamp. No evidence was called from any rating apart from Mr Gill which, in retrospect, is a pity, for an account by the seamen on watch during the night of 14/15 April might well have been valuable.

It has been mentioned briefly that a number of ships were in the general area and three of these will be referred to later.

CARPATHIA, a Cunard liner of 13,600 gross tons commanded by Captain A H Rostron, had sailed from New York for Mediterranean ports on 11 April. She was the first vessel to reach the scene in response to TITANIC's wireless signals and picked up all those who survived. MOUNT TEMPLE, owned by the Canadian Pacific Railway Company was westbound from London. She also responded to the distress calls but did not reach the position of foundering. She was a ship of 6661 tons and on the voyage in question had a complement of some 1600 including over 1400 passengers. A rather different type of vessel was the Norwegian sealer SAMSON, a large motorised barque with a crew of 45. Nothing was known of this ship at the time of the Formal Investigation, but many years later her Chief Officer, Henrik Naess, said that she had been some 10 miles from TITANIC and had seen the distress rockets. Why she did not assist is explained briefly in Section 5.

Much reference is made in this Report to the Formal Investigation (FI). A Court of Formal Investigation has been (since 1876 when such proceedings were introduced) the forum for public inquiry in this country for shipping accidents; where an Inquiry by Government Inspectors is also held, the evidence which they gather will generally be put before the FI but the proceedings are quite separate. It should be stressed that although a Formal Investigation is ordered by a Government Minister (in 1912, the President of the Board of Trade), once in being it is entirely independent. It is both wrong and misleading to refer to the FI proceedings in the TITANIC (or any other case) as a "Board of Trade Inquiry". Formal Investigations are held less often now than used to be the case, partly because the procedures for Inquiry by appointed Inspectors have been strengthened and made independent of the regulatory authority; but they still take place on occasion, and in broad essentials their mode of operation has not changed, so it is not difficult to comprehend the proceedings of 1912.

The Court is presided over by a senior lawyer, called the Wreck Commissioner, who is appointed for the purpose by the Lord Chancellor; and by assessors - professional people with extensive relevant experience. The FI into the loss of TITANIC was ordered on 30 April 1912, the Wreck Commissioner appointed was Lord Mersey and the assessors were Rear Admiral S A Gough-Calthorpe, Captain A W Clarke, Cmdr F C A Lyon, Professor J H Biles and Mr E Chaston. Parties were represented by Counsel who included both the Attorney-General and the Solicitor-General (Sir Rufus Isaacs and Sir John Simon) for the Board of Trade. So far as CALIFORNIAN is concerned, neither Leyland Line nor Captain Lord appear to have been formally made parties, but Mr Robertson Dunlop was instructed to appear on their behalf and he was given, and took, the opportunity to cross-examine witnesses and address the Court.

It is customary for the proceedings of a Formal Investigation to be fully recorded and, in the case of TITANIC, the transcript - including all the evidence and the speeches of Counsel - was printed and published. The proceedings included 37 public sittings, beginning on 2 May 1912, and 97 witnesses were examined. The Court reported on 30 July 1912. The Transcript, which includes over 25,000 questions and answers, has been invaluable to this reappraisal and should be studied by anyone seeking to examine the TITANIC tragedy in depth.

Finally in this section, a brief note on times is called for. It was customary in 1912 for ships to adjust their clocks so that the sun would be approximately on the meridian each day at 1200 hrs, so that apparent Noon co-incided with Noon ship's time. Therefore, time during the night kept by different ships in the same area but on different courses or with different speeds might be appreciably different. However, the possible difference in times between TITANIC and CALIFORNIAN is only likely to have been a few minutes; since most times were recalled only approximately by witnesses I do not regard the difference as significant and I have generally used the subject ship's own time in this Report.

### 3. THE RELATIVE POSITIONS OF TITANIC AND CALIFORNIAN

As is briefly stated in Section 2 above, the Inspector has found that the two ships were between 5 and 10 miles apart whilst they lay stopped, and probably nearer five; whereas in my opinion the distance was substantially greater, probably about 18 miles. I summarise below the evidence available and our respective interpretations.

#### The Position of TITANIC

This is the one almost fully substantiated piece of new evidence since the 1912 Inquiry. Dr Robert Ballard, leader of the expedition which found the wreckage, gives the position of the boilers and stern section, and the Inspector supports his view that these very heavy items will have sunk almost straight to the seabed: their position must therefore be very close indeed to the position of sinking. I agree. The position is 41°43'.6N 49°56'.9W. This will not of course be the position of the collision, as the ship must have drifted some distance before she foundered; how far and in what direction will have depended entirely upon the current, for the night was calm with virtually no wind. The current is discussed below, for it is an important feature in this reappraisal: there is strong evidence that it was setting a little west of south at rather more than 1 knot. Allowing such a current, and working back from the position of sinking, the position yielded for collision with the berg is approximately 41°47'N 49°55'W. This position is substantially different from that given by TITANIC in her wireless distress messages and accepted by the Court of Formal Investigation, namely 41°46'N 50°14'W.

#### The Position of CALIFORNIAN

There is no really new concrete evidence as to CALIFORNIAN's position. A number of documents have been produced over the years since the accident, and during the present reappraisal, with the aim of assisting its establishment, but the evidence they call upon is either speculative or was available at the time of the FI. The Investigation was not specifically required to establish CALIFORNIAN's position in absolute terms, and the Report found simply that the ships were "not more than eight to ten miles apart". It is clear from the Report that the Court based this finding on the two facts - which were not contested - that during the time TITANIC was sinking those on board her saw a ship, and so did those on CALIFORNIAN. They decided that the ship seen by TITANIC was CALIFORNIAN and vice versa. The extract from the Report of Court at Annex 2 clearly shows the reasoning. For the present appraisal, however, it is obviously desirable to assess CALIFORNIAN's actual position so far as is possible, especially now that that of TITANIC is known.

The evidence on which such an assessment can be based is principally that of Captain Lord and his officers. CALIFORNIAN was bound from London towards Boston. On 14 April, her noon position by observation was recorded as 42°05'N 47°25'W. Her passage plan was not examined in detail at the FI but it appears clear that, as was and indeed still is common, the intention was to follow a Great Circle course to a position south-east of the Grand Banks and then to steer a Rhumb Line to her destination - much the same indeed as did TITANIC. Accordingly, the course being steered from noon was due west. At 1830 hrs three large icebergs were seen some five miles to the south and an estimated position was worked up, and at 1930 hrs a warning signal was sent by wireless to another Leyland liner:

"To Captain ANTILLIAN. 6.30pm apparent time ship, latitude 42.3N longitude 49.9W. Three large bergs five miles to southward of us. Regards, Lord."\*

Although addressed to ANTILLIAN, the message was broadcast for any ship within wireless range to hear, and shortly after 1930 hrs TITANIC called up CALIFORNIAN to say that she had picked it up.

Also at about 1930 hrs, Mr Stewart, CALIFORNIAN's Chief Officer, took a Pole Star sight which gave a latitude of 42°05'N.

At 2000 hrs the Third Officer, Mr Groves, took over the Bridge watch from Mr Stewart and very soon afterwards Captain Lord joined him on the Bridge. At about 2215 hrs ice was seen ahead and CALIFORNIAN was stopped; the time of stopping was noted as 10.21pm and Captain Lord estimated the position as 42°05'N 50°07'W. Some time after this, a ship was seen to approach and then to stop (it was assumed because of the ice) at a distance estimated as five miles.

CALIFORNIAN remained stopped throughout the night, getting underway again at about 0600 hrs when a signal was received by wireless from VIRGINIAN saying that TITANIC was in distress and sinking, in position 41°46'N 50°14'W. CALIFORNIAN made her best course and speed through the ice field towards that position, reaching it at about 0730 hrs. They saw the MOUNT TEMPLE, who had also responded to the distress, but could see no sign of TITANIC. Soon afterwards, a message was received from the Cunard liner CARPATHIA that she was picking up survivors. When CARPATHIA was seen, she was the other side of the ice field which CALIFORNIAN had passed through, that is, to the east of it; CALIFORNIAN crossed through the ice again and joined in the search for survivors, remaining in the area until about 1100 hrs. No survivors were found but some boats and flotsam were seen. She then resumed her passage to Boston. Her observed position at noon was 41°33'N 50°09'W, from which the position of wreckage was deduced to have been 41°33'N 50°01'W.

This is a summary of CALIFORNIAN's evidence. The crucial position is that in which she stopped. As will be seen from Annex 2, the Wreck Commissioner was "satisfied that this position is not correct". Captain Lord's case was not improved by the fact that the only log records he could produce were written up after the event; the scrap log kept by the officers had been destroyed. There is evidence that this was normal practice in Leyland Line ships, but it is certainly unfortunate that an exception to the normal rule was not made: this, coupled with the Court's rejection of Captain Lord's position has led to a common assumption by those commenting on the case that the Court considered deliberately false evidence to have been given. I am, however, not sure that that was indeed the Court's opinion. It is interesting and perhaps instructive to read Lord Mersey's final comments (again, see Annex 2):

\* This is the message as recorded in the minutes of evidence. It is clear from the context that "42.3" and "49.9" mean 42°3' and 49°9', respectively.

The "circumstances convince me that the ship seen by the CALIFORNIAN was the TITANIC, and if so, according to Captain Lord, the two vessels were about five miles apart at the time of the disaster. The evidence from the TITANIC corroborates this estimate, but I am advised that the distance was probably greater, though not more than eight to ten miles ....."

The 'advice' presumably came from the assessors. No reason for it is given, but the most reasonable inference to draw seems to be that they agreed that the two ships were in sight of one another but they accepted Captain Lord's position as his genuine estimate; the discrepancy was due to error in reckoning, not deliberate deception, and they did not consider the error likely to be great enough to bring the ships so close to each other as five miles. On the other hand, they would not see each other even on a very clear night at a distance greater than 8 to 10 miles.

The Inspector in his assessment has followed an approach broadly along the same lines and has explained how he thinks the error arose. He considers that the current had set southerly since noon on 14 April; no allowance for this current was made, with the result that at the time of the casualty CALIFORNIAN would indeed be some 8 to 10 miles from TITANIC. It is here that I differ from the Inspector, for reasons set out below; and as the current is an important factor (though not the only one) it is convenient at this point to discuss it more fully.

The Chart extract at Annex 1 shows that for the month of April the prevailing current in the region of the casualty sets east or ENE; the region is roughly where the Gulf Stream develops into the North Atlantic Drift. However, not far to the north-west the south-going Labrador current prevails, and the exact course of these two conflicting streams varies from year to year. There is no doubt that in 1912 the Labrador current extended further south and east than is usual in April: the principal evidence for this is the presence of ice and, particularly, the ice field. That this was exceptional is clear not only from the Chart but also from evidence given at the FI, especially that of Captain Moore of MOUNT TEMPLE who told the Court that in 27 years of regular trading across the North Atlantic he had never known the ice to be so far south. The position of the flotsam as given by the CALIFORNIAN, when compared with the position of sinking as now established, is further evidence of a southerly set and - assuming the position to be correct - allows it to be quantified: the direction of set was about 196° True and the rate about 1.3 knots. There is still further suggestive evidence in support of these figures in that, when run back to give the likely position of collision, the position arrived at, though different from that sent by TITANIC in her distress calls does lie practically on the line of her course through that position. Perhaps the error in the position as transmitted was caused by the wrong distance being allowed along the course line from the last known position - a simple mistake to make under stress.

Thus far I am entirely with the Inspector. I think there can be no reasonable doubt that a current setting about south by west at something like 1¼ knots existed in the area of the accident. But for his assessment of CALIFORNIAN's position when the accident occurred to be correct he has found it necessary to assume that this current

had affected her since at least noon on 14 April; indeed he suggests that it had been felt since noon on 13th. I have to say that I think this most unlikely, for several reasons:-

- (a) It has already been shown that the presence of a southerly current in the region of the accident was unusual. For it to have been present much further east, in the region normally associated with the North Atlantic Drift, would clearly be even more unusual, progressively so the further east one goes.
- (b) The Pole Star sight taken by the Chief Officer at 1930 hrs (and confirmed by him in Court) gave the same latitude -  $42^{\circ}05'N$  - as that observed at noon on the same day, showing a course made good of west, which is that stated as having been steered. It follows that the net effect of set was nil, at least until 1930 hrs, unless either the observations were in error or false evidence was given.
- (c) The one piece of evidence on CALIFORNIAN's track which cannot have been fabricated is the signal sent to ANTILLIAN concerning the sighting of icebergs. This in isolation gives no proof of the track followed but - unless all the other evidence was doctored - it adds weight to the statement that CALIFORNIAN was steering westerly and thus, coupled with the Pole Star sight, to the evidence against a southerly set. (In fact, the latitude sent to ANTILLIAN of  $42^{\circ}03'N$ , which was based on dead reckoning, suggests that the course steered was slightly South of West which, given the subsequent sight, argues a slight northerly set. This is not impossible given the current to be expected; but Captain Lord later recalled the latitude which he wrote out for the Wireless Operator as  $42^{\circ}05'N$ , and it may well be that the figure 5 was misread for 3. But neither figure offers any grounds for deducing a set to the South.)
- (d) The evidence of Captain Rostron of CARPATHIA is significant. On receiving TITANIC's distress call he steered for the position given which was some 58 miles distant, bearing N 52 W ( $308^{\circ}T$ ). After about two hours he sighted a flare from one of the liner's boats about half a point on the port bow. From Annex 3, which shows CARPATHIA's starting-out position, the position transmitted by TITANIC towards which CARPATHIA was steering, and TITANIC's sinking position, it will be seen that at the time the flare was seen (0240 hrs) the boat which it came from must have been to the north of CARPATHIA's course line and it follows that during the two hours the ship must have been set to the north: otherwise the boat would have been seen on the starboard bow. Bearing in mind that at the time CARPATHIA was eastbound (from New York) it will be appreciated that this argument essentially holds good even if there was some error in her position by dead-reckoning when she received the distress call: the rate of current would be affected but not the fact that its net effect was to the north.
- (e) Finally, there is the ice and particularly the ice field which lay in a roughly north/south direction close to the 50th meridian. It seems clearly reasonable to associate this field with a southerly current; but if such a current was to be

found much further east why was no ice there? There appear to be no reports even of isolated bergs east of 49°W. It is suggested that the limits of the ice field probably indicate the axis of the southerly drift, and these are fairly clear from the evidence. It cannot have extended much further south than the region of the accident, for Captain Moore, westbound in MOUNT TEMPLE before he received TITANIC's distress call and turned back, had crossed the 50th meridian in latitude 41°20'N and seen no ice; its western edge must have been near to the distress position sent by TITANIC as MOUNT TEMPLE encountered it in that vicinity; and its eastern edge was somewhere to the west of TITANIC's actual position, for she at no time seems to have sighted the field, while CARPATHIA, when she was picking up survivors, was among icebergs but still east of field ice.

In order to bring this part of my Report to a sensible conclusion it is necessary to anticipate the next section : for clearly none of the arguments are significant if it is the case, as the FI believed, that CALIFORNIAN was the ship seen by TITANIC and was no more than, at the most, 8 to 10 miles away. If that was so, then whether the discrepancy with Captain Lord's statement of her position was due to abnormal current, simple error, or deliberate falsification of evidence is (at least for the present purpose) academic. It will be seen from the next section that on the matter of the two ships seeing each other I unfortunately again cannot fully agree with the Inspector; and our respective opinions on CALIFORNIAN's position are undoubtedly coloured by this difference.

In the Inspector's view the FI finding is right and indeed his personal opinion, based upon his assessment of the evidence of what was seen by both ships, is that their distance apart was between 5 and 7 miles. In my opinion, TITANIC was not seen by CALIFORNIAN nor vice versa, except possibly at a range much greater than the ordinarily visible horizon owing to abnormal refraction. This being so, then unlike the Court and the Inspector, I have no need nor cause to discount CALIFORNIAN's evidence, and the only adjustment to her position as tendered to the FI which is required is that which follows from what we can now deduce as to the current.

For all the reasons set out previously I do not believe that CALIFORNIAN will have been affected by the southerly set for more than at the most a few hours before she reached the ice field and stopped. She may have met it before the Chief Officer took his Pole Star sight, its effect up to that point being cancelled by a northerly set earlier in the afternoon; but even given that her southerly set between 1930 hrs and stopping will have been some 3½ miles at most. While stopped she would have drifted further, for some 2 miles up to the time TITANIC hit the berg. Applying this maximum drift and the direction as deduced previously, her position at the time of collision becomes 42°00'N 50°09'W. More likely, especially taking into account the implication of CARPATHIA's evidence, the full strength of current was only felt when close to the ice field. I therefore consider that CALIFORNIAN was between 17 and 20 miles from TITANIC at the time of collision, bearing about NW by N from her.

Between the collision and sinking, both ships will in all probability have drifted similarly so that their position relative to each other would not appreciably change.

#### **4. WAS TITANIC SEEN BY CALIFORNIAN?**

The Inspector considers that TITANIC was seen by CALIFORNIAN and indeed kept under observation from 2300 hrs or soon after on 14 April until she sank. He bases this view on the evidence from Captain Lord and the two watch officers, Mr Groves and Mr Stone, and on the extent of coincidence between what they saw and what is known of TITANIC's movements. As the Inspector points out, there is a good deal of evidence as to what was seen by CALIFORNIAN which does not coincide with what is known of TITANIC; but his opinion - which if review were to be confined to what was seen by CALIFORNIAN I would not dissent from - is that the balance is strongly in favour of TITANIC having been the ship seen.

However, I do not propose in this Report to discuss the evidence from CALIFORNIAN in detail, because to my mind the question posed is answered, conclusively, by the evidence of what was seen - and by what was not seen - from TITANIC. It is absolutely clear, unless there is conspiracy involving not only Captain Lord and his officers but also the Donkeyman, Mr Gill (whose independent statement made in America precipitated the case against his ship), that the ship thought by the Court to be TITANIC was in view continuously from CALIFORNIAN from 2300 hrs or thereabouts. TITANIC's speed, maintained until collision at 2340 hrs, suggests that if at that time she was five miles from CALIFORNIAN, then at 2300 hrs she will have been nearly 20 miles away, which is a very long way off for her to be seen, but given the possible difference in the two ships' clocks and the imprecision of times, this point is perhaps not very important. What is significant, however, is that no ship was seen by TITANIC until well after the collision; the exact time is not recorded but seems to have been about 0030 hrs and certainly substantially past midnight. During all this time, although many of the crew were preparing boats or attending to the passengers, watch was maintained with officers on the Bridge and seamen in the Crows Nest, and with their ship in grave danger the lookout for another vessel which could come to their help must have been most anxious and keen. It is in my view inconceivable that CALIFORNIAN or any other ship was within the visible horizon of TITANIC during that period; it equally follows that TITANIC cannot have been within CALIFORNIAN's horizon. It is no argument to say that TITANIC was much the more conspicuous vessel of the two: the ship seen by CALIFORNIAN was readily noticed, not only from the Bridge but also from the deck, by the casual observation of Mr Gill coming up from the lighted engine room; and the watch officers easily distinguished her individual navigation lights. It is clear therefore that sighting did not depend upon particular conspicuity; and this must equally have been the case in the reverse direction.

In his closing speech at the Formal Investigation, Mr Robertson Dunlop (on behalf of CALIFORNIAN) clearly drew attention to the marked inconsistency between what was seen by the two ships. It is no part of this reappraisal to criticise the Court, but it must be remarked as surprising that no consideration of what he said appears in their Report.

There are two possible explanations for what CALIFORNIAN saw. The first and most obvious is that a third ship was present which approached from the East, stopped on meeting the field ice, and then after a period steamed away to seek a break in the ice. This is very far from unlikely; the North Atlantic trade was busy in 1912 and a number of other ships are known to have been in the area. A good deal of print has been expended on consideration of the identity of such a ship but the question is not within the remit of the present reappraisal and I do not consider that an attempt to answer it with certainty would be likely to be successful or would be a proper expenditure of public resources.

The second explanation, which was first advanced some years ago in an unpublished document, is that CALIFORNIAN did actually see TITANIC but at a very much greater range than her horizon because of abnormal ("super-") refraction. A note on super-refraction is included at Annex 4. In favour of this theory, the phenomenon is variable in its effect and this might explain the apparent movement of each ship as seen by the other when both were in fact stopped. In addition, the rockets seen by CALIFORNIAN were described as low-lying (quoted as rising to less than mast-head height) and this could be because they actually rose to a height above the refracting layer and were seen directly. Against the theory, it requires a long period during which CALIFORNIAN could see TITANIC but not vice versa. This is not impossible: the phenomenon does lead to curious results, and further it is possible that CALIFORNIAN's lights (though they were electric and could certainly be seen on a night such as this at 5 miles or more range) could not be seen even with super-refraction at 17 to 20 miles.

There are two further objections to the super-refraction theory both of which are, equally, objections to the general theory that TITANIC was seen. The first is that, although when he first saw the other ship Captain Lord recalls seeing a green (starboard) sidelight as one would expect with a ship to the south and approaching on a westerly course, later her red (port) light came into view, arguing that after stopping she swung markedly to starboard. Evidence of TITANIC's change of heading after collision is not absolutely conclusive, but it is known that initially she went to port and the balance of evidence seems to be that afterwards her heading did not much change. Her port sidelight would therefore not be seen. The second is that Mr Stone, CALIFORNIAN's officer on watch from midnight till 0400 hrs, noticed a change of bearing before the other ship disappeared. I do not place great weight on this, for Mr Stone had no particular reason to take accurate compass bearings of the other ship, and the explanation may have been that his own ship was swinging, leading to a change in relative bearing; but clearly if the compass bearing did change appreciably the vessel cannot have been TITANIC for she remained stopped; super-refraction could not explain a substantial change in bearing.

In sum, I do not consider that a definite answer to the question 'was TITANIC seen' can be given; but if she was, then it was only because of the phenomenon of super-refraction for she was well beyond the ordinary visible horizon. More probably, in my view, the ship seen by CALIFORNIAN was another, unidentified, vessel. Whether the ship seen during the later stages of the tragedy by TITANIC was this third ship, becoming visible to her and then disappearing as she sought a break in the ice field, or a fourth vessel is a matter of speculation outside the scope of this reappraisal.

## **5. WERE TITANIC'S ROCKETS SEEN?**

The Inspector's answer is 'Yes', and I entirely agree with him. There is no doubt that some rockets were seen and while it has been suggested that these were Company signals from the other ship seen by CALIFORNIAN, I think this possibility is quite unrealistic. Quite apart from the extreme coincidence required, the argument which I advanced in the previous section against TITANIC and CALIFORNIAN being in sight of each other equally rules out any vessel other than TITANIC having fired rockets in the area. It is, if anything, even more certain that rockets would have been seen by TITANIC, than lights. My opinion that TITANIC was much further from CALIFORNIAN than the FI found or the Inspector considers does not of course rule out her rockets being seen, but it would explain their apparent low altitude. It has been objected that the timings of TITANIC firing her distress signals do not precisely accord with the times the rockets were seen by CALIFORNIAN, but none of the times were recorded precisely and I place no value on that point.

Linking the question with the previous one, it will be realised that if the ship seen by CALIFORNIAN was a third vessel, she must have been for a considerable period on just the same bearing as TITANIC for the latter's rockets to be seen apparently coming from her. This may at first glance seem to be stretching credibility, but in fact it is far from impossible. The third ship must have encountered the ice field and, like CALIFORNIAN, will have stopped as indeed she was seen to do. Her position will have depended upon the exact configuration of the field which - unlike its general outline - cannot be known, but it is perfectly feasible that it lay on TITANIC's line of bearing. With all three ships stopped, their only movement will have been with the current and their bearings from each other will not have changed.

This does, manifestly, beg the question of why the third vessel - who must also have seen the rockets - did not respond. One possibility is that she was the Norwegian sealer SAMSON; the then Mate of that vessel, many years after the event did indeed state publicly that his ship had been near the scene of the accident and that rockets had been seen. According to his statement SAMSON had been sealing illegally and, fearing that the rockets were from a US Coastguard vessel, she dowsed her lights and made off. There are fairly obvious weaknesses in this account if it is put forward as fully explaining the third ship theory; but one thing it does do is remind us that in those days, before wireless was common at sea, rockets were much more used than is now the case for reasons other than indicating distress. The most likely explanation for CALIFORNIAN not responding to the rockets is put forward later in this Report, and perhaps some similar reason applied to any other ship which saw them. Given the amount of shipping in the area, it must be very probable that CALIFORNIAN was not the only ship to see the signals, irrespective of whether the 'third ship' between her and TITANIC existed.

## 6. ASSESSMENT OF THE ACTION TAKEN BY CAPTAIN LORD

Although the terms of reference of this reappraisal relate specifically to Captain Lord, the Inspector rightly points out that the Court did not single him out personally for criticism but simply referred to 'the CALIFORNIAN'. While as Master, Captain Lord was of course responsible for his ship's action (and inaction) it is impossible to avoid some consideration of others on board, at least Mr Stone who was the middle watch officer and therefore in immediate charge of the ship between midnight and 0400 hrs.

In broad terms, there is indeed little contention as to what happened on board. There are differences in detail between the accounts given by various witnesses but nobody experienced in accident investigation will find this odd: even the most honest witnesses allow their recollection of events to be coloured to some extent, perhaps unconsciously, by what they would like to recall.

There is no dispute that CALIFORNIAN encountered field ice and very properly stopped; nor that she then sent a wireless message reporting this; nor that she remained stopped throughout the night. There is no dispute that another ship was seen to approach and to stop some few miles off. There is no reason to doubt that an attempt was made to call up that ship by morse lamp and there can be no reason to suggest that at that stage any further attempt to communicate should have been made even though the other ship failed to respond.

Nor is there any dispute that during the middle watch rockets were seen which were thought to come from this other ship; that Captain Lord was told that rockets had been seen; and that no action was taken save to make further attempts to raise her with the morse lamp.

Finally, there is no doubt that when wireless messages were received in the morning reporting TITANIC's distress, CALIFORNIAN went to the position given and, finding no sign of the liner, then steamed through the ice field to join CARPATHIA.

Given the degree of correspondence on these salient points, I see neither profit from nor need for a detailed examination of the evidence of each witness so as to attempt to reconcile such differences as exist, except so far as is required to answer the crucial questions. These are: should CALIFORNIAN have taken further action when the rockets were seen; and if so, what action, and why was it not taken?

The Inspector considers that further action should have been taken, and I agree. Although as has been pointed out the use of rockets was much more common 80 years ago than it is today, it was certainly not so ordinary an event that their sighting, especially in an area where ice was about, required anything less than all practicable positive measures to establish the reason for them being fired. Merely attempting to call by morse lamp fell far short of what was needed. The action which should have been taken by Mr Stone as soon as he was sure that he was indeed seeing rockets was:

The Master should have been called and if he did not immediately respond Mr Stone should have reported to him in person;

Engine Room should have been placed on immediate readiness by ringing 'Stand By Engines';

The Wireless Operator should have been called; and

Captain Lord on being called should have at once gone to the Bridge, verified that the Engine Room was at readiness and the Wireless Operator at his post, and then got under way towards the apparent source of the rockets.

It is only possible to speculate why this action was not taken. None of the more picturesque or indeed scurrilous suggestions which have been advanced from time to time - that Captain Lord lay drunk in his cabin, that he was entirely callous or that he was frightened to attempt to manoeuvre in the ice - stand up to even the most cursory examination. On the first, Captain Lord was in fact almost tee-total; and it requires not just that he was incapable but the entire watch on deck as well. That this was not so is patent from the very evidence which leads to criticism of them, namely their admitted sighting of rockets and the degree of correspondence between what they saw and the evidence from TITANIC. On the second, even if (which I do not for a moment believe) Captain Lord had been devoid of all normal human feelings of compassion, he would still have done his utmost to assist for reasons of personal glory; and of course again it assumes equal callousness or at least extreme pusillanimity on the part of Mr Stone and his watch. As to the third, Captain Lord in fact took his ship through the ice twice once he learnt of TITANIC's distress: first to head for the reported position, which was west of the ice field, and second to join CARPATHIA in her search. The second passage was made after he had gone to the reported position and found MOUNT TEMPLE there, and it ought to be noted that the latter ship did not attempt to traverse the field to assist CARPATHIA. This is not mentioned in critical spirit; one can well understand the caution of MOUNT TEMPLE's Master with his very large complement of passengers, and he no doubt realised that it was too late for his ship to be of any practical help: but the fact remains that Captain Lord made the effort and he did not. Captain Lord's action may very well have been that of a man who realised that his ship had failed to do what should have been done earlier, and was desperate to make amends; but it is certainly not the action of a coward. Moreover, clearly all these 'explanations' require a high degree of conspiracy in totally fabricating evidence by the witnesses from CALIFORNIAN and, quite apart from the inherent improbability of this, the discrepancies which do exist in their evidence argues against it.

I have little doubt that the true explanation is more prosaic. There are appreciable differences between the evidence given by Mr Stone, by the apprentice, Mr Gibson, who was on watch with him, and by Captain Lord himself as to the exact information passed from the Bridge to Captain Lord. There is however no doubt that Mr Stone spoke directly to Captain Lord by voice-pipe and that, separately, he sent Mr Gibson down to call the Master.

Captain Lord's recollection of what he was told by Mr Stone is somewhat at variance with what that officer recalled; and he had only the vaguest memory, according to his evidence, of Mr Gibson's call. This seems to me entirely consistent with a common condition when a man is called while he is sleeping heavily: there is a state of somnambulism quite often experienced in which the subject appears to respond to a call but the message given does not break the barrier between sleep and consciousness. Commonly, when the subject does wake he has no recollection of the call until he is told of it, when there is some memory but only in a very hazy sense. In plain language, I think the message from the Bridge simply did not get through.

This inevitably points to weakness on the part of Mr Stone. Again, I think we need look no further than human fallibility for the cause. There is a natural tendency to reject the signals of disaster and to hope that all is well despite the evidence of one's own eyes and senses. Of course, Mr Stone should have gone down himself to the Master when there was no proper response from him, but the impression one gets of Captain Lord is that, far from being slack as has sometimes been suggested, he was in fact something of a martinet, and the young officer may have feared to leave the Bridge (normally a grave dereliction of duty) even though under the circumstances it would have been safe and right to do so. One can readily imagine Mr Stone on the Bridge, knowing in his heart what ought to be done (he is recorded as saying to Mr Gibson that "a ship doesn't fire rockets for nothing") but trying to persuade himself that there was no real cause for alarm - and desperately wishing it was four o'clock and the Mate was there. I sympathise with Mr Stone, but it must be said that he was seriously at fault.

## 7. CONCLUDING COMMENTS

A few further points require some mention.

Although it is not specifically within the terms of reference of the reappraisal, this Report would be incomplete without some consideration of whether the action which CALIFORNIAN should have taken would have led to the saving of the lives of those who were lost.

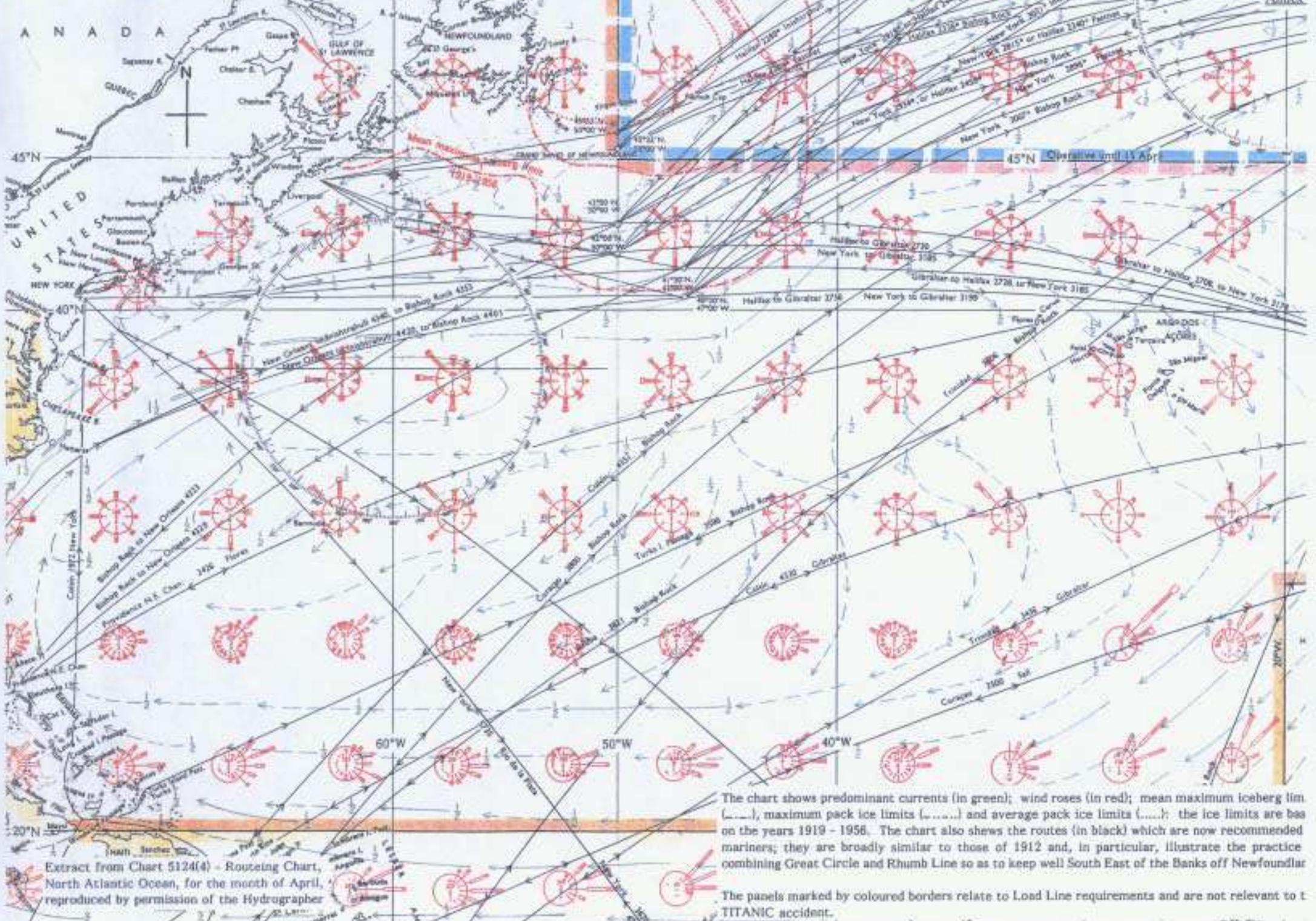
The first rocket appears to have been fired at about 0045 hrs (TITANIC time). The ship sank at about 0220 hrs. If CALIFORNIAN saw the first rocket and took immediate action to head straight for it, and had quickly worked up to full speed (which would have taken several minutes) she would probably, given my minimum distance off of 17 miles, have reached the scene at just about the time of sinking. This however is unrealistic. No officer would take such action on seeing a single distant flash which might be a shooting star or even a visual aberration: such sights are quite common. More practically, if proper action had been taken as set out above, Captain Lord would have been on the Bridge at perhaps 0055 hrs and begun heading towards the rockets, but cautiously at first because of the ice for at that stage the urgency of the situation would not be known and it would be right for him to have regard for the safety of his own ship. Meanwhile, the Wireless Operator would have been called and would shortly receive TITANIC's SOS with its incorrect position. This would have put Captain Lord in something of a quandary: probably he would have called TITANIC by wireless giving CALIFORNIAN's position, saying what had been seen, and asking TITANIC to check her position. This would very likely have led to the error in dead reckoning being discovered, after which full speed would be made towards the correct position; but with the time lost CALIFORNIAN would arrive well after the sinking. It therefore seems clear that - if I am right as to the distance apart - the effect of CALIFORNIAN taking proper action would have been no more than to place on her the task actually carried out by CARPATHIA, that is the rescue of those who escaped. I do not think any reasonably probable action by Captain Lord could have led to a different outcome of the tragedy. This of course does not alter the fact that the attempt should have been made.

There is one rather curious point about the distress signals which is worth mentioning. In 1912, under the International Regulations then in force, such signals could be of any colour (TITANIC's were in fact white) and there was therefore nothing immediately to distinguish them from other rockets. The TITANIC disaster led to a number of changes improving provisions for emergency at sea, but it was not until 1948 that the rules for distress signals were amended to make the (present) requirement that they be red. Had that rule been in force in 1912, when it was much more needed than now, Mr Stone would surely not have remained passive.

A final word seems called for on the aftermath of the FI and its finding so far as Captain Lord is concerned. He lost his post with the Leyland Line, but soon gained employment with another British company, Lawther Latta, quickly regaining command: he remained at sea throughout the Great War and into the 1920s with that Company. He died in 1962. No formal action was ever taken against him, even though the conduct of his ship, as found by the Court, seems clearly to call for inquiry into his fitness to continue to hold a Certificate of Competency. Examination of contemporary records shows that proceedings were considered but does not make it entirely clear why they were not pursued. Part of the reason may have been that, with the weight of a recent FI headed by a very senior and distinguished judge, it was seen as difficult for there to be a completely unprejudiced Inquiry. Be that as it may, it is difficult not to believe that some at least of those responsible at the Board of Trade felt a substantial measure of doubt as to the justice of the findings. It is not surprising if this were so: the case has continued to divide opinion to this day, and has been argued strenuously both on Captain Lord's behalf and against him. Some of the arguments have been well-reasoned but some - on both sides - have been absurd and scurrilous.

Neither party will be entirely satisfied with this Report, but while it does not purport to answer all the questions which have been raised it does attempt to distinguish the essential circumstances and set out reasoned and realistic interpretations. It is for others if they wish to go further into speculation; it is to be hoped that they will do so rationally and with some regard to the simple fact that there are no villains in this story: just human beings with human characteristics.

\* \* \* \* \*



Extract from Chart 5124(4) - Routing Chart, North Atlantic Ocean, for the month of April, reproduced by permission of the Hydrographer

The chart shows predominant currents (in green); wind roses (in red); mean maximum iceberg lim (---), maximum pack ice limits (.....) and average pack ice limits (.....); the ice limits are bas on the years 1919 - 1956. The chart also shows the routes (in black) which are now recommended mariners; they are broadly similar to those of 1912 and, in particular, illustrate the practice combining Great Circle and Rhumb Line so as to keep well South East of the Banks off Newfoundland

The panels marked by coloured borders relate to Load Line requirements and are not relevant to the TITANIC accident.

## 5.—THE CIRCUMSTANCES IN CONNECTION WITH THE S.S. "CALIFORNIAN."

It is here necessary to consider the circumstances relating to the s.s. "Californian."

On the 14th of April, the s.s. "Californian" of the Leyland Line, Mr. Stanley Lord, Master, was on her passage from London, which port she left on April 5th, to Boston, U.S., where she subsequently arrived on April 19th. She was a vessel of 6,223 tons gross and 4,038 net. Her full speed was 12½ to 13 knots. She had a passenger certificate, but was not carrying any passengers at the time. She belonged to the International Mercantile Marine Company, the owners of the "Titanic."

At 7.30 p.m., ship's time, on 14th April, a wireless message was sent from this ship to the "Antillian." "To Captain, 'Antillian,' 6.30 p.m., apparent ship's time, lat. 42° 3' N., long. 49° 9' W. Three large bergs, 5 miles to southward of us. "Regards.—Lord." Evans, 8941,  
8943

The message was intercepted by the "Titanic," and when the Marconi operator (Evans) of the "Californian" offered this ice report to the Marconi operator of the "Titanic," shortly after 7.30 p.m., the latter replied, "It is all right. I heard you sending it to the 'Antillian,' and I have got it." 8973  
Lord, 6710

The "Californian" proceeded on her course S, 89° W. true until 10.20 p.m., ship's time, when she was obliged to stop and reverse engines because she was running into field ice, which stretched as far as could then be seen to the northward and southward.

The Master told the Court that he made her position at that time to be 42° 5' N., 57° 7' W. This position is recorded in the log book, which was written up from the scrap log book by the Chief Officer. The scrap log is destroyed. It is a position about 19 miles N. by E. of the position of the "Titanic" when she foundered, and is said to have been fixed by dead reckoning and verified by observations. I am satisfied that this position is not accurate. The Master "twisted her head" to E.N.E. by the compass and she remained approximately stationary until 5.15 a.m. on the following morning. The ship was slowly swinging round to starboard during the night. 6704  
Lord, 6713  
Groves, 8249

At about 11 p.m. a steamer's light was seen approaching from the eastward. The Master went to Evans' room and asked, "What ships he had." The latter replied: "I think the 'Titanic' is near us. I have got her." The Master said: "You had better advise the 'Titanic' we are stopped and surrounded with ice." This Evans did, calling up the "Titanic" and sending: "We are stopped and surrounded by ice." The "Titanic" replied: "Keep out." The "Titanic" was in communication with Cape Race, which station was then sending messages to her. The reason why the "Titanic" answered, "Keep out," was that her Marconi operator could not hear what Cape Race was saying, as from her proximity, the message from the "Californian" was much stronger than any message being taken in by the "Titanic" from Cape Race, which was much further off. Evans heard the "Titanic" continuing to communicate with Cape Race up to the time he turned in at 11.30 p.m. Evans, 8982  
8988  
8993  
8994  
9004  
9022

The Master of the "Californian" states that when observing the approaching steamer as she got nearer, he saw more lights, a few deck lights, and also her green side light. He considered that at 11 o'clock she was approximately six or seven miles away, and at some time between 11 and 11.30, he first saw her green light, she was then about 5 miles off. He noticed that about 11.30 she stopped. In his opinion this steamer was of about the same size as the "Californian"; a medium-sized steamer, "something like ourselves." Lord, 6761  
6762

From the evidence of Mr. Groves, third officer of the "Californian," who was the officer of the first watch, it would appear that the Master was not actually on the bridge when the steamer was sighted.

Mr. Groves made out two masthead lights; the steamer was changing her bearing slowly as she got closer, and as she approached he went to the chart room and reported this to the Master; he added, "she is evidently a passenger steamer." In fact, Mr. Groves never appears to have had any doubt on this subject: in answer to a question during his examination, "Had she much light," he said, "Yes, a lot" Groves, 8147  
8174  
8178

\* The figure "57" is a mis-print for "50"

"of light. There was absolutely no doubt of her being a passenger steamer, at least in my mind."

Gill, the assistant donkey-man of the "Californian," who was on deck at midnight said, referring to this steamer: "It could not have been anything but a passenger boat, she was too large."

By the evidence of Mr. Groves, the Master, in reply to his report, said: "Call her up on the Morse lamp, and see if you can get any answer." This he proceeded to do. The Master came up and joined him on the bridge and remarked: "That does not look like a passenger steamer." Mr. Groves replied "It is, Sir. When she stopped, her lights seemed to go out, and I suppose they have been put out for the night." Mr. Groves states that these lights went out at 11.40, and remembers that time because "one bell was struck to call the middle watch." The Master did not join him on the bridge until shortly afterwards, and consequently after the steamer had stopped.

In his examination Mr. Groves admitted that if this steamer's head was turning to port after she stopped, it might account for the diminution of lights, by many of them being shut out. Her steaming lights were still visible and also her port side light.

The Captain only remained upon the bridge for a few minutes. In his evidence he stated that Mr. Groves had made no observations to him about the steamer's deck lights going out. Mr. Groves' Morse signalling appears to have been ineffectual (although at one moment he thought he was being answered), and he gave it up. He remained on the bridge until relieved by Mr. Stone, the second officer, just after midnight. In turning the "Californian" over to him, he pointed out the steamer and said: "she has been stopped since 11.40; she is a passenger steamer. At about the moment she stopped she put her lights out." When Mr. Groves was in the witness-box the following questions were put to him by me: "Speaking as an experienced seaman and knowing what you do know now, do you think that steamer that you know was throwing up rockets, and that you say was a passenger steamer, was the 'Titanic'?—Do I think it? Yes?—From what I have heard subsequently? Yes?—Most decidedly I do, but I do not put myself as being an experienced man. But that is your opinion as far as your experience goes?—Yes, it is, my Lord."

Mr. Stone states that the Master, who was also up (but apparently not on the bridge), pointed out the steamer to him with instructions to tell him if her bearings altered or if she got any closer; he also stated that Mr. Groves had called her up on the Morse lamp and had received no reply.

Mr. Stone had with him during the middle watch an apprentice named Gibson, whose attention was first drawn to the steamer's lights at about 12.20 a.m. He could see a masthead light, her red light (with glasses) and a "glare of white lights on her after deck." He first thought her masthead light was flickering and next thought it was a Morse light, "calling us up." He replied, but could not get into communication, and finally came to the conclusion that it was, as he had first supposed, the masthead light flickering. Some time after 12.30 a.m., Gill, the donkeyman, states that he saw two rockets fired from the ship which he had been observing, and about 1.10 a.m., Mr. Stone reported to the Captain by voice pipe, that he had seen five white rockets from the direction of the steamer. He states that the Master answered, "Are they Company's signals?" and that he replied, "I do not know, but they appear to me to be white rockets." The Master told him to "go on Morsing," and, when he received any information, to send the apprentice down to him with it. Gibson states that Mr. Stone informed him that he had reported to the Master, and that the Master had said the steamer was to be called up by Morse light. This witness thinks the time was 12.55; he at once proceeded again to call the steamer up by Morse. He got no reply, but the vessel fired three more white rockets; these rockets were also seen by Mr. Stone.

Both Mr. Stone and the apprentice kept the steamer under observation, looking at her from time to time with their glasses. Between 1 o'clock and 1.40 some conversation passed between them. Mr. Stone remarked to Gibson: "Look at her now, she looks very queer out of water, her lights look queer." He also is said by Gibson to have remarked, "A ship is not going to fire rockets at sea for nothing;" and admits himself that he may possibly have used that expression.

Mr. Stone states that he saw the last of the rockets fired at about 1.40, and after watching the steamer for some twenty minutes more he sent Gibson down to the Master. "I told Gibson to go down to the Master, and be sure and wake him, and

... tell him that altogether we had seen eight of these white lights like white rockets in the direction of this other steamer; that this steamer was disappearing in the south-west, that we had called her up repeatedly on the Morse lamp and received no information whatsoever."

Gibson states that he went down to the chart room and told the Master; that the Master asked him if all the rockets were white, and also asked him the time. Gibson stated that at this time the Master was awake. It was five minutes past two, and Gibson returned to the bridge to Mr. Stone and reported. They both continued to keep the ship under observation until she disappeared. Mr. Stone describes this as "A gradual disappearing of all her lights, which would be perfectly natural with a ship steaming away from us." Gibson, 7553 Stone, 7957

At about 2.40 a.m. Mr. Stone again called up the Master by voice pipe and told him that the ship from which he had seen the rockets come had disappeared bearing S.W.  $\frac{1}{2}$  W., the last he had seen of the light; and the Master again asked him if he was certain there was no colour in the lights. "I again assured him they were all white, just white rockets." There is considerable discrepancy between the evidence of Mr. Stone and that of the Master. The latter states that he went to the voice pipe at about 1.15, but was told then of a white rocket (not five white rockets). Moreover, between 1.30 and 4.30, when he was called by the chief officer (Mr. Stewart), he had no recollection of anything being reported to him at all, although he remembered Gibson opening and closing the chart room door. 7976 7079 Lord, 6790 8369

Mr. Stewart relieved Mr. Stone at 4 a.m. The latter told him he had seen a ship four or five miles off when he went on deck at 12 o'clock, and at 1 o'clock he had seen some white rockets, and that the moment the ship started firing them she started to steam away. Just at this time (about 4 a.m.) a steamer came in sight with two white masthead lights and a few lights amidships. He asked Mr. Stone whether he thought this was the steamer which had fired rockets, and Mr. Stone said he did not think it was. At 4.30 he called the Master and informed him that Mr. Stone had told him he had seen rockets in the middle watch. The Master said, "Yes, I know, he has been telling me." The Master came at once on to the bridge, and apparently took the fresh steamer for the one which had fired rockets, and said, "She looks all right; she is not making any signals now." This mistake was not corrected. He, however, had the wireless operator called. Stewart, 8577 8582 8598 8615 8619 8632

At about 6 a.m. Captain Lord heard from the "Virginian" that "the 'Titanic' had struck a berg, passengers in boats, ship sinking"; and he at once started through the field ice at full speed for the position given. Lord, 7003

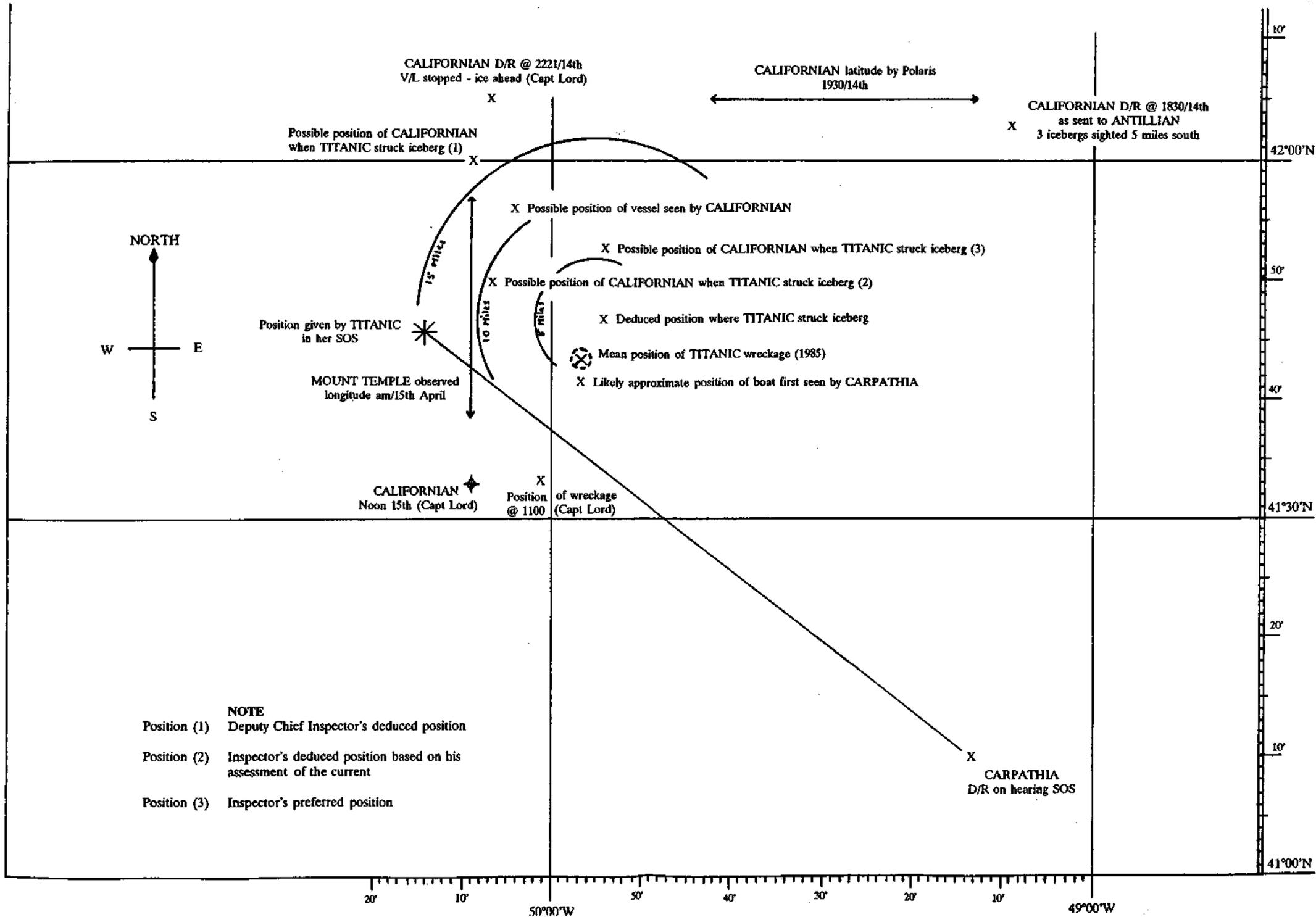
Captain Lord stated that about 7.30 a.m. he passed the "Mount Temple" stopped, and that she was in the vicinity of the position given him as where the "Titanic" had collided (lat.  $41^{\circ} 46'$  N.; long.  $50^{\circ} 14'$  W.). He saw no wreckage there, but did later on near the "Carpathia," which ship he closed soon afterwards and he stated that the position where he subsequently left this wreckage was  $41^{\circ} 33'$  N.;  $50^{\circ} 1'$  W. It is said in the evidence of Mr. Stewart that the position of the "Californian" was verified by stellar observations at 7.30 p.m. on the Sunday evening, and that he verified the Captain's position given when the ship stopped ( $42^{\circ} 5'$  N.;  $50^{\circ} 7'$  W.) as accurate on the next day. The position in which the wreckage was said to have been seen on the Monday morning was verified by sights taken on that morning. 7014 7026 7030

All the officers are stated to have taken sights, and Mr. Stewart in his evidence remarks that they all agreed. If it is admitted that these positions were correct, then it follows that the "Titanic's" position as given by that ship when making the C.Q.D. signal was approximately S.  $16^{\circ}$  W. (true), 19 miles from the "Californian"; and further that the position in which the "Californian" was stopped during the night, was thirty miles away from where the wreckage was seen by her in the morning, or that the wreckage had drifted eleven miles in a little more than five hours. Stewart, 8820

There are contradictions and inconsistencies in the story as told by the different witnesses. But the truth of the matter is plain. The "Titanic" collided with the berg at 11.40. The vessel seen by the "Californian" stopped at this time. The rockets sent up from the "Titanic" were distress signals. The "Californian" saw distress signals. The number sent up by the "Titanic" was about eight. The "Californian" saw eight. The time over which the rockets from the "Titanic" were sent up was from about 12.45 to 1.45 o'clock. It was about this time that the "Californian" saw the rockets. At 2.40 Mr. Stone called to the Master that the ship from which he had seen the rockets had disappeared. 7020

At 2.20 a.m. the "Titanic" had foundered. It was suggested that the rockets seen by the "Californian" were from some other ship, not the "Titanic." But no other ship to fit this theory has ever been heard of.

These circumstances convince me that the ship seen by the "Californian" was the "Titanic," and if so, according to Captain Lord, the two vessels were about five miles apart at the time of the disaster. The evidence from the "Titanic" corroborates this estimate, but I am advised that the distance was probably greater, though not more than eight to ten miles. The ice by which the "Californian" was surrounded was loose ice extending for a distance of not more than two or three miles in the direction of the "Titanic." The night was clear and the sea was smooth. When she first saw the rockets the "Californian" could have pushed through the ice to the open water without any serious risk and so have come to the assistance of the "Titanic." Had she done so she might have saved many if not all of the lives that were lost.



**NOTE**

- Position (1) Deputy Chief Inspector's deduced position
- Position (2) Inspector's deduced position based on his assessment of the current
- Position (3) Inspector's preferred position

## ABNORMAL REFRACTION

### General information

#### 5.56

The propagation of electromagnetic waves, including light and radar waves, is influenced by the lapse rate of temperature and humidity (and therefore density) with height.

When conditions are normal in the near-surface layers of the atmosphere there is a modest decrease of temperature with height and uniform humidity, and no significant refraction of electromagnetic waves occurs. Variations in these conditions can cause appreciable vertical refraction of light rays, and radio transmissions varying with their frequencies. Extraordinary radio propagation and optical effects can result, including abnormal radar ranges and the phenomenon known as mirage.

**Caution.** Whenever abnormal refraction is observed or suspected, either visually or by anomalous radar performance, the Mariner should exercise caution, particularly in taking sights or in considering radar ranges.

### Super-refraction

#### Causes

##### 5.57

Super-refraction or downward bending is caused either when humidity decreases with height or when the temperature lapse rate is less than normal. When temperature increases with height (ie when an inversion is present), the downward bending of rays and signals is particularly enhanced.

Super-refraction increases both the optical and radar horizons, so that it is possible to see and to detect by radar objects which are actually beyond the geometrical horizon, see Diagram (5.57).

#### Likely conditions

##### 5.58

Super-refraction can be expected:

In high latitudes wherever the sea surface temperature is exceptionally low;

In light winds and calms;

In anticyclonic conditions, particularly in the semi-permanent sub-tropical anticyclone zones over the large oceans;

In Trade Wind zones;

In coastal areas where warm air blows offshore over a cooler sea;

Occasionally, behind a cold front.

### Effect on radar

#### 5.59

A modest degree of super-refraction is usually present over the sea as evaporation from the sea surface gives rise to a decrease in humidity immediately above the sea. Consequently, average radar detection ranges over the sea are often 15-20 per cent above geometrical horizon range. When a surface temperature inversion is present extremely long ranges may be possible since the transmitted signals may be refracted downwards more sharply, to be reflected upwards from the sea surface, and then again bent downwards, and the process repeated. The signals thus effectively travel and return along a duct parallel to the Earth's surface. See Diagram (5.59).

### Optical effect

#### 5.60

Objects beyond the geometrical horizon may become visible, so that lights may be raised at much greater distances than expected.

**Superior mirage**, when an inverted image is seen above the real object, is an occasional effect produced when the air is appreciably warmer than the sea. Sometimes an erect image is seen immediately above and touching the inverted one. The object and its images in this instance are well-defined, in contrast with the shimmering object and image of an inferior mirage (see below).

Superior mirage is most often experienced in high latitudes and wherever the sea surface temperature is exceptionally low.