

WHAT LURKS AHEAD?

by Samuel Halpern

(Expanded and revised 25 May 2023)

What if *Titanic* had not collided with an iceberg on the night of April 14th 1912? Given what we know about conditions in the North Atlantic that night, would she have simply continued on her course and reached New York as planned without incident?

This speculative article will look at these questions in some detail. It is based on knowledge about the ship, and knowledge about ship handling that comes from commanders who were asked about the measures that they had taken, or would have taken, while trying to navigate through those ice-infested waters on that dark, cold Sunday night in April of 1912. So let us begin.

Despite several ice warnings received that day, including one report of ice just a few miles north of her track,¹ *Titanic*'s commander, Captain E. J. Smith, continued to do what many others had done in good nighttime visibility by continuing on course at speed while keeping a sharp lookout for any danger ahead.² With two lookouts up in the nest and a senior officer out on the bridge wing, *Titanic* was running at 22½ knots on a course of 266° true toward New York. By about 11:40pm, ship's time, *Titanic* was approaching a position near 41° 45.5' N, 49° 55' W, the likely position of the iceberg that *Titanic* collided with.³ However, in this scenario, we will first assume that this iceberg was not there. What was there directly ahead of her, and not known to those on watch at the time, was this vast field of pack ice that was from 5 to 6 miles wide, that stretched roughly from northwestward to the southeastward as far as the eye can see.⁴

The approaching situation is shown in Figure 01.

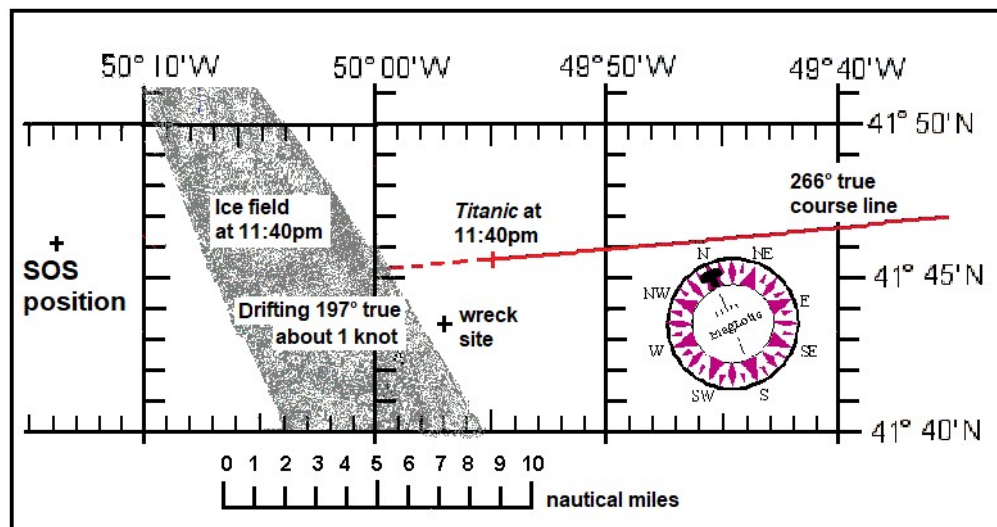


Fig. 01 – Path of *Titanic* the night of April 14th 1912.

So what would have happened on board *Titanic* if that iceberg was not there? To answer this question we look at what happened to the SS *Californian* as she approach this same field of pack ice earlier that night. According to what *Californian*'s Captain Stanley Lord wrote in a 1959 affidavit:

¹ Received at 11:52am NYT: "Baltic (MBC) sends message to Titanic (MGY): "Captain Smith, 'Titanic.' Have had moderate variable winds and clear fine weather since leaving. Greek steamer 'Athenai' reports passing icebergs and large quantities of field ice today in lat. 41° 51' N., long. 49° 52' W. ..."

² British Wreck Commission Report on the loss of the SS *Titanic*.

³ See: <http://www.titanicology.com/Titanica/CollisionPoint.htm>.

⁴ As described by captains Rostron and Moore to the inquiries that followed the disaster.

“At 10:15pm I observed a brightening along the western horizon. After watching this carefully for a few minutes I concluded that it was caused by ice. At 10:21 I personally rang the engine-room telegraph to full speed astern and ordered the helm hard-aport. As these orders came into effect the lookout men reported ice ahead.”

Californian was traveling at just about 11 knots heading westward that night. At that speed she was making just over one nautical mile every six minutes of time. So after seeing this “brightening along the western horizon” at 10:15pm, *Californian* traveled about one nautical mile further along before Captain Lord realized what was ahead of him and took decisive action at 10:21. It was also at this same time that his lookouts, “a man in the crow’s nest and another on the focs’le head,” reported ice ahead.

So just how far from the eastern edge of the pack ice was the SS *Californian* when Lord took decisive action? According to what he described, under the influence of the hard-aport helm (right full rudder) and the propeller going astern, the ship swung round to the northeast before coming to a stop. According to Captain Lord:

“The ship was then stopped surrounded by loose ice and from one-quarter to half-a-mile from the edge of a low ice field. As I could not see any clear place to go through I decided to remain stopped until daylight.”

Under normal situations, merchant ships with hard over helm usually turn in a circle having a diameter of about 3 to 4 times their length between perpendiculars (LBP), and the turning circle is approximately the same at low speeds as at full speed.⁵ For *Californian*, with 447.5 feet LBP, her steady-state turning circle diameter would be about from 1350 to 1800 feet, or about 0.22 to 0.30 nautical miles. The ship’s advance, or the amount of forward movement of the vessel from the time the helm is put over, is about the same as the turning diameter. However, *Californian*’s engine was also run full astern, and as pointed out to me by Master Mariner and Maritime Pilot Georges Guay, *Californian*’s turning circle would have been tightened by the transverse thrust effect of her astern rotating propeller, thus turning in a circle that was only about twice her LBP.

For this exercise, we will take 900 and 1000 feet as the approximate turning circle diameter and advance, respectively, for *Californian* under the conditions that were presented. We will also accept that *Californian* stopped facing NE about 1/3 mile (which is between one-quarter and half-a-mile as Lord estimated), or about 2000 feet, from the apparent edge of the pack ice. Based on the geometry of the situation as shown in Figure 02, we find that at the time her helm was put hard over, *Californian* would have been about 2750 feet, or about 0.45 nautical miles from the apparent edge of the pack ice.

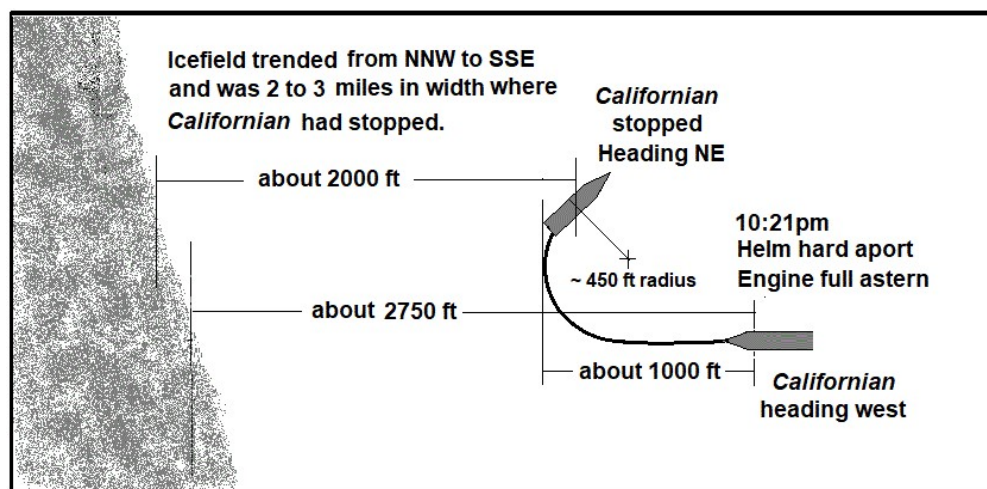


Fig. 02 – *Californian*’s encounter with the pack ice.

⁵ See: <http://shipsbusiness.com/turning-circle-factors.html>. *Titanic*, a passenger vessel, had a diameter to LBP ratio of 4.4 (Ref: <http://www.titanicology.com/Titanica/Two-Points-in-Thirty-Seven-Seconds.pdf>).

From what we just found, it appears that Captain Stanlry Lord took action when *Californian* was a little less than half a nautical mile from the edge of the field of pack ice. Since *Californian* had traveled about one mile since that brightening on the horizon was first seen by him from the bridge, we can then say that *Californian* had to be about one and a half nautical miles from the pack ice when Captain Lord first noticed that brightening along the horizon ahead. This finding is further supported by the very last thing that Captain Stanley Lord said at the US Senate investigation back on April 26th 1912 where he was quoted as saying: “I only saw that ice a mile and a half off.”⁶

Although the height of eye on the bridge of *Titanic* that Sunday night was almost 70 feet above the water, while that of *Californian* was about 45 feet above the water,⁷ the height of eye would not make much of a difference in sighting that field of pack ice in clear weather on a dark, moonless night. The height of eye only becomes important at night in sighting an object, such as the light of a vessel, when that object first comes up over the horizon, when many miles away.⁸

So now let us consider what might have taken place on *Titanic* if there was no iceberg in her path that night.

By 11:40pm, the pack ice would have been about 3 to 4 nautical miles ahead of the vessel (see Figure 01), and too dark to be seen. At 22½ knots, *Titanic* was covering a little over 2 nautical miles every six minutes, or about 1/3 of a nautical mile per minute. From what we have seen above, a ship had to come within about 1½ nautical miles of the pack ice before a brightening along the horizon could be expected.⁹ Therefore, *Titanic* had to travel about 2 more miles before her lookouts up in the nest, or First Officer William Murdoch out on the bridge wing, would notice some brightening along the horizon. The time that this would take place would be around 11:46pm.

So what would have happened on *Titanic* when a brightening along the horizon would first become noticeable? Probably the same that happened on *Californian* where there was no action taken at first since there was nothing definitive to warrant taking any action at the time. In the case of *Californian*, it took about six more minutes before what lurked ahead became recognizable as a field of ice requiring some form of immediate action. In the case of *Titanic*, traveling at about twice the speed of *Californian*, it would be no more than about 3 minutes when that field of pack ice would become perceived for what it really was. The time on *Titanic* would be close to 11:49pm.

Figure 03 below shows a rendering of what the field of pack ice might have looked like from the bridge of *Titanic* when it was about a half mile ahead. It was created by taking an actual photograph of the ice field that was taken on board the rescue ship *Carpathia* on the morning of April 15th well after the sun came up, and then darkened accordingly. Also the western sky at night for a time close to 11:49pm ship’s time (02:47am GMT) was created using planetarium software, and then superposed onto the darkened photograph.

As with Captain Lord of the SS *Californian*, immediate action would be called for by *Titanic*’s First Officer William Murdoch, the Officer of the Watch (OOW) at the time. Since the icefield trended northwestward to southeastward across *Titanic*’s path down where she was, there would be a little more maneuvering room to starboard than to port. Murdoch would have likely ordered hard-a-port (right full rudder) to swing his ship to starboard. With the vastness of the icefield across their path, there would have been no hope of getting around it. In addition, Murdoch would have likely ordered his ship’s

⁶ American inquiry, p. 733.

⁷ Samuel Halpern, *Strangers on the Horizon: Titanic and Californian – A Forensic Approach*, printed by Kindle Direct Publishing, November 2019, App. J.

⁸ The distance to the horizon as seen from the navigating bridge of *Titanic* was 9.8 nautical miles, while that from the upper bridge of *Californian* was 7.8 nautical miles.

⁹ Serious students of the *Titanic* disaster are quite familiar with the claim that haze was seen by the two lookouts who were up in the nest that Sunday night. These claims are highly problematic when looked at carefully. Both lookouts, Frederick Fleet and Reginald Lee, told very different stories about this alleged haze, which was first mentioned when they were called to testify before the Commission. What’s even more suspicious about their stories is that this haze, which they claimed was sighted along the horizon before the collision, somehow mysteriously disappeared after the ship struck the iceberg. A full treatment of the haze issue is given in Chapter VI – “Haze, Sea Smoke and Mirages,” in my book, *Prelude To An Allision - Titanic's Fatal Encounter Revisited*, printed by Kindle Direct Publishing, July 2022.

engines to stop and then to full astern to reduce the speed and take the way off of the vessel. However, because the engine room was not put on standby that night, it would have taken more than a minute or two for her engines to actually come to a stop, let alone start to reverse.

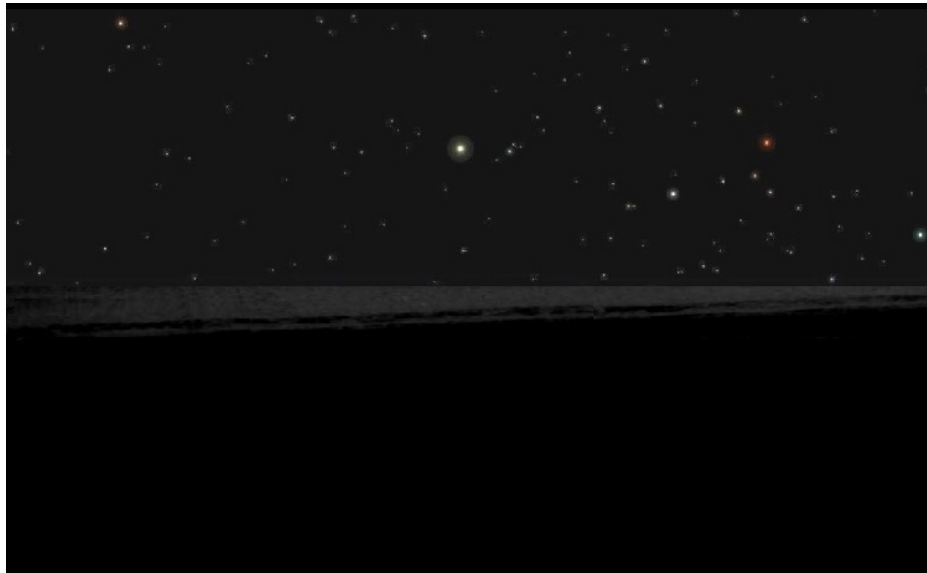


Fig. 03 – Approaching the icefield at 11:49pm.

Based on derived turning characteristics for *Titanic* as shown in Figure 04 below,¹⁰ *Titanic* would advance about 2745 feet (0.45 nautical miles) by the time she turned 90° to starboard, just a little shy of half a nautical mile. This is about the same distance that we would expect action to be first taken, unless Murdoch would have recognized what was ahead of him much sooner than it took Captain Lord.

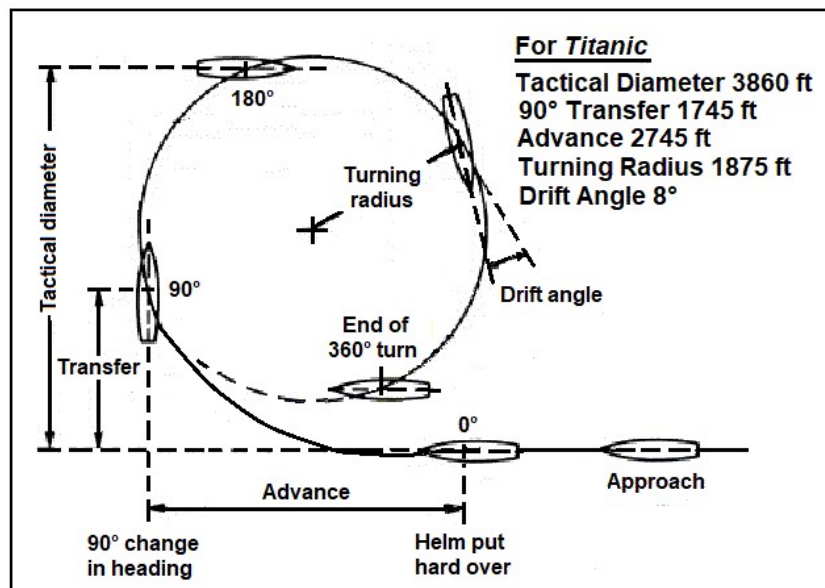


Fig. 04 – Derived turning characteristics of *Titanic* and *Olympic*.

Based on the scenario being considered, it is quite possible that *Titanic* would come in contact with the edge of the pack ice. She certainly would have crashed through a lot of loose ice that was within a quarter of a mile from the edge of the field. Because of the speed she was making,¹¹ there likely would

¹⁰ See: <http://www.titanicology.com/Titanica/Two-Points-in-Thirty-Seven-Seconds.pdf>.

¹¹ Even if the engines were not stopped, *Titanic*'s speed would have reduced from about 22 knots to about 17 knots once established in a turn due to increased hydrodynamic drag. It would also take almost 2 minutes for *Titanic* to turn a full 90°, and we know from several eyewitnesses, that *Titanic*'s engines went on running for about two minutes, or thereabouts, following

have been some denting to some of her bow plates despite the fact that the framing and plating at the forward end of the ship was especially strengthened to prevent damage from meeting several inches of harbor ice, as well as strengthened against panting when plunging into a large head sea.¹² There is also the possibility that a few riveted seams would have opened up thus allowing some water to get into the vessel. However, striking some low-lying field of pack ice is not the same as striking a massive, practicably immovable, iceberg. Would *Titanic* have been severely damaged striking the ice, or in danger of foundering?

When asked about seeing any icebergs near the vicinity of the icefield up north where *Californian* was Monday morning, before he took her westward across the field to *Titanic*'s reported erroneous distress position, Captain Lord said:¹³

“I can only tell you what I saw that morning when we were at the mouth of the field. They were not really bergs, but they were big chunks of ice and I suppose they were about 2 feet above water, when we were driving along toward the *Titanic*, and we would probably get to the corner of one of them and turn it over, and probably see about 10 or 11 feet to it, and I could not see any end to it.”

About seven tenths of the mass of ice is hidden under water. As *Californian* was being driven along, large chunks of ice were being pushed aside. It was these large chunks of ice that Captain Lord was talking about when he took his vessel across the ice. Lord went on to explain that it took him about half an hour to cross about two to three miles of pack ice before reaching open water on the other side. That means he crossed at an average speed of about 4 to 6 knots. Later on however, when he took his ship back across the pack ice heading toward *Carpathia*, Lord claimed:¹⁴

“Yes, I ran along [down the western side of the field] till I got to the *Carpathia* bearing north-east and then I cut straight through the ice at full speed.”

Californian's full speed when driven hard was about 13 knots, the speed that Lord claimed he did when heading southward along the western side of the field. But did he really cross the icefield at full speed going toward *Carpathia*?

By around 8am *Californian* was sighted by Captain Rostron to be about 5 to 6 miles from *Carpathia* and cutting through the pack ice heading straight toward him. *Californian* arrived next to *Carpathia* and the wreckage from *Titanic* around 8:30am, about a half hour later. We therefore see that *Californian* had to have been making more like 10 knots, or thereabouts, when crossing that ice in her approach to *Carpathia*.¹⁵ This is still a relatively high speed for a merchant vessel to be making while crossing ice. If *Titanic* would have struck that same field, she would have done so at a much greater speed than *Californian*. Keep in mind that the force of contact with an object goes up as the square of the speed. Even if *Titanic*'s speed had dropped to about 17 knots by time she reached close to the edge of the ice, the force of contact with any ice at that speed would have been almost three times greater than what *Californian* experienced when crossing the pack at about 10 knots toward *Carpathia*.¹⁶ Captain Lord must have been quite lucky in that he did not sustain damage his vessel during that run.

The guidelines for mariners today are quite specific about navigating in ice-covered waters. According to what is published by the Canadian Coast Guard (*Ice Navigation in Canadian Waters*, CCG/6120, 6th Ed.-Vol. 1, 2022):

the collision with the iceberg before they came to a stop. *Titanic*'s engine room was not placed on standby that night, and when engine orders came down from the bridge, the engine room staff was caught off guard.

¹² British inquiry, 20262-20265.

¹³ American inquiry, p.724.

¹⁴ British inquiry, 7401.

¹⁵ Samuel Halpern, *Strangers on the Horizon: Titanic and Californian – A Forensic Approach*, printed by Kindle Direct Publishing, November 2019, Ch. 9.

¹⁶ The force would be $(17/10)^2 = 2.9$ times greater.

Warning: Any vessel that is not strengthened for operating in ice should avoid large unbroken ice floes, particularly if the ice is deformed by rafts, ridges, or rubble.

The same publication also says that, “excessive speed almost always results in ice damage.”

As far manning the bridge while navigating in waters that may be covered with ice, the CCG publication says:

It is recommended that, because of the hazards of navigating in ice-covered waters, lookouts should be increased when in or near an area of ice. Navigation in ice can be very strenuous and Mariners should be careful not to overextend themselves, even if it means doubling the Officers of the Watch on the bridge or stopping the vessel at night to receive adequate rest. This applies not only for those on the bridge, but for engine-room staff who may be called upon for long periods of maneuvering, clearing.

Hindsight more than a hundred years after *Titanic* is obviously wonderful. At least Captain Lord doubled his lookouts, kept his engine room on standby, and stayed on the bridge himself knowing that he might encounter ice on the night of April 14th 1912. In contrast, and despite a number of warnings received by wireless, along with the expectation of meeting up with ice that night, Captain Smith did none of the above.

What if the iceberg that *Titanic* actually struck was there, but was successfully avoided? For example, what if William Murdoch was able to have successfully performed a port-around maneuver as shown below in Figure 05?¹⁷

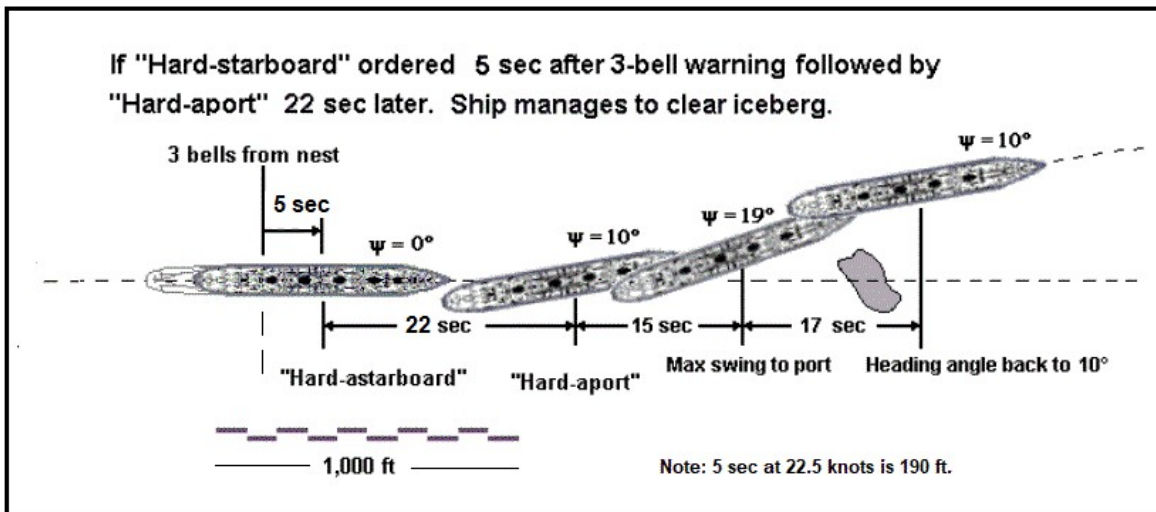


Fig. 05 – A port-around maneuver to avoid an object directly ahead.

To execute such a maneuver successfully requires full power on all engines, and near perfect timing. As stated previously, with any turning vessel, the speed of the vessel would drop off somewhat while in the turn because of the greater hydrodynamic forces that would be acting on the hull of the vessel while in the turn. However, once the maneuver is completed, and the vessel put back on her course, the vessel would soon accelerate back to her cruising speed once more. But what would Murdoch have done if he were to have successfully avoided the iceberg? Would he have then stopped the vessel, or ordered half or slow-ahead on her engines, and called Captain Smith to the bridge? Or would he have continued on as if nothing had happened?

¹⁷ Samuel Halpern, *Prelude To An Allision - Titanic's Fatal Encounter Revisited*, printed by Kindle Direct Publishing, July 2022, App. C.

According to what Master Mariner Georges Guay believes, as the OOW of the vessel, William Murdoch would have likely continued on at full speed until that field of low-lying, multiyear field of pack ice that stretched across his path was seen ahead. He also believes that *Titanic* would probably have stricken some of the ice, and would have sustained some degree of damage. One way or another, the ship would have soon been stopped, and Captain Smith would have arrived on the bridge.

Assuming the ship did not suffer any severe damage by the encounter, what would they have done next? Would they have remained stopped for the night as Captain Lord had done? Would they have dared and gone slowly through the ice in the dark of night while hoping that they wouldn't get stuck or receive further damage to the vessel? Or would they attempt to try and go around the pack by slowly heading southward keeping within sight of the pack while maintaining a greater vigilance?

Once again we enter the world of speculation. My own opinion, assuming there was no serious damage done to the vessel from any close encounter with the icefield, is that they would attempt to carry on by taking the ship southward along the edge of the field. It is likely that they would have proceeded at slow-ahead or dead-slow-ahead,¹⁸ and would have added more bodies to man the bridge as well as having lookouts stationed up in the nest and on the forecastle head as was done with other vessels transiting ice-infested waters that night. Captain Smith would probably have remained on the bridge himself until clear water to the westward would be reached after traveling more than 55 nautical miles to get around the pack ice. Most likely, *Titanic* would have been taken along the same route that was taken by *Carpathia* after Captain Rostron left the area of the wreckage Monday morning.

What has been described above is, of course, mostly conjecture. The truth is that we will never really know. To use the words of the late author and *Titanic* enthusiast, David G. Brown, history does not reveal its alternatives.

¹⁸ For *Titanic*, slow-ahead is about 9 knots at 30 rpm on her reciprocating engines, while dead-slow-ahead is about 6 knots at 20 rpm on her reciprocating engines. This is with the central turbine engine disconnected. See: <http://www.titanicology.com/Titanica/SpeedandRevolutions.htm>.