1880−1

VICTORIA.

TORPEDO.

REPORT

OF THE

BOARD APPOINTED TO ENQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH, AND TO DISCOVER THE CAUSE OF, THE FATAL ACCIDENT TO A BOAT'S CREW OF THE " CERBERUS," AT QUEENSCLIFF, BY THE EXPLOSION OF A TORPEDO;

TOGETHER WITH

MINUTES OF EVIDENCE AND APPENDICES.

PRESENTED TO BOTH HOUSES OF PARLIAMENT BY HIS EXCELLENCY'S COMMAND.

By Authority:

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February 2004.

REPORT.

To His Excellency the Governor in Council

MAY IT PLEASE YOUR EXCELLENCY:

The Board appointed to make a searching enquiry into all the circumstances connected with the recent fatal accident to a boat's crew of the *Cerberus*, with a view to discover, if possible, the cause which led to the explosion of the torpedo, have the honor to report as follows:−

1. The Board commenced its enquiry on 23rd day of March 1881, and held six meetings, at which they took on oath the evidence of those who were on board the *Cerberus* at the time of the accident, and of other persons, experts in the subject of torpedoes and explosives. The Board also visited the *Cerberus*, where they examined and tested the apparatus employed on the occasion, and had all those on board at the time of the accident arranged as nearly as possible in the positions they occupied just prior to or at the time of the explosion; they visited the magazines on board the hulks *Deborah* and *Sacramento*, both under the control of the commander of the *Cerberus*, and of which the late Mr. Groves was the resident officer in charge. The Board examined the storebooks, as well as some of the explosives kept there. This portion of the investigation was completed on the 5th of April 1881.

2. In order to comply as far as possible with the terms of the Order in Council " to make a searching enquiry" the Board made its investigations chiefly in two directions −

1st. With view of ascertaining if any direct and immediate cause of the explosion was discoverable, and, if not−

2nd, With the view of discovering any proximate cause, due to lack of discipline, skill, knowledge, or care on the part of the Naval Torpedo Corps, or of the officers or men of the *Cerberus*, which may have led to the accident or made such an accident possible.

DIVISION I

3. This portion of their enquiry the Board subdivided into the following questions:−

(a) Was the torpedo exploded by an electric current; if so, how was that current produced, and how was it conveyed through the fuse?

(b) Was there dynamite in the charge of the torpedo? If there was, what was its condition, and what its liability to be exploded by the friction or concussion to which the torpedo was subjected?

(c) Does anything in the mode of preparing or sinking of the torpedo suggest that the explosion resulted from some cause other than electricity.

(d) Conclusions to be drawn from the answers to these questions.

4. (a) The direct evidence tends to show that it is highly improbable that an electric current sufficiently intense to ignite the fuse was either intentionally or accidentlly transmitted. The battery and leading wires, as shown to the Board, appeared to have been carefully arranged,with the proper firing−key. The chief electrician (Mr. Murray) held the wire connected with the torpedo in his right hand, in an uplifted position, clear of the battery wire or firing−key, with his left hand resting on the binnacle stand, closer to, and perhaps touching the firing−key, during the whole time the boat was moving away from the ship, and up to the time of the explosion.

Q. 965,969, 999,1074, 1076−9.

Q. 1169, 1173−5.

Q. 965

The witnesses testified that the wires, although not previously tested, were considered to be safely insulated throughout, and even on cross − examination, no evidence was elicited of any accidental connection between the battery and firing wires. The firing battery used consisted of twenty−nine cells of Leclanche's battery, of the form known as the Silvertown firing battery, each generally assumed to be capable of firing a platinum wire fuse of such a form as was used in this instance through one ohm of resistance, which would be equal to about a hundred yards of

No.15 copper wire, the size of wire used. The battery, therefore, if in good working order, should have been capable of firing such a fuse through at least a mile of No.15 wire. It appears in evidence (questions 502−3) that there were about eighty yards of wire measured off, and that the battery would fire the fuse through fourteen ohms resistance.

Q. 747,972.

The wire used was No 15. copper, with Hooper's insulation, the resistance of which was less than one column, or not more than one ohm when attached to the fuse. The battery current, therefore, was greatly in excess of that required, and thus became an element of danger in case of defective insulation, or of accidental metallic contact with any portion of the ship. So large an electro−motive force would fire the mine on even the slightest or instantaneous metallic contact being made in a circuit. But the Board have no direct evidence of any such accidental contact having been made, although on their visit to the *Cerberus* they tested the firing−wire used at the time of the explosion and found some large faults, or removal of insulation from the wire. It was however, pointed out to the Board that these had perhaps been caused by the numerous and rough handlings to which the wire had been subjected subsequently to the fatal occurrence.

5. Another aspect of this subdivision of the case has attracted the serious attention of the Board. It may be thus stated: − The torpedo case was a zinc cylinder of considerable size, presenting about a square yard of surface; This together with the iron bottom of the *Cerberus* and the intervening sea−water, made up a galvanic battery of the form known as a "sea−cell." The Board ascertained, by actual experiment on the ship, that a considerable current was obtained from such a combination even in the comparatively fresh water of Hobson's Bay; and it is evident that a much more powerful current would be set up at Queenscliff, on account of the great saltiness of the water. Assuming that such a current would suffice to ignite the fuse, any accidental contact of the firing−wire with the metal of the ship would have caused the mischief without completion of the circuit to the firing battery proper. No actual test, however, has been made to ascertain whether the sea−cell current obtainable at Queenscliff is strong enough to satisfy this assumption, and that question, therefore, remains one of theoretical electricity. On this account the board requested Captain Moors (an officer of the Torpedo and Signal Corps skilled in both mathematical and practical electricity) to investigate the point, the exact conditions obtaining at the time being furnished to him as data. Captain Moor's important report appears in the Appendix marked :A."

6. (b) By the evidence it is established with certainty that the torpedo contained 70lbs. of gun powder and some fragments of discs of gun−cotton. There is no evidence that dynamite was put into the torpedo. One witness only (Doyle) stated that he saw grains of black dynamite lying on the binnacle−table, alongside the gun−cotton but he did not see it in the torpedo. Doyle was subjected to a careful cross−examination, and under it his evidence became less reliable.

Q 1369, 1429, 1364, 1365.

Several other witnesses saw gun−cotton lying on the binnacle−stand at the time the torpedo was being made ready close by, but they saw no dynamite; yet they had at least as good an opportunity as Doyle of seeing what was on the binnacle−stand, and they were fully as competent as he to distinguish dynamite from gun−cotton. Each stated that for himself, he did not see dynamite in the torpedo case.

The reason why gun−cotton was placed on the binnacle−stand was said to be that a hand−grenade, used during the day's experiments, had not exploded, and had therefore, with one or two others, been opened, in order to examine their contents and to ascertain the cause of failure. The witnesses state positively that no dynamite was found in the grenades.

Q. 782, *et seq.* Q. 1021 *et seq.*

No evidence was adduced to show that dynamite had been brought on board the *Cerberus,* Supposing, however, that dynamite was in the case it would not have increased materially the danger of accidental explosion, unless it were in bad condition − that is to say, unless the nitro−glycerine had separated from the absorbent material and remained free. Seven ounces of dynamite were found on board the *Deborah* and examined by the Board. This was not black, but yellow, or brown−yellow, in color, and was in good and safe condition.

Q. 1274.

Supposing further , that nitro−glycerine were set free in the case from unsafe dynamite, it would (as shown in evidence of Captain Wagemann, and as well know to some members of the Board) be absorbed immediately by the gun powder, and cease to be a source of danger.

Q. 1533.

That this absorption would occur is not merely an hypothesis, but a well known fact. Moreover, it does not appear that the torpedo received any rough usage likely to ignite dynamite (in whatever condition it might have been) by shaking or concussion.

Q. 1534−6. 8.

7. (c) In the preparation of the torpedo, nothing appears to have been done that would render it liable to explosion,

Q. 1525. otherwise than by electric current, up to the time when it was put over the side of the boat. The suggestion made by Captain Wagemann, that at that moment a jerk on the fuse might ignite the fulminate, the Board cannot accept, because the junction of the firing−wires with the lid of the torpedo case, which remained attached to the wire after the accident, showed no disturbance of the fuses as is suggested; and had such a jerk occurred, and had the wires consequently slipped, it cannot be supposed that friction could thence have arisen sufficient to ignite the fulminate, which requires percussion, or at least very rapid friction between hard substances, to detonate it.

8. (d) Guided by the investigations made on board the *Cerberus,* and the facts then placed before them, and also by the evidence carefully weighed, the Board are of opinion:−

1st. That no dynamite was placed in the torpedo, and that Doyle must have been mistaken as to its presence on board.

2nd. That if it had been present, the evidence goes to show that the chance of accidental explosion would have been in no way increased thereby.

3rd. That the premature explosion of the mine was brought about by an electric current, but that whence or how that current was conveyed is not traceable with certainty.

DIVISION II.

9. In the enquiry as to the existence of any approximate or possible cause of the untoward explosion, the board carried their investigations into matters concerning the discipline and methods of proceeding of the chief officers of the *Cerberus* and of the members of the Naval Torpedo Corps on occasion of torpedo practice, as well as into the training skill, and the knowledge of the latter.

Q. 1510. *et seq.* In this direction the board obtained valuable evidence as to the methods of practice in vogue in the French navy, and on other matters, from Captain Dufresse, of the R.F. Ship *Finisterre* otherwise than by electric current, up to the time when it was put over the side of the boat.

Q. 589. *et seq.* 10. Neither the chief electrician (Mr. Murray) nor any of the members if the corps appeared to have acquired, either by instruction or by actual practice, a safe knowledge of torpedo operations, or of the exact properties and characteristics of the explosives used in torpedo service.

The commander of the *Cerberus* (Captain Mandeville) did not receive any special training for torpedo work, and from his answer to question 244 it appears " it is not necessary that he should ," and the evidence also made it quite certain that Captain Mandeville did not in any way interfere with the electricians in their work. The Torpedo Corps consisted

Q. 17 of eight persons, under the command of Mr. Murray. This gentleman stated that he studied the work of an electrician, as connected with torpedoes, in Melbourne, under Captain Mandeville, since his appointment to the Naval Torpedo Corps in 1878 (see questions 589, 590, 591 and 597.)

Prior to that time he had for a number of years been an officer in the Telegraph Department. The other members of the corps who were examined gave evidence similar in character. The only member of the corps who had received previous training was the late Mr. Groves, who was next in command to Mr. Murray. "Mr. Murray had the

Q. 1203 management of the torpedoes generally, but the practical part was performed by the late Mr. Groves." The lieutenant of the *Cerberus* (Mr. Collins R,N,) and Mr. Richards, gunner, had both received , like Mr. Groves, a previous two or three months' training in naval torpedo operations at Portsmouth,on board

Q. 15. H.M.S. *Vernon,* one of the British torpedo training ships, but neither was in any way connected with the Torpedo Corps here.

11. The degree of proficiency of the Naval Torpedo Corps may be gauged by a syllabus, handed in by Mr. Murray. of

Q. 602. subjects to be written upon by members of the corps, and to be discussed at weekly meetings during the months of February, March and April of this year. These subjects embrace many points, a knowledge of which is necessary in torpedo operations. In reply to question No.682, "Were those gentlemen suppose to be experts in the subjects they were going to read the papers upon?" Mr. Murray said, "Rather the opposite. I wanted to give a man a subject to get up that I thought he might be rather shady upon, so as to cause him to read books and go into authorities; and his paper would be thought over and discussed by the whole of us." Each member of the corps had a subject for study, leaving the Board to infer that no one member was perfect in his work,

12. Brief as has been the experience gained by the use of torpedoes in war, it has yet been sufficient to show clearly

Q. 1522. that the greatest caution is needed in making experiments connected with such subtle weapons. With this fact in full view, the Board feel bound to draw attention to the division of authority on board the *Cerberus*, not only between the commander of the vessel and the Naval Torpedo Corps, but also between

Q. 3. the electricians themselves. These divisions add greatly to the possibility of accidents occurring. The electricians belong to the Railway Telegraph Department, "none belong to the ship;" and it was shown to the Board that, while the commander can command his men to work the *Cerberus* down to the Heads "for big gun

Q. 695. practice," with respect to the Naval Torpedo Corps his authority extends only to saying "he would be glad if they would accompany him with a view to having torpedo practice also.

Q. 877, *et seq.* 13. Except the late Mr. Groves, not one of the corps who conducted the operations appears to have previously seen a practical illustration of the discharge of large torpedoes, and this seems to have originated the desire to conclude the day's experiments with the one which proved fatal. The five members of the Naval Torpedo Corps on board the ship appear to have been on the deck watching with eagerness for the moment of the explosion: thus no one witness was able to relate with definiteness the doings of another person, just before the accident. On the other hand, the evidence shows that there was general carefulness throughout the day's work, that the battery and leading wires had been properly arranged on board, that no mishap occurred up to the time of the explosion, and that the utmost sobriety and quiet existed amongst the men employed.

Q. 155. 14. Captain Mandeville was ashore at the time if the accident, "partly to witness the effect of the explosion from the shore and for other purposes" not stated. He was without a field−glass for

Q. 162. purposes of actual observations, and was not watching the explosion" at the moment." His only

Q. 160. lieutenant was also on shore, having leave of absence from the ship for the night. From these facts it is evident that he did not consider it of importance that he or his lieutenant should be present at the time of carrying out an important, and in their case a novel experiment, namely, that of firing a fully loaded stationary mine from the deck of an ironclad vessel.

Q. 1282, 1285. 15. It is in evidence that stores were taken to and fro from the storage hulks without any proper record

Q. 1291, 1295, being kept of these transactions, or of the description of the stores. During the investigations on board

Q. 1401. the *Deborah*, several important facts attracted the attention of the Board. In the first place, there was a larger storage of explosives than they were led to believe from the evidence given to them. Second, there were explosives found on board which did not appear entered in the store−books. The Board also ascertained that there were certain dangerous chemicals which appeared upon the books, and had been removed from the hulks subsequent to the accident, without any entry of their removal having been made, and that this was done by the authority of Mr. Murray.

16. The Board, guided by the evidence given and the facts placed before them, are of opinion that the Naval Torpedo Corps have not evinced adequate skill and judgement in carrying out these operations, and that a want of training and practical knowledge throughout is apparent.

17. In support of this it may be stated that:−

1st. The evidence, though inconclusive as to what was actually placed in the torpedo, points to a laxity and want of caution which is at least reprehensible.

2nd. The firing battery employed for firing a mine through so small a resistance as that used (namely, 29 cells for barely one ohm resistance) was a source of danger, and indicates a want of judgement and of extreme care necessary in such operations.

3rd. The use of a zinc case for a mine to be fired from an iron vessel was wrong, because the zinc of the case and the iron of the vessel, with the sea−water, form a galvanic battery, which might possibly have produced a current sufficiently powerful to cause ignition of the fuse if there had been any defect in the insulation of the wire, through which an accidental contact with the metal of the ship could have occurred.

4th. The most important error was committed in sending away the torpedo to its destination, leaving the battery end of the firing−line on board ship − whereas the usual and obviously safe practice is to send the firing−line away coiled up with the torpedo, and to bring back the battery end towards the battery after the mine is laid and after the boat and those engaged in the work are clear away from its vicinity. Captain Dufresse in his evidence lays stress upon this, which is the invariable course pursued in such experiments both in the French Torpedo Service and in the English Defensive Torpedo Service. Had such a course been adopted in this case, no accidental explosion from a battery current could have been possible until all concerned were at a safe distance.

Q. 1520, 1521.

5th. The practice which appears to be usual with the Naval Torpedo Corps, though never adopted by other bodies performing similar duties, is to have both the battery end of the firing−line and the firing−key in the hands and under the control of one and the same person while the torpedo is being placed. This practice was followed in the present case. It is manifestly wrong and very dangerous, because under such circumstances a stumble, an inadvertent movement, or one of many possible occurrences might bring about an accidental and momentary contact of the wire with the firing−key. The battery end of the firing−line should have been in charge of one of the electricians, at a distance from the firing−key, until the torpedo was placed in position and the boat out of reach of any effects of its explosion. The course adopted by the chief electrician (Mr. Murray), while it shows a praiseworthy sense of responsibility, indicates a lack of practical knowledge in torpedo operations, for it was his duty as chief electrician, and the proper course to pursue, not to perform any operations himself, but to see the several operations carried out methodically and carefully by his subordinate officers.

Q. 990, *et seq.*

18. The board consider it a matter for regret that both Captain Mandeville and Lieutenant Collins should have left the *Cerberus* while such an operation as firing the first large submerged mine from the ship was pending − an operation which, even if conducted with strict order and formality, and the most scrupulous care in every detail, still entailed a certain amount of risk on those immediately concerned with it, and therfore, according to all usage of both naval and military service, imperatively demanded the presence and supervision of every officer.

19. It appears from the evidence that although this was the first trip of the *Cerberus* for both torpedo and gun practice,and although war material was freely expended in experiments, no notes that might serve for future guidance were taken of the conditions under which the experiments were made of or their results. From this fact, and from the laxity which evidently marked the whole proceedings relating to torpedoes, the Board feel compelled to say that the voyage of the *Cerberus* to Queenscliff on the 4th and 5th of March 1881 resembled more a voyage for pleasure than one for the purpose of improving the defence of the colony.

20. In conclusion, the Board express their regret that they are unable to discover with certainty the exact cause which led to the explosion of the torpedo. They are nevertheless unanimous in the opinion that the disaster was brought about by an electric current in some unexplained manner. Both the evidence and the investigations of the Board suggest several ways in which, through the wrong practice or the injudicious mode of procedure of the Naval Torpedo Corps, it was possible that such a current might have been conveyed.

JOSEPH BOSISTO, Chairman
ROB. L. J. ELLERY,
SAML. W. McGOWAN,
J. COSMO NEWBERY,
JAS. PHELAN,

5th May 1881.

MINUTES OF EVIDENCE

LIST OF WITNESSES.

MINUTES OF EVIDENCE.

WEDNESDAY 23RD MARCH 1881.

Present:

JOSEPH BOSISTO Esq., M. L. A., in the Chair

R. L. J. Ellery, Esq., F.R.S. J. Como Newbery. Esq.,

S.W. McGowan, Esq., Captain James Phelan.

The *Government Gazette* notice, containing the appointment of the Board, was read.

Captain Colebrooke T. Mandeville, in command of the *Cerberus,* sworn.

Captain C.T.Mandeville 23rd MARCH 1881

1. Will you state the number of men that are under your command? − Fifty−six able seamen; altogether counting stokers, petty officers and stewards.
2. Does that include gunners and electricians? − No, it does not include the electricians.
3. How many are on board belonging to the Naval Torpedo Corps? −There are none belonging to the ship; they all belong to the Telegraph Department.
4. They are called the Naval corps? − Yes.
5. Are they under your command when on board the *Cerberus,* and when performing experimental work? − They are under my command, but of course I do not understand as much about torpedoes as they do.
6. Then, if you order experiments to be performed, they would take the order from you? − Yes, when I am on board; but they frequently have practice by themselves.
7. When you are absent from the ship, who takes your place? − Mr. Collins, when he is on board, but I only have one lieutenant, and he cannot be always on board; then one of the gunners takes charge. A gunner ranks with a lieutenant in the army, but he does not rise higher than that.
8. Do they go by rotation?− If there are two on board. Mr. Groves was attached to the torpedo department, he did not take his turn on board. Mr.Richards and Mr. Tubb took turn at night.
9. Have you any special regulations in the conduct of your ship and crew. or are the regulations those in use in the Royal navy? − The same as a harbor ship in the Royal navy. Half go on shore every night; half are always on board; but after the working hours are over, half are allowed to go on shore; the other half remain on board, and the same with the officers.
10. Do the regulations refer in any particulars to the duties on board when in harbour as well as at sea? − In the Bay they are always on board, except when I give them leave.
11. Do the regulations refer to the duties of the men when the ship is at anchor in its proper anchorage?− Yes.
12. Does it also refer to the duties the men are required to perform when they are at experimental practice work, when you are away from your proper anchorage and at work in the Bay at experiments? − When we are in the Bay at target practice everybody has his station; but even then you cannot keep to any particular station, because we have not enough men to man both turrets when we are firing − we can only man one turret.
13. The board wants to know if the discipline in force when the ship is underway is the same as when she is in the Bay, or is there a special discipline − like being under action − when they are at gunnery practice? − Only while we are under exercise; after we come to anchor we carry on the routine. While the ship is under way, of course everything is different − all hands at the stations, as near as we can make with so few me.
14. Then were the regulations carried out on this particular occasion in accordance with your wish and intention? − Exactly the same.
15. Will you state what the official relations are that exist between the Naval Forces and the Naval Torpedo Corps generally? − The Naval Torpedo Corps are first−class electricians, and they had the management −in fact, Mr. Murray had the management of the torpedoes generally; but the practical part was performed by the late Mr. Groves.
16. Are there any general official relations between the two? − Yes.
17. Will you state them when they are on duty? − Mr. Murray always had command of the electricians, the gunners, and any seamen I might send to help with the work. The work the seamen had to do was merely laying out the electric cable and so on, and Mr. Groves generally took care of that duty, but it was under Mr. Murray's supervision.

Captain C.T. Mandeville, continued 23rd March 1881

18. He was Mr. Murray's subordinate officer for the time being? − Yes.
19. So that, if Mr. Groves required any of your men to assist in the work, he gave the order, and you did not interfere? − All that he did was to send to me to let me know how many men the electricians required, and I used to send them to pull the boats and lay the cable.

20. Did the men demur at all? − Not that I heard of. 21. Has an *esprit de corps* existed on all occasions between the several departments on board − between the gunners and seamen and the torpedo corps − no disputes? − I never heard of any; if there had been, they would have been reported to me.
22. Is Mr. Murray, as chief electrician, under your command, or under his own command, on board the ship? − He is under my command so far as that he reports when he is going to have any practice. I am not always present. He conducts the experiments himself as a rule.
23. Especially referring to the case under consideration now− the gunnery and torpedo practice at the Heads − is Mr. Murray under your command? − He has nothing whatever to do with the gun drill; but so far as the torpedo is concerned, he has the command.
24. Is a daily account kept of each day's proceedings when in harbor as well as when under way − is any daily account kept? − Yes, always − the ship's log.
25. Can that be produced if required by the Board? − Yes.
26. Do you receive any directions or orders from the Minister of War before proceeding to sea for torpedo or gunnery practice? − I ask permission.
27. Then it first emanates from yourself? − I ask permission of the Treasurer − when I get permission I get into work.
28. You yourself first throw out the idea you want to perform certain work? − Yes− unless I was ordered. In this particular instance I asked permission to get under way for target gunnery practice, and also to practice the electricians.
29. What proceedings followed after your first direction, when you ordered the anchor to be weighed? − I got permission to get under way.
30. But, before that, is there anything as to your making any enquiry as to the amount of war material on board? − Everything is ready except the torpedo − that question would include all the power and everything − everything is ready at a moment.
31. Is any one in particular in charge of the magazine on board? − Yes, the gunner and the responsible gunner's mate.
32. What is his name? − Tubbs the responsible gunner, and then there is the gunner's mate, who is also responsible.
33. Do they keep an account of all the material in the magazine? − Yes.
34. Then, when any gunpowder or other war material is issued, does he keep an account of the amount and to whom it is issued? − Yes, and for what purpose it is expended.
35. Would it be against the regulations if any of the Torpedo corps or other persons brought explosives on board without you knowledge? − Yes, certainly, without my knowledge it would be.
36. Against the rules and regulations? − Yes.
37. Then all the material in your magazine on board is received from the Government magazines? − Yes.
38. So that there is a check from one to the other? − Yes.
39. Would you say what the daily routine of the men and officers on board the *Cerberus* is when in harbor? − There is a daily and weekly routine, and a routine of drill; it is with Mr. Symonds, the Under Treasurer −[*The same was sent for − vide Appendix.]*
40. Does it refer to the hours of work and the hours of recreation, and of the mess or meals? − Yes.
41. How many hours a day do they work? − There is a summer and winter routine.
42. Is there any difference when they are under way in the daily routine? − Very little.
43. All the sailors mess together? − Yes; the chief petty officers have a different mess.
44. The Torpedo Corps do not mess on the *Cerberus* when she is at anchor? − No.
45. They do, of course, when they are under way? − They mess with the officers then.
46. What is the hour for the general mess? − The men have their dinners at twelve o'clock.
47. And it lasts, how long? − An hour and a quarter.
48. Have you always found your officers carry out your instructions? − Always.
49. Are the officers even tempered men? − Yes.
50. And you have always found them considerate, one towards the other, in their work when on duty? − Always.
51. How many torpedo practices have you had on board the *Cerberus* since you had the command? − Anterior to the one under discussion, none, except from the torpedo launch.
52. How long have you had command? − Over three years − nearly four years.
53. On board the *Cerberus*, have you ever had any accident with torpedoes? − None on board the *Cerberus.*
54. What was the position that the late Mr. Groves held with regard to the Victorian navy? − He was the gunner in charge of the torpedo stores
55. Was he brought from England for that particular duty? − Two of them were sent out; the condition they were engaged upon was, that they were to be especially qualified for the torpedo work.
56. Mr. Groves was under your command the same as any other gunner? − Yes.
57. Ordinarily speaking, would he be under the chief electrician's command at the time of the practice? − Yes.
58. Did he live on board the *Cerberus?* − No, on board the torpedo hulk *Deborah.*
59. It is not quite clear as to the relative official positions held by the chief electrician and yourself and also Mr. Groves. In case of any difference of opinion during the proceeding of practice between yourself and Mr. Murray, what action would be taken? − He would obey my orders, but there never was any difference, the position would be much the same as a captain, lieutenant, and sublieutenant.
60. He would distinctly have to obey your orders? − Yes− quite so.

Captain C.T. Mandeville, continued 23rd March 1881

61. Supposing you were absent from the ship, who is in command? − The lieutenant, the only one I have now, if he was on board, but when he is on leave the ship would have to be left in charge of one of the gunners.
62.Suppose the gunner was absent? − There is always one on board.
63. With reference to the Torpedo Corps you have found them very attentive when you have been on duty? − Very.
64. Have any of them shown any temper? − None to my knowledge.
65. You were asked with reference to the war material in the magazine? − We have a fore and aft magazine containing nothing but powder; there is a shell room. there is no proper place in the ship for torpedo stores − we never keep any there.
66. Where were the torpedo stores generally kept? − It was only just for this one day.
67. After you gave instructions that a torpedo practice was going to take place, who would bring the explosive material on board? − Mr. Groves. 68. Under his direction at least? − Yes, from the hulks.

69. Would they have a list of the things given to the Torpedo Corps and the material that was taken on board the *Cerberus* for the last experiment? − Mr. Murray would know.
70. Then, when they were brought on board the *Cerberus*, where were they placed? − Right aft, under the stern gratings.
71. Who would issue the list of the requirements for the torpedo practice? − Mr. Murray would give instructions to Mr. Groves as to what he wanted, Mr. Groves would provide , fill and have them ready for a certain day, sometimes they used to go under way in a boat we had for the purpose from the Saturday till the Monday, and during that time they would practice with the torpedoes. That is quite apart from the ship, the material is brought on board either the night before or the same day.
72. Did you rely wholly on Mr. Murray getting the material for torpedo practice? − Mr. Murray does not belong to the service regularly, and so you cannot rely upon him for all the stores. Mr. Groves had a very great practical knowledge of the torpedoes and stores. He used to live on board the hulk, and had charge.
73. When you gave the order that torpedo practice was going to take place on a certain day, of course you, or someone under your authority, would direct Mr. Murray, or someone else, to get all the material ready? − Yes.
74. Then would they come and report to you that all the torpedo material was ready on board? − No; they would inform me when they were going to have torpedo practice.
75. When the material was received on board the *Cerberus* was any account taken of when they came on board? − No, Mr. Groves would take note of the stores used.
76. Then would you know what kind of explosives came on board in the shape of torpedo stores? − A general knowledge.
77. But not a specific one? − No. I would understand they were going to explode a certain number of small torpedoes, about the size of that tumbler; and I should not find fault with Mr. Murray if he brought one or two more or less.
78. You would know whether there was any dynamite? − My distinct orders were that no dynamite was to be used.
79. No explosive material could be brought on board the ship without your knowledge? − Any person in the Torpedo Corps could bring it on board without my knowledge.
80. Did you observe any of the torpedo material out of place on board? − No.
81. Did you see the material under the stern gratings? − I did.
82. Then, before you started, did you give an intimation as to the number of torpedoes you intended to explode? − No, I did not; I knew within two or three.
83. Did you give the Torpedo Corps any intimation as to the number of torpedoes you thought of exploding through the day? − No.
84. Did you state the number? − Not the exact number, but I did within a few − they were only a small thing.
85. What took place from the time the anchor was weighed in the harbour to the time you cast anchor at Queenscliff, on Friday evening? − After shot practice we passed down the West Channel and anchored off Queenscliff.
86. At what time? − In the afternoon.
87.After you anchored, were any further experiments undertaken − that is, on the Friday? − At night we exhibited an electric light.
88. By whom? − By Mr. Murray and the electricians.
89. Were you present? − Yes.
90. And all seemed to go well? − Everything.
91. Then, during the time that gun practice is going on, there is no account taken as to the material given from the magazine or magazines to the persons who make use of them in firing? − Yes − you mean the heavy guns?
92. Yes? − I give instructions how many rounds should be fired; after the practice is over the expended stores are accounted for in the issue book.
93. Did anything in particular occur on the Friday evening on board? − Nothing that I remember.
94. That is to say did anything occur with reference to the experiments? _ No, everything went well.
95. And all the men were agreeable one with the other? − Yes, as far as I know.
96. Was it usual to take stock of the torpedo materials on board the hulk at certain intervals? − Yes.
97. At what intervals? − I used to go round about every week, and I could see everything there except the explosives; we are not supposed to have any on board.
98. There was a store−book kept? − Yes.
99. How often was it written up? − I signed it every month.
100. Then, were the receipt and expenditure of such materials checked by an officer under you? − By myself; I looked through them all.

Captain C.T. Mandeville, continued 23rd March 1881

101. As a matter of fact, although it was against the regulations, were there any explosives on board the hulk *Deborah?* − I understood there was a small quantity of gun−cotton −− about a pound and a half.
102. As a matter of fact, although against the rules, there was an explosive material on board the *Deborah?* − It was not against the rules to keep a small quantity − there were no written regulations. I had a small quantity for experiments.
103. Under what regulations? − My orders. 104. Not written orders? − No.
105. Only by word of mouth − verbal orders? − Yes.
106. Then, as a, corollary upon that, if a large amount of gun−cotton or other explosive material for torpedoes is required, it is obtainable at the magazine? − There is a magazine on board the hulk for gun−cotton − on board the *Deborah* − but I was trying to explain that I only gave permission to keep a small quantity ; they kept it in the magazine.
107. What would be a small quantity? − Last time I asked Mr. Groves how much he had, he said two pounds and a half. I call that a small quantity.
108. Suppose they wanted a 50lb charge for a torpedo, where would it be got from? − Mr. Murray.
109. How would he obtain it? − From Colonel Anderson.
110. From the magazine, through Colonel Anderson? − Yes 111. From the new magazine at the Saltwater River? − Yes.
112. What would be written on the order? − I should have applied for it by requisition
113. If you yourself, from your own personal observation, had seen this gun−cotton magazine on board the *Deborah*, should you know from your own personal knowledge what was in it? − I did not see the amount personally, but I have no doubt the amount was there, and they could not have got it without buying it out of their pockets.
114. You were not conscious, personally, of the contents of the torpedo? − No.
115. Did you ever go into the magazine and see what was there? − Yes, I used to go round there, but I had to trust the officer in charge of the stores.
116. Have you had a personal knowledge of the contents of that magazine or any place where those explosives were stored except what you obtained through Mr. Groves or any other officer? − Not lately.
117. Did the electricians go on board the *Cerberus* before you weighed anchor? − Yes.
118. All of them? − No, one joined us at Queenscliff.
119. Who was that? − Mr. Doyle. 120. Had he any thing with him? − Not that I am aware.
121. Then there was no special reason why he went on board at Queenscliff? − No, only that his duty kept him in Melbourne.
122. Were you on board all Friday night? − Yes.
123. Were you on board during the day of Saturday? − Up to about five o'clock.
124. What was the order of Saturday's proceedings? − All the forenoon the electricians were employed generally about the cables, splicing them and so forth. in fact preparing work for the afternoon.
125. Under any programme? − They had first of all to fix up the battery, and then to gather all the wires in proper order.
126. All the officers and men employed in it did their work freely and cheerfully? − Yes.
127. At what hour did the torpedo experiment commence? − About three o'clock.
128. And lasted until when? − They were practising all the afternoon − they commenced at three and ended at about five, when everything was finished.
129. How many torpedoes were exploded, not counting the disastrous one? − I think it was five, but I did not see them all exploded.
130. But you were on board? − Yes. 131. Did you witness those torpedo experiments? − Yes.
132. How many did you see explode? − I only saw about two, but then they were very small ones, about the size of a tumbler, and they were a good way off the ship.
133. What you would call experimental charges? − Yes.
134. Then you would not take any particular note of any such experiments? − I think they were unimportant.
135. With what view was that done? − To exercise the electricians.
136. What were used − were they circuit−closer buoys? − Some of them were.
137. There was no large charge used in connection with the circuit? − No.
138. Those charges would be about two pounds, the size of a tumbler? − Yes, about that.
139. Were they all successful? − No, one of the grenades was not. I saw that.
140. What different kinds of charges were exploded on that day? − The circuit−closing buoys and the hand grenades, one by electricity and the large mine.
141. Only one large mine? − Only one. 142. That was the fatal one? − Yes.
143. Do you know what was in those charges? − Gun−cotton, I understood.
144. Then you do not know of your own personal knowledge? − No, not more than you would know of the charge in a gun.
145. You did not distinctly make yourself aware of the change. − No.
146. Then you do not know what they were charged with? − Not of my own personal knowledge, but I believe it to have been gun−cotton.
147. And the large mine was what? − Gunpowder. I know that, because it came up from the magazine.
148. You say the experiments were all successful, save one? − I believe so. I saw one that was not.
149. Do you know of any reason why it was not successful? − No.
150. Who would know? − Mr. Murray would perhaps know.
151. When those smaller experiments were finished, what next took place.? − We decided (that was Mr. Murray, Mr. Groves, and myself) to explode a larger charge than we had done before.

Captain C.T. Mandeville, continued 23rd March 1881

152. What moved you and the other gentlemen to decide upon a larger charge − that is, what was it, decided you to fire a larger charge? − I really cannot say exactly; I forget who suggested it, but I gave permission to explode a larger one. I fancy it was Mr. Groves suggested that we should fire a larger charge, and I gave my permission, at any rate I knew it was going to be done.
153. The principal object was with the view of seeing the effect of a larger explosion?_ Yes, with a view of seeing the effect.
154. Can you tell the Board of your own knowledge what was decided as to the depth as to which this torpedo was to be placed? − I did not interfere in matters of detail, but I understood it was to be six or eight feet below the water.
155. After you had given your permission with reference to this charge, what then did you do? − I went on shore partly to witness the effect.
156. How far were the day's experiments performed from the shore? − I should say about half a mile opposite to the high cliff.
157. In the fairway? − Inside the fairway.
158. Did you watch the last experiment from the shore? − I saw the explosion. I was on the cliff.
159.Watching it? − Yes, I was watching it. I missed the first upheaval of the water. I heard the explosion, and then looked, and I saw the water disturbed.
160. You did not witness the explosion? − No, not at the moment. I heard the explosion, and of course from the distance it would be a little after.
161. By that time had the water subsided? − The water was disturbed. As I said before, I did not see the upheaval.
162. Had you your field−glasses? − No, I never dreamt of such an accident happening.
163. When you take the *Cerberus* away to make these experiments, on your return do you report to the Minister of War or anyone? − We have never had any experiments, except firing at the target. All the other experiments have been at the hulks. 164. This is the first occasion direct from the *Cerberus?* − Yes.
165. When you went on shore did any other officer go with you? − Yes, Mr. Collins.
166. And no other person? − No other officer.
167. Is it not the practice to report, or was it your intention to report in this case? − We have never had such experiments before; but it was my intention to report the result on my return. I always report when the ship comes back.
168. Did you report the result of this practice? − I telegraphed.
169. Who was really responsible for the torpedo practice? − Mr. Murray.
170. If Mr. Murray is responsible, he would be responsible for the charges contained in the torpedoes?− He used to give instructions to Mr. Groves.
171. If the wrong thing went into the torpedo, it is to be presumed he would be responsible for that wrong thing going into the torpedo? − He would know what was going to be put in. I cannot say whether he would actually see it.
172. Would he be responsible for it? − Yes, so far as orders given by him to a responsible person. Suppose for instances, I wanted so many charges for the guns, I should give instructions to the first lieutenant, and he would order the gunners what to put in. It was the place of the gunner to send the charges up to the gun, He was responsible.
173. It appears to the Board there has been some little divided authority between Mr. Murray and Mr. Groves? − It was divided in this way: Mr. Groves used to do all the practical work, such as laying out mines, and in fact he used to instruct them how to splice cables &c.
174. And it would be left to him to charge the mines? − Mr. Murray would give the orders as to what was to be put in.
175. That was generally understood? − That was quite understood.
176. Was the torpedo practice carried out with any formality? − Under Mr. Murray's supervision. I did not interfere with him in his work at all. I looked upon him as responsible for his part of the work.
177. Is the Naval Torpedo Corps paid? − A small sum, the same as the Naval Reserves.
178. Are they sworn in under the Discipline act? − They are appointed by the Governor in Council, and are sworn in.
179. Under the Discipline Act or as volunteers? − I always look upon them as volunteers. I never ordered them to drill. On certain days when they had spare time they used to say they wanted to go away in the boat or whatever it was.
180. Were they sworn in under the Discipline Act or not − that would make a difference, would not it? − Yes, they were.
181. Are you aware there are two Acts − one called the Volunteers Statute and the other the Discipline Act? − Yes.
182. Did you decide before you left the *Cerberus* the quantity of explosive material to be used in the last torpedo? − Yes, fifty pounds I understood I did not see it put in, but I subsequently heard there were seventy pounds put in.
183. Who gave you that information? − I believe it was Mr. Tubb.
184. Was it on board the *Cerberus* you heard it? − I believe it was on board the *Cerberus,* from the gunner of the ship.
185. Nevertheless, you fully concurred with the last torpedo experiment? − Yes.
186.When you went ashore whom did you leave in charge? − Mr. Richards, gunner.
187. What would his duty be after you left? − He would not have interfered with the practice at all, he was what we call commanding officer.
188. To do what? − There are a number of duties. Mr. Richard used to act as the officer of the day, and would keep watch in addition if we had officers enough.
189. And Mr. Richards was in charge when you went on shore? − Yes.
190. Could Mr. Richards have interfered or resisted with reference to this torpedo? − If he saw anything going on that he thought was dangerous he could have stopped it.
191. Would he have stopped putting twenty pounds more powder in? − I think not.
192. Would you have objected if you had been there? − No, I have exploded the same quantity before − seventy pounds, sixty pounds.

Captain C.T. Mandeville, continued 23rd March 1881

193. Were there any strangers on board the *Cerberus* when you were at Queenscliff? − There were visitors.
194. Did they come on board from the cliff? − Yes, just to look round the ship.
195. Were they ordinary visitors or people likely to take an interest in the proceedings? − Both.
196. When did they go on shore? − Some went in the boat with me.
197. Did you leave any on board? − I saw no one on the quarter−deck, no one anywhere near the wheel. There may have been visitors below.
198. Were there any visitors on board during the torpedo experiments? − Yes there were.
199. When did they go on shore? − They were coming on board and going on shore.
200. When you left the ship at five o'clock did you leave any visitors on board? − There may have been, down below. I did not notice any except those that went on shore with me.
201. Did any of those strangers take any part in any discussion as to the strength of this torpedo? − Not to my knowledge.
202. During the afternoon were the men allowed rations− that is, were they allowed grog? − They are allowed a wineglass full of rum a day, or money for it.
203. Had any of them served grog in the afternoon? − They would have had it at dinner−time, but very few of them take it.
204. At dinner−time they would have grog served to them if they chose to take it? − Yes.
205. Are there many on board that take it? − No, they prefer the grog money.
206. Did you give any special allowance on this occasion? − No.
207. When the electricians are on board, do they have to submit to the rations of the ship? − No, they live with the officers; they would be guests, in fact, of the officers.
208. Then do they take wine or grog? − I cannot tell.
209. Do the officers at their mess? − Yes, they have beer or wine of their own.
210, Then, if the electricians had any at all, they would take it as a gift from the officers? − Yes.
211. They would not take it on board themselves? − No.
212. At what time do the officers dine? − They lunch at twelve o'clock and dine about five o'clock.
213. They had not dined before the explosion? − No.
214. Were the electricians − that is, those who were engaged in the experiments − known to you to be moderate men; that is, men not given to take too much stimulants? − I knew them to be steady and moderate men.
215. Had you ever any of your men under you reported when on duty as being in any way under the influence of drink? − In a few instances of the ship's company of men.
216. If any man on board was under that influence on duty, you would order him under arrest? − Yes.
217. And there were none so arrested? − None.
218. You had no fault to find with the officers on the Saturday? − No, everything was quite satisfactory.
219. Did you see the last mine leave the ship before you went on shore? − No, they were just getting it ready to lay out.
220. Did you know whether there was anything placed in the torpedo besides powder? − I knew there was a fuse and a few bits of gun−cotton, I did not see them placed.
221. You saw those things about ready to be put in? − Yes.
222. Is that [*handing a printed document to the witness*] − a fair copy of the report made by you to the Chief Secretary.? − It is, as far as I can remember.
223. Up to the time of the accident, had you any knowledge of any dynamite having been on board? − I would not have allowed it, and I never dreamt of it being on board. I did not know anybody had any on board.
224. Is there any specified drill used in torpedo experiments on board your ships similar to that adopted in the British navy? − We have no torpedo stores.
225. There is no regular drill on board? − Only the electricians − they come down on Saturday afternoons generally to the hulks in the river.
226. Could you tell us how the Naval Torpedo Corps was ordered on board; did they receive specific instructions to attend? − No. they attend when they can spare the time.
227. On an occasion like that of the *Cerberus* going down to Queenscliff? − I asked Mr. Murray, and he said he thought he could get three or four electricians, who were off duty, to come on board.
228. Is there any way of ordering them? − Not more than ordinary volunteers.
229. If they were sworn under the Discipline Act, that amounts to an order? − One cannot very well order them− perhaps they have got a duty in their own department to go up country or somewhere. Mr. Murray is half his time away.
230. With reference to Mr. Groves, was he on board the *Cerberus* whenever any experiments had to be performed during the whole time you were commanding? − Whenever anything was connected with the torpedoes he was always in attendance superintending.
231. Then you could form a pretty good judgement as to his capabilities, and the proper way of proceeding to perform experiments? − Yes. 232. Did you consider him steady in is work? − Yes.
233. That is, was he deliberate, and thoughtful, and careful when he was dealing with those materials? − As far as I could see he was, he used often to come into my house to instruct me so far as his knowledge went, and that was practical knowledge. 234. Was Mr. Groves looked upon by you as a practical man? − Certainly.
235. Though you might have been something like a pupil under him, you would be able to form an opinion whether he was steady? − Yes. I should say so.
236. Did anything ever come to your knowledge that would lead you to the opposite view of what you know of Gunner's Groves' experiences? − The only instance I can think of was when I met with the accident myself.

Captain C.T. Mandeville, continued 23rd March 1881

237. You had generally confidence in him? − Yes.
238. Do you know whether it is the practice in the British navy to hold the officers responsible for the crews? − Any responsible officer would have to answer for himself.
239. That was when you yourself gave instructions? − There are people responsible for everything.
240. Suppose the ship was to blow up, who would be responsible to the Admiralty? − The Captain must be on deck. I had been in the conning−tower −that is away from the magazine − and I could not be answerable for that.
241. Supposing a ship goes ashore, or is blown up, or catches fire, is a court martial held upon the captain? − There is a court martial on the whole of the officers, to find out who was at fault. For instance, when the *Thunderer's* guns burst, the captain could not see the charges put in, there were two instead of one.
242. Is the captain of a British war vessel supposed to have any knowledge of the construction of a torpedo? − Not unless they pass through a course; but they keep a torpedo lieutenant on board some of the larger ships.
243. And the commander's knowledge is only general? − He knows nothing about it unless he has been through the course himself.
244. Then the commander is not taught the various systems as a necessity − it is not necessary that he should? − No− not of a necessity.
245. Are stationary topedoes placed on board Her Majesty's ships for the purpose of coast defences, or is it only what are known as fish torpedoes, like the Whitehead, or Brennan, or others? − They do not keep coast torpedoes on board. The *Cerberus* has none whatever of any kind.
246. Are you aware of any country having any naval forces who are in charge of stationary torpedoes? − I think, the American; but I will not be certain. I think, one or two of the European nations.
247. You think so? − I will not be certain.
248. When you are exercising with the guns and torpedoes, it is a usual thing to have visitors on board, going to and fro? − Not with guns− the torpedoes take up only a very small portion − everything was perfectly safe.
249. When they came on board, at Queenscliff, do they ask permission? − They always ask permission, and a boy or one of the seamen is sent to show them round. The only thing is, when we have a big gun practice, we never have anybody on board except the members of the press, or anything of that kind.
250. With reference to coast torpedoes on actual service, is not it more proper to fire from the shore rather than from the vessel? − Always from the shore with coast torpedoes.

The witness withdrew.

Lieutenant Robert Collins, R.N. sworn.

Lieutenant R. Collins. R.N., 23rd March 1881

251. What office do you hold? − I am Lieutenant on board the *Cerberus.* 252. Are you next in command when Captain Mandeville is absent? − Yes.
253. When the *Cerberus* is ordered to undertake duties for gunnery purposes or torpedo practice, away from anchor, have you any special duties to perform? − No, except as first Lieutenant of the ship − as first Lieutenant I am in charge of all duties on board.
254. Duties with reference to firing as well as to your men? − Everywhere where the men are concerned I am concerned.
255. You have nothing to do with the Torpedo Corps, particularly when they are on board? − No.
256. Then, if the order is given that torpedoes are to be exploded and experiments made with them, you have nothing to do with that? − If the Torpedo Corps are working on board I should give them hands, and I should interfere if I saw cause to do so.
257. What cause do you mean − what would you consider necessary to call for your interference? − If they were doing anything I disapproved of.
258. What would that be? − They could not make use of the ship's stores, nor of the men in any way without my permission.
259. You do not interfere in any way with the charge of the torpedoes, or anything of that kind? − No.
260. Then you would only interfere if they were interfering with your ship's company? − Yes.
261. Were you on board on the day of the disaster? − Till nearly 5 o'clock − not at the time.
262. Who was left in charge of the *Cerberus?*− The warrant officer − Mr. Richards.
263. When did you leave on the Saturday? − A little before 5 o'clock.
264. Did you leave with the captain? − Yes. 265. Did you witness the explosion? − No.
266. Where were you? − On shore. 267. Did you go on shore to witness the explosion? − No.
268. You had leave of absence? − I had. 269. Then you did not see the explosion? − No.
270. Do you know what explosives were placed on board the *Cerberus* before she left her anchorage for Queenscliff? − No.
271. Had you been present for any former gunnery and torpedo practices before the last fatal one? − Not in the colony.
272. Have you been elsewhere? − In England. 273. Where? − In the torpedo school on board the *Vernon.*
274. Have any of the torpedo experiments there been of a similar character to those on the *Cerberus?* − Never when so small charges were used − never with such small charges.
275. What are the regulations with reference to visitors being on board in England − on such an occasion are there any? − The only regulation on board the *Vernon* was that an officer was to be with the visitors when they came.

Lieutenant R. Collins, R.N., continued 23rd March 1881

276. During such experiments are they allowed on board at home? − The experiments or rather the exercises are done away from the ship, so that people would not come to the ship to see them.
277. Then you have not had similar experiments in England? − Yes, there are stations put up about two miles away from the *Vernon*, and when we carry out these exercises we go to one of these stations. At the end of each short torpedo course, of which there are two a year, there is an explosion of a system of mines that have been put down from the stations erected up the creek; but there is almost daily exercise from the *Vernon* when *extempore* mines and charges are exploded by classes under instruction. Steamers used to convey spectators to the former, but after a time the Admiralty stopped such visitors, probably from the reason of the steamers getting in the way of the work. I know of no regulation prohibiting visitors to the *Vernon* during the latter exercises.
278. The fact of their being two miles from the ship would make them quite dissimilar to the one under inquiry? − Yes.
279. Is it usual to have visitors on board the ship or the station while the experiments are going on? − No.
280. in carrying out these experiments in the British navy at home is there any special drill or formality in carrying out the work? − Outside of the routine of the ship?
281. Yes, is there any drill, book? No, there is a manual, but that does not give any stations for the officers or men; that is merely an instruction book.
282. Under what formalities do those experiments take place then? − Under the charge of the commander of the *Vernon* or one of the torpedo officers who are appointed there.
283. Are there any regular ways of doing all the operations? − Equally regular with any drill.
284.If a counter line is to be fired from the launch will you tell how it is laid and how the connections are carried out, and how the connections are finally made with the boat? − We do all the stationary mines at Portsmouth, and when counter−mining we are merely carrying out a series of mines by means of slip toggles, and as soon as the line is dropped they can be exploded by a firing−key − the battery is somewhere in the boat − or in action it would be on board the ship you would commence running this line from.
285. Each mine is made up with this attached firing line connected? − Yes.
286. When and where is the firing line connected with the key. The question is this, is the firing line put on board the firing boat before the mine is laid? − Yes, one end is on board the boat from which you start, and the other end of the line is passed in to the ship or boat at the end of the run; they can be exploded from either end.
287. Are there no stations in the Bay for firing torpedoes from? − No, not that I know of.
288. Is that the reason why they were done from the *Cerberus?* − Yes, but they are in the habit of drilling every Saturday.
289. Is it usual for some one in authority on board to take notice during the time that experiments have been made on board a man−of−war as to the result of the explosions − you understand? − Yes− in torpedo work.
290. Was that carried out on board the *Cerberus?* − No. not that I know of.
291. Can you give a reason why? − No.
292. So far as you were concerned in the matter, you looked upon the cruise of the *Cerberus* from anchor to Queenscliff as being an experimental one for the purpose of experimenting in gunnery, torpedoes, and so forth? − Yes. 293. You say no notes were taken in reference to the experiments? − No.
294. What then would be the ultimate end of the experiments− if you wish to go through certain experiments, do you not note down a torpedo of such a size, and so on, and the explosion, or the disturbance that it caused, or the eruption? − Then I would withdraw my answer to the question about experiments. I did not know you meant the word experiment to apply in that way; it was not an experimental cruise.
295. What was it then? − A cruise for exercise. 296. Then you took no note of the explosion in the report? − No.
297. Are any notes taken of the results of the gunnery practice? − No.
298. It is usual to do so on board men−of−war? − Some one is always present to observe the distance at which it passes.
299. No notes are made in the log? − No, unless the target is hit, that is put in the log.
300. Have you any knowledge with reference to the reception, storage, and issue of torpedoes for the practice of the Naval Torpedo Corps? − No.
301. You do not know where it is kept, or what stores are kept? − Kept in the torpedo hulk; I know that they are kept on board the hulk *Deborah.*
302. Do any requisitions or books pass through your hands? − The books were kept by Mr. Groves.
303. They do not come through your hands at all? − Not unless a survey is held, and then I must be on the survey.
304. Not as a matter of ordinary duty? − They will now, since I have been first lieutenant.
305. Have there been many surveys? − One. 306. In what period? − July or August.
307. For twelve months? − For twelve months. 308. Did you proceed on board the torpedo hulk *Deborah?* − Yes.
309. Did you see on board that hulk the torpedo stores there? − Yes. 310. Was the gun−cotton in a special magazine? − A special magazine.
311. What quantity of gun−cotton might have been there when you saw the magazine? − Two or three pounds, not more. 312. Any dynamite? − Not in the magazine that I recollect.
313. Was there any dynamite on board the *Deborah?* − Yes, a little.
314. What do you call a little? − At the outside two pounds.
315. Was that kept in any special place or in a lock−up? − In a special lock−up.
316. Who was in charge of the dynamite? − Mr. Groves.
317. Was that dynamite accounted for in the books? − No. 318. Do you know why? − No.

R.Collins R.N., continued 23rd March 1881

319. Did you ever see any dynamite on board the *Cerberus?* − No.
320.Was any record kept of the dynamite, or did any person know officially, by means of forms or books, what quantity of dynamite was on board or what was done with it? − I have seen an order for the purchase of five pounds − at least it was paper in connection with the purchase of dynamite; the paymaster showed me that about a fortnight ago.
321. Do you remember what day that was? − No. 322. Was it this year? − I am certain it was not this year.
323. Could you give the Board any information that has come to your knowledge at all as to how that dynamite, supposed to have come on board the *Cerberus,* was in store in the hulk? − Six months I should think.
324. At least six months? − Yes.
325. When material is brought on board the *Cerberus,* either small or great, is there not a man there to receive it? − Yes− there is a book kept to enter it in.
326. Could any person belonging to the Torpedo Corps come on board the *Cerberus* with a small parcel in his possession, without the knowledge of the man who admits him? − Yes.
327. Could it come on board? − Yes, the quarter−master would not examine anything an officer brought.
328. If it came in an official manner from the hulks, or from anywhere else − any combustible material the quarter−master would know? − He would not.
329. But he would know that it was presented as coming on board ? − Yes.
330. If it was coming officially? − Yes.
331. That is, if a certain amount of gun−cotton was coming on board the quarter−master would know? − Yes.
332. If it came openly? − Decidedly.
333. Would he take a note of it? − He would report it to the officer of the day.
334. Do you hold a similar or analogous position on board the *Cerberus* to that you held n England? − I am not a torpedo lieutenant in the sense of a torpedo lieutenant in the English navy. A torpedo lieutenant requires to be educated in the Greenwich University as a chemist, and go through a nine month's course of torpedo instruction on board of H.M. training ship *Vernon.* I am a torpedo officer in the sense that I have gone through the torpedo course − three months.
335. Then your knowledge would be equivalent to that of Mr. Groves? − Yes.
336. You went through the same course as Mr. Groves? − Yes
337. Did you hold a higher position in England to that of gunner Groves on board the *Cerberus* as a torpedo officer? − No, except my rank, of course. I was lieutenant− Mr. Groves was only a gunner.
338. Do you hold any rank on board the *Cerberus,* to bring out your special torpedo knowledge, with regard to which you were appointed in England for the Victorian Government? − No.
339. Did you express any wish, when you came, to the effect that you would like to be only a lieutenant on board the *Cerberus* away from the Torpedo Corps? − No. I was appointed to the *Nelson* first.
340. And transferred to the *Cerberus?* − Yes.
341. When you arrived here you anticipated you were going to take a position in the Torpedo Corps in this colony? − Yes.
342. You did not take that position? − No.
343. But you held the position on board the *Cerberus?* − Yes.
344. Therefore your special knowledge with reference to torpedo work is not made use of? − No.
345. When you left the *Cerberus* on the Saturday at five o'clock, on leave of absence, for how long was that leave granted to you? − For the night.
346. Did you return the following morning? − I returned at half−past five.
347. In consequence of what? − In consequence of hearing of the accident.
348. Mr. Richards was in charge of the *Cerberus* after you left? − Yes.
349. Is he the next by rank in command? − Yes.
350. Have you always found the Torpedo Corps, when on board the *Cerberus,* to show good knowledge of their profession? − That was the first occasion on which I had seen them on board.
351. Before the accident occurred on that day, did you see them doing any part of their work? − No.
352. Did you see any of their trials on shore? − No.
353. Then you are not in a position to give an opinion as to the capabilities of our Torpedo Corps? − No.
354. Have you formed any theory or idea at all of how this explosion was brought about? − No.
355. You have no fixed idea how the accident occurred? − No.
356. Was there any sign amongst any of the officers or members of the Torpedo Corps of having taken anything to drink. Did you notice whether they were flushed at all, or a little excited? − No.
357. You did not notice anything of the kind? − No.
358. Are you certain that they were all perfectly quiet and careful, as they should have been under such circumstances? − As far as I could see.
259. You have not the slightest reason to think that anyone was the worse for anything he had taken on board? − No.
360. Would you have a good opportunity of judging that? − Yes I think so. I saw them immediately after the explosion.
361. Did the Torpedo Corps lunch at twelve o'clock − Yes.
362. After that time was there any special half−hour given for refreshments? − No
363. Could all of those men, or any of them, have obtained any purchased liquor on board if they desired to do so? − Yes. 364. Unknown to yourself? − Yes.
365. Did you during the day see any of them taking anything away from the ordinary luncheon? − No.
366. Then you saw no impropriety at all? − No.
367. What was the rank of Mr. Richards? − Gunner, Royal navy.

R.Collins, R.N., continued 23 March 1881

368. You were not on board when the last torpedo was put into the boat? − No.
369. Did you see the torpedo loaded? − No.
370. Then you cannot say anything as to what it contained? − No.
371. Did you see them preparing to charge the torpedo? − No.
372. In your home experience have you witnessed any similar accident? − No.
373. Has any similar accident occurred in the British navy, according to your recollection? − I have seen mines exploded prematurely, but through the fault of the officer at the firing−key; some men were injured on board the *Vernon.*
374. The charge fired too soon? − Yes.
375. You know of no instance where a similar accident occurred without having been accounted for? − No.

The witness withdrew.

Adjourned to Monday next, at half−past one o'clock.

Monday 28TH MARCH 1881.

Members present:

J.Bosisto, Esq., M. L. A., in the chair;

R. J. Ellery, Esq. S.W. McGowan, Esq.,
J. Cosmo Newberry, Esq., Captain J. Phelan.

Gunner James Tubb sworn.

James Tubb, 28th March 1881

376. You are a gunner on board the *Cerberus?* − Yes.
377. How long have you held that position? − Since 1870.
378. Where were you prior to that? − In the Royal navy.
379. How long were you there? − About twenty years. 380. Do you hold any particular rank as gunner on board the *Cerberus?* − No, only gunner in the Naval Forces.
381. Then you are only equal with the other gunners on board? − That is all.
382. Have you any knowledge as an electrician? − Very little; I understand some practical part of it.
383. Where did you learn it? − In England.
384. Did you go through the torpedo class? − There was no torpedo class, I had a rough pull through.
365. You had charge of the magazine on board the *Cerberus?* − Yes.
386. What magazine was it you had charge of on board? − All of them.
387. Describe the magazines? − Two main magazines − one to supply each turret − and one Snider − that is, for stowing small arms ammunition and other things, such as lights, rockets, fuses and so on, on board.
388. The magazines contain different combustables − one contains gunpowder? − Two main magazines contain powder only, and the Snider magazine contains small ammunition and rockets.
389. Do you keep the keys of the magazine? − No. 390. Who does? − They are kept in the first lieutenant's cabin.
391. Under what regulations are they kept. Under the Queens's Regulations, they are kept in a case, under lock and key, in the first lieutenant's cabin.
392. And when you require them, what do you do? − I make it known to the commanding officer, if he is on board.
393. And if he is not? − I go myself, if I am commanding officer.
394. You are quite sure no one else can take possession of the keys? − No.
395. Did you keep a record of the contents of each of the magazines? − Yes.
396. When application is made to your for any material from such magazines, how is it done? − Do you mean from the outside?
397. No, from those on board ? − I supply it, and keep a record of it.
398. Is that done by writing?− No by order, by word of command.
399. Then, in gun practice, who comes to you for the material? −The gunner's mate.
400. Then any of the Torpedo Corps requiring any gunpowder or anything else, they have to come to you separately? − Yes.
401. So that you have a record of the material supplied to the gunners and a record of the material supplied to the Torpedo Corps separately? − I have to enter in my exercise book how the material is expended.
402. Who receives the material from you for the Torpedo Corps? − I have never supplied them with any before.
403. Who did, then, on the late occasion? − I did on the late occasion.
404. To whom?− Mr. Groves. 405. Personally? − Yes, personally.
406. And to no one else? − The gunner's mate brought it from the magazine, and I gave it to Mr. Groves.
407. Did you give Mr. Groves any dynamite or gun−cotton? − None.
408. Had you any on board in any of your magazines? − No.
409. Has there ever been any on board to your knowledge? − No.
410. Do you know of any dynamite being taken on board the *Cerberus?* − No.
411. When you supply material to the Torpedo Corps, in what condition do you supply it. In the original packet, or loose, or how? − As we receive it. If they apply for so many hundred pounds of gunpowder we send it in the barrels, as we had it from England.

James Tubb, continued 28th March 1881

412. In this case how did you supply it? − In a 70−lb cylinder.
413. The original package? − No− not the original one.
414. Did you ever weigh it out? − No.
415. How did you know there were 70 lbs? − By the depth from the top of the case to the powder.
416. Did you put the gunpowder into that cylinder? − I could not say.
417. Have you ever seen any of them emptied? − Yes.
418. Have you ever seen anything but the gunpowder? − No, I knew where it came from.
419. There was no reason why anything else should be in? − No.
420. You would look upon it as a remarkable thing if anything but powder was in those cases? − The gunpowder was the powder we used for the gun charge formerly.
421. Were you on board the *Cerberus* when the Torpedo Corps went on board when you were going to Queenscliff? − Yes.
422. Did you see them arrive on board the *Cerberus?* − Yes, they came on board on the Friday morning.
423. Had any of them anything with them? − I could not say.
424. You did not observe? − No.
425. Of your own knowledge and observations, can you say whether there was anything in the shape of extra ammunition brought on board? − No.
426. Did you hear of any other men belonging to the *Cerberus* say they had brought on board other explosives? − No.
427. Had you anything to do with preparing the large torpedo − the one that caused the accident? − Only to take off the lid of the case. They could not get it off, and I took it off for them; I mean the zinc cylinder.
428. When you took the lid off you saw nothing but powder? − I am sure I did not see anything else.
429. In whose charge was the cylinder? − Mr. Groves's
430. How many were present besides Mr. Groves? − I should think there were about 14 or 15 people on deck.
431. Who were they? − Electricians, Mr. Richards, myself, the captain, and first lieutenant.
432. There were no strangers? − No strangers.
433. Were you present during the time the torpedo was being prepared? − Yes.
434. Who put in the necessary material? − I saw no one touching the case but Mr. Groves.
435. What did he do? − I did not see him put any extra powder in.
436. After you handed the case over to Mr. Groves, what was done with the lid? − The lid was given to the armourer to fit the wires and fuses.
437. With reference to the contents of the torpedo, did you see anything else put in besides the gunpowder? − No I saw some gun−cotton on the compass stand that had been taken out of the hand grenades.
438. Did you see any other combustibles?_ No.
439. Was that on the binnacle−table? − Yes, with old tins that had been taken out.
440. Did you see those hand grenades come on board with the torpedo material? − No, I saw them before they were opened.
441. When anyone brings hand grenades, or any other war material on board, is it in the regulations that they should hand them over to you, who have charge of the magazine? − If I had been in the ship.
442. And, if not, who would take them? − My mate, Prideaux.
443. Have you heard Prideaux say he received anything? − Yes, when I came on board I asked the question what was brought on board, and where he put it.
444. Was it the right and proper course to report to you what was brought on board, or whoever was in command of the gunner's stores at the time? − Or the commander of the ship.
445. Was it so reported? − When I came on board the first thing in the morning it was reported to me what was brought on board.
446. Did you go to look? − Yes, I got the keys of the shell room, and saw the torpedo gear that was brought on board.
447. Did you count the grenades? − There were five mines, and, I think, eight hand grenades.
448. How many grenades were used up to five o'clock on the Sunday? − One was thrown overboard and missed fire, and I think Mr. Groves opened that one and one besides; that was two that were opened, and one fired successfully.
449. That was leaving a balance of how many? − I think five.
450. You say those that misfired were brought back on board? − They were only thrown overboard by hand with a line attached.
451. And, not going off, what was done with them? − When Mr. Groves came on board with the Torpedo Corps, he took the lids off to ascertain the reason they did not fire, and he found that they had high−tension fuses instead of low.
452. Where was that material put, did you see? − On the compass stand.
453. And part of it was gun−cotton? − All gun−cotton that I saw.
454. Then the gun−cotton you say was employed in the torpedo − some of that gun−cotton had come from the grenades? − It was taken from the hand grenades when they took the lids off.
455. Do you know how much of the gun−cotton was employed in the torpedo? − I do not know.
456. You saw the torpedo before the lid was put on? − Yes.
457. As far as you could judge, was there anymore or less than you could have held in two hands of the gun−cotton, speaking approximately? − I would not like to say.
458. Was there a bucketful? − I did not see in the torpedo, but all the gun−cotton had gone from the stand.
459. Those hand grenades hold about two pounds? − I think not so much.
460. What quantity do you think?− I think about one pound and a half.
461. Was there any mark to distinguish those hand grenades, whether they had high or low tension fuses? − None.
462. You saw no dynamite amongst the gun−cotton, or anywhere on board? − None.
463. If it had been there, would it have attracted your attention? − I think so.

James Tubb, continued 28th March 1881

464. Do you know what became of the gun−cotton? − I did not see it.
465. You say the lid was sent to the armourer − did you see it when it returned? − Yes.
466. What condition was it in then? − It was fitted through, having the wire through the lid of the case.
467. Was there anything attached to those wires in the inside of the lid− did you see anything attached? − No not then.
468. Did you afterwards? − Mr. Groves attached the fuses.
469. You saw him do it? − I saw him do it.
470. Did you see anything attached to the wires inside the lid afterwards? − I saw Mr. Groves tying a disc of gun−cotton to the fuse before he put it on the lid
471. Did you see where that gun−cotton came from? − Yes, out of the hand grenade.
472. From off the table? − From off the table.
473. In what quantity? − I think about three pounds altogether.
474. Of gun−cotton? − Of gun−cotton.
475. Three pounds? − Yes.
476. Then there was more than one hand grenade opened? − Two.
477. Were the fuses high or low tension? − High tension fuse in the grenade.
478. What tension was used in the torpedo? − I think some manufactured by the electricians.
479. Do you know whether that was high tension or low tension? − I do not.
480. Did you see the lid fastened? − Yes.
481. Did you see anything put into the torpedo at that moment when the lid was about being put on? − No.
482. You are in full belief nothing was put inside? − But powder and the disc of cotton.
483. Nothing loose? − No.
484. You say you saw the lid fastened on? − Yes.
485. Did you hear any conversation just at that time with reference to any dynamite or gun−cotton being put in? − No.
486. And no one spoke about dynamite? − No, I never heard the word mentioned.
487. And you say you saw the lid fastened on − by whom? − By Mr, Groves.
488. How was it fastened? − By the two studs. It was then bound round with india−rubber tape to make a joint, and then afterwards there was red lead and canvas seized on with spun yarn.
489. After that, what more did you see with reference to the torpedo; did you watch its progress? − Yes.
490. Tell us what you saw after the lid was finished; what next took place? − Mr. Murray asked me if I thought it would float, and, by its weight, I said no, it would sink, and I suggested to put a float on the top of it, which he agreed to.
491. Will you describe the float? − A piece of broken target, about three feet long. Mr. Groves then lashed the torpedo to it with spunyarn, and then it was put into the boat.
492. By whom? − Mr. Groves and William Barnes.
493. Will you tell the Board how it was passed over into the boat? − Through the gangway. The torpedo was hanging under the boat.
494. There was no stop put round the torpedo? − The lashing.
495. Was it lowered by the lashing or by the buoy rope −state how it was lowered? − The mine was suspended about four feet from the float and passed by hand into the boat.
496. In what position was the 70 lb. cylinder in when it was lowered from the deck to the boat − on its end or its side> − On its side.
497. How high was the deck from the boat? − About two feet.
498. The float, you were understood to say, was horizontal with torpedo? − Yes
499. And the attaching line from the float to the torpedo was passed under the torpedo and up again to the float, allowing the torpedo to go alongside, how many feet from the float? − I do not think it was as much as four feet.
500. At this time were the wires joined up to the torpedo? − To the torpedo?
501. Was the firing wire attached to the torpedo on board before you began to put it into the boat? − It was; it was inside the line and must have been.
502. When the torpedo was lowered into the boat you say the firing line was attached, what line of firing line was there? − Eighty yards.
503. How do you know that? − I saw them measuring it off. Mr. Groves ran it off the coil by his arms.
504. A fathom line? − A fathom line.
505. Was that line coiled up and put into the boat? − On the deck of the *Cerberus* it was coiled.
506. It was not coiled up and put in the torpedo boat with the torpedo? − No.
507. Then when the boat went far away the firing line was paid out from the ship? − Yes.
508. And the end of the firing line was in the ship? − Yes, held by Mr. Murray.
509. Who had hold of the wire on board whilst the torpedo was being put in the boat? − Mr. Murray had hold of the end, and some of the electricians were paying it out as it was required in the boat.
510. Then where did the electricians stand? − Nearly in the centre of the ship.
511. Where was Mr. Murray? − Close by the binnacle stand.
512. How far was the binnacle stand from the battery? − The battery was down below in the after steerage.
513. And the distance from there was fourteen feet? − Fourteen feet horizontally and six perpendicularly.
514. Do you know how the battery wire passed from the battery to the deck? − Yes.
515. How did it pass? − Passed up through the scuttle. 516. In the deck? − In the deck.
517. Was that scuttle of brass, or what?− Galvanised iron. 518. It was all Hooper's core? − All.
519. Did you have anything to do with the working of the battery − did you see the battery placed in position? − Yes− the battery was in a wooden box.

James Tubb, continued 28th March 1881

520. Where was the box? − On the deck.
521. The wooden deck? − Yes.
522. Iron or brass stanchions? − Iron stanchions close by, but not touching.
523. How may cells were there in the battery? − Twenty−nine cells in the battery, one on the deck.
524. Was there any wire attached to the other end of the battery? − Earth.
525. What did that consist of? − Copper wire and copper plate.
526. Was that insulated wire or naked wire? − Naked wire.
527. Where was the copper plate passed? − On the end of the wire.
528. And overboard? − Over the port side of the ship.
529. In the sea? − In the sea.
530. What did you see done after it was lowered in the boat? − The boat was taken from the ship.
531. How many persons were in it − and who were there? − There were six altogether, namely Mr. Groves, gunner, who had charge of the boat; Mr. William Barnes, leading seaman; James Hunter, A.B., Henry Timberley, A.B., James Wilkie, A.B., and James Jasper, A.B.
532. How far did they proceed? − Between 70 and 80 yards.
533. Were you watching all the time? − Yes.
534. During this time, did you see the wiring being paid out? − I did.
535. Was there any strain upon the wire as paid out? − None. whatever, it was all slack. Mr. Richards, I remember, calling out to Mr. Groves that the wire was getting taut.
536. Was there any answer given? − They knocked off pulling, and laid their oars for and aft, and were backing the boat away from the ship with two or three oars.
537. Then, during this time, the wire was paid over the rail? − Yes.
538. What was that? − Galvanized iron rail.
539. The tide was running at the time? − Slightly, it was very nearly slack water.
540. Was the tide out or in? − The tide was running slightly.
541. Had that then a tendency to increase or diminish the strain on the wire? − To increase, if there was any strain on the wire.
542. Then that strain would be exerted by the friction on the rail; that is to say, the effect of that strain would be the firing line would rub upon the rail? − I do not think there was any strain on the wire at the rate the boat was going.
543. Not sufficient strain to cause any friction? − No.
544. Would the wire hold a boat of that kind? − Yes.
545. Had you changed your position from the time you saw the lid of the torpedo put on to the time when the boat left the *Cerberus?* − I might have changed my position, but I had not left the deck.
546. Had you gone away any distance, say five or ten yards? − No.
547.You maintained about the same position until the accident? − Yes.
548. When the boat stopped − now will you go on and tell us what occurred just at that time − what occurred on board the *Cerberus?* You say that Mr. Richards shouted out to Mr. Groves? − Yes, when the wire was getting taut; then they stopped rowing.
549. Was any answer given by Groves, or anyone from the boat? − He made a signal that he understood it; and then they left off rowing to put the torpedo over the side.
550. Between the time that Mr. Richards cried out, and the time the torpedo was placed over the boat's side, how long was it? − Not half a minute.
551.Did you hear any conversation on board during that half minute about anything? − No, we were watching the boat from the ship, and we saw they were in a mess. We saw the boat drifting on the top of the torpedo.
552. Will you describe, if you saw, how did the torpedo go over the side of the boat; was it lifted over? − Lifted over by the two after men in the boat. I could not tell who they were.
553. Did it go in with any splash, or did it appear to be put in carefully? − Carefully in the water.
554. Did you see the float? − I could not see the float or the torpedo. the boat was between it and the ship.
555. You only judged where it was? − Yes.
556. Then the torpedo was so heavy it overcame the resistance of the float, and took it down below the water? − We could not see it. 557. The boat came between you and the torpedo? − Yes.
558. Did you see anything over on that side − could you see the oars? − We could see the men putting the oars from aft forward; that would lead me to believe that the blade of the oar got between the wire and the lid of the case.
559. Were the rowlocks stationary? −They work on a pivot.
560.State what you saw? − Immediately the explosion took place?
561. You saw someone attempting to relieve the wire from the oar? − Yes. 562. Who was it? − I think it was Wilkie.
563. Endeavouring to remove the oar from something you thought was a bight in the wire of the torpedo? − Yes.. and immediately after that I saw the explosion.
564. Were they still leaning over, as if to disentangle the torpedo, when the explosion took place? − Yes, they were all leaning over the boat's side. I saw the body of Mr. Groves about fifty or more feet in the air, and fragments of the boat, and remains of the other men.
565. Will you take your mind back again on board, at the time of the explosion− Were all of you standing in much about the same position and place as previously described? − Nearly all.
566. Immediately upon the explosion taking place, can you tell what followed on board. What was said amongst yourselves? − I heard Mr. Murray call out, "My God, Huysmans" (the engineer in charge), "how did that occur?"
567. Did he address it to anyone, or was it an exclamation? − Mr. Huysmans was standing close by him.
568. Was anything said then? − Immediately I left to get a boat out.
569. And you heard nothing more? − No. 570. You heard no answer to it? − No.

James Tubb, continued 28th March 1881

571. But you left immediately after to do what? − To get a boat to go towards where the explosion took place. 572. Who placed the battery in position? − Mr. Groves and Mr. Schrieber.
573. When did they place it in postiion? − On the Saturday morning about half past nine o'clock.
574. Who attached the wire to it? − I do not know. I saw Mr. Groves filling the cells; and I suppose he filled the cells, but I do not know.
575. You say you have some little knowledge of these matters − have you any particular opinion of your own as to the cause of the accident? − I thought there might be a possibility of the fuse being broken −−− the top of the fuse being broken by the treatment in the case, which was not properly filled. I thought there might be a probability.
576. By the movements of the contents of the case? − By the movements of the contents of the case. The fulminate and the acid of the gun−cotton, I thought, might cause an explosion. 577. Can you tell the Board what caused the accident unless the acid of the gun−cotton could ignite the fulminate? − No.
578. If that would not do it, have you any other theory? − I do not think that the treatment the mine received would be sufficiently harsh to light one of those fuses. 579. From what you saw of the group of persons about where you stood, is it in any way possible that contact might have taken place in some hurried movement? − I do not think so; I think the deck was very clear − then ends of the wire, and all that, and nothing to cause a circuit.
580. You have told us about the officers about you − were there any strangers there at that time? − None; they had left the ship. There had been some, but they had all gone from the ship. They left with the captain.
581. Were all the men employed steady and perfectly sober − no hilarity going on? − None. They were selected under Mr. Groves's direction. 582. Was anybody the worse for liquor on board all that day? − No one, I am certain.
583. All sufficiently steady to be well up to their business? − Yes.
584. You can speak positively from your own observation? − I can. 585. They had luncheon when? − At twelve.
586. Had they anything to drink between that time and five o'clock? − Not that I know of.

The witness withdrew.

Mr. Kynaston L. Murray sworn.

Mr K.L. Murray, 28th March 1881

587. What office do you hold? − Telegraph Engineer of the Victorian Railways
588. What position do you hold in the Naval Corps? − Chief Electrician.
589. Will you inform the Board where you studied the work of an electrician? − As connected with torpedoes only in Melbourne, in connection with the Naval Torpedo Department. 590. Under whom? − Under Captain Mandeville.
591. Was that prior to your being appointed to the Naval Torpedo Corps? − No, since.
592. Begin at the beginning, and please inform the Board as to where you obtained your knowledge appertaining to electricity, and all that? − If I begin at the beginning, I began under Mr. McGowan, the superintendent of telegraphs in Melbourne, and I have been in Tasmania, where I was in charge of the telegraphs at the time of the first submarine cable across Bass's Straits. 593. Your knowledge of electricity, then, has been obtained in the Telegraph Departments of the colonies? − Yes, quite so. 594. Commencing how many years ago? − About twenty−two. 595. And you have been connected with it ever since? − Ever since.
596. How were you appointed to the Torpedo Corps, and when? − I was ordered by the Commissioner of Railways, in 1878 or 1879, to undertake the electrical duties connected with the torpedoes, under Captain Mandeville.
597. Then, up to that time, you had no experience with torpedoes? − None.
598. Since your appointment, have you had much torpedo practice? − Yes, our practice has been to meet every Monday evening for theoretical work, I might say, and every alternate Saturday for out of door practice.
599. Can you say how many? − Six besides myself and Mr. Groves. 600. Does that include the whole of the electricians in the Torpedo Corps? − Yes. 601. You made use of the word "theoretical" work − what do you mean by that? − Papers would be read upon batteries and upon circuits, upon the different parts of torpedo works or junction boxes, and everything connected with torpedo work, and a discussion would take place.
602. Papers by whom? − By different electricians. I think I have in my pocket a syllabus of the present quarter's work, which may answer the purpose. [*producing the same, which is as follows:−−]*

TORPEDO SUBJECTS

Date	Subject	Treated by
1881		
January 31	Chemical Experiments	Mr. Murray
February 7	Notes on Fuses: High and Low Tension, and Mechanical ...	" Doyle
" 14	Magnetic Exploders ...	" Mahler
" 21	Batteries − Firing and Testing, Heating Effects ...	" Murray
" 28	Static Electricity. The Electrometer ...	" Schrieber
March 7	Galvanometers ...	" Beatty
" 14	Locomotive Torpedoes ...	" Haysmans
" 21	Mechanical Appliances, Cases, Disconnectors, &c ...	" Houston
" 28	Guns and Gunpowder ...	" Groves
April 4	Explosives: Gun−cotton and Dynamite ...	" Holmes
" 11	Electrical Testing, and *resume* of work done ...	" Murray

Mr. K.L. Murray, continued 28th March 1881

603. A syllabus such as you now produce? − Yes.
604. At the time you had those papers read were any small experiments made? − No. 605. Then when did you perform practical experiments? − On Sunday afternoons.
606. Where? − Principally on the hulk, and sometimes down the Bay, in a boat.
607. On each of the days when you have had experiments performed, have you had any mishaps at all? − No.
608. Never? − No.
609. What was the nature of the practical work? − A complete torpedo would be got on deck, for example, with sinker, its connecting chains − its buoy and everything belonging to it. Joints would be made in the cable, and all the different parts would be connected together, and then taken to pieces and put back in its place. That would be one lesson for example.
610. Did you explode any of those? − Sometimes. I do not mean that we ever exploded one of the large torpedo cases, but that we sometimes exploded a small quantity of gun−cotton at our practices. Another example is, when we went down the Bay, and we were to lay a line of mines − say three or four, or five or six sometimes − and exploded each or all of them at will.
611. That was in a boat? − Yes.
612. Then you had a battery in the boat? − Yes.
613. What cell battery would it be? − Generally, perhaps, from ten up to thirty.
614. Where, in those cases, did you get the explosive material from? − From the hulk.
615. In the usual way? − Yes; I used to tell Mr. Groves before − a few days beforehand − what I proposed to do, and he would prepare everything. We used to explode little tins, containing from an ounce and a half of gun−cotton up to a pound.
616. Did you ever use dynamite? − Yes. 617. In what form? − In the form of little cartridges.
618. Did you ever use it along with gun−cotton? − No. I may explain with regard to the dynamite, that about twelve months since, a firm in Melbourne wrote to Captain Mandeville recommending him to purchase a lot of dynamite for torpedo work. Captain Mandeville asked my opinion about it, and I reported strongly against having any dynamite.
619. You say you used dynamite occasionally? − Only on one series of experiments.
620. Why did you obtain the dynamite.? − Oh! a few pounds − five pounds, I think, of dynamite was obtained to try it.
621. From whom obtained? − I do not know.
622. Was it obtained under your advice? − No; but if I had been asked I would have offered no opposition. I was quite prepared to try it, and when it was there I was just about that time experimenting with some fuses. That was about a year ago, and I tried a few cartridges of dynamite, more for the purpose of testing the fuses than testing the dynamite, and after that, when we were going down the Bay, I told Mr. Groves I wanted a few small mines made, he said, "There is some of that dynamite left." Mr. Groves suggested that one of the little experimental mines should have the dynamite in, in order to get rid of it. We did not want it any more. We had done all the experimental work with it, and it was put into the mine, as I thought, all of it, and exploded.
623. In the experiments in the Bay which took place twelve months ago? − Yes.
624. Where did the dynamite come from? − I do not know with certainty; it came, I think, from a firm of merchants in Melbourne.
625. In whose possession was it? − It went direct to the hulks, I should say.
626. Who was it that supplied the dynamite? − I think McLean Brothers and Rigg. I do not know with absolute certainty.
627. It was at the hulks? − Yes, nowhere but the hulks.
628. Was it accounted for in the books? − I know nothing about that. I know nothing about the books. The explosives were all in charge of Mr. Groves and the books as well.
629. This dynamite came on board after you were appointed in charge of the Naval Torpedo Corps? − Yes.
630. Would you give an order to the hulks to deliver over to one of your men so much dynamite? − No; I would tell Mr. Groves that I wanted certain little mines made, and he would make them on board the hulks.
631. Did you not know what he put in them? − I told him what to put into them. I certainly did not see them filled, not one that I know of.
632. You placed implicit confidence in Mr. Groves carrying out your orders? − Yes. I should have no more thought of seeing what was in one than the captain of a ship seeing what was put in a gun to fire. I told Mr. Groves what to put in, and I presume he put it in.
633. Then the conversation of Mr. Groves in the boat with you, in reference to that dynamite, was with reference to the balance he had in use? − It was not in the boat, I sent for him to my office, and told him the arrangements I wished him to make for practice.
634. Then the last experiments you had in a boat with Mr. Groves you were under the impression that the explosives contained the remnant of dynamite? − Not the last one.
635. When? − I cannot say when, but one of them.
636. You believed all the dynamite had been expended by the experiments in the river? − Yes. I was going to lecture a short time ago, and I told Mr. Groves I wanted a small bit of dynamite, and he said he had not got a bit. He said it was all gone.
637. You do not know of dynamite coming on board the hulks subsequently? − No.
638. Did you ever see any torpedo practice from off any vessel before that of the *Cerberus?* − Yes; once.
639. Where? − From off the *Nelson.* 640. The *Cerberus* is an iron−plated boat, and the *Nelson* wood?− Yes.
641. Did you assist in the experiments? − I did.
642. In those experiments you had on board the *Nelson*, were they small ones? − I do not know what the contents were. All I had to do with them was to connect the battery to the firing line.

Mr. K.L. Murray

643. Did it go off successfully? − Yes.
644. Where was the battery on the *Nelson?* − At the hulk, from which a cable had been laid to the *Nelson* the day before.
645. What occasion was that − how long ago? − It was very shortly after, within a month after I first had anything to do with torpedoes.
646. Was that during some party on board the *Nelson?* − There were a lot of people there.
647. There were some visitors there? − Yes.
648. Could you tell us whether upon any occasion in the river there was some premature explosion? − Not that I am aware of. Not during the time that I have had anything to do with it. I do not know that I ever heard of it.
649. Can you say whether it is usual for experiments such as that which occurred lately on board the *Cerberus* to take place from off vessels? − I cannot say, but I believe it is.
650. Are you aware there are such things as stations to explode from? − Yes. but I know no reason why they should not take place from a vessel like the *Cerberus.*
651. Where are those stations fixed for the purpose of making the experiments from? − They are generally in a fortification − the firing station you mean.
652. We have had evidence of certain stations. Do you know how they are made. We have been informed there are stations in certain places that are away from the vessel where the batteries and the material is taken to? − The fortifications − that is to say, where they are kept for safe keeping.
653. Do you know whether they are constructed for the purpose of fixing the batteries? − For convenience sake, there is always a room with all the necessary paraphenalia, into which, for convenience sake, they are put; but there is no reason why they should not be on board ship.
654. We have information as to place on shore from which torpedoes are fixed; what we want to get at is this − is there not a possibility of a leakage taking place of the electricity on board the vessel, from not being properly insulated? − No more than anywhere else.
655. As put against the stations? − Certainly not. I do not admit that.
656. Do you think there is a possibility of the insulation not being perfect on board an iron vessel ? − Of course there is.
657. Is it possible that the vessel itself might be made part and parcel of the battery by the want of insulation? − It is possible but very improbable, indeed so much so that, as far as I am concerned, I say impossible.
658. Why? − Because I should take good care to see that the wire had proper insulation around it.
659. The question is this − in case of leakage arising from non−insulation on board an iron vessel, it is not possible that the vessel may become part and parcel of the circuit by reason of the leakage? − Yes, but we are speaking of a station on shore, properly constructed, with a view to its permanent use, and we are speaking now of a ship which is not constructed for the purpose, and it is only used on a particular occasion. If you go on the sea−shore and improvise some torpedo practice there, you will not be a bit safer from that leakage than you would be on board a ship, and the effect of the leakage would be to prevent the battery current from reaching the mine.
660. You make distinction between the electricians and other members of the Naval Corps? − No, pardon me.
661.How many members are there in what is known as the Torpedo Corps? − Beyond the seven.
662. It consists of seven electricians? − Yes.
663. Have you been sworn in under the Discipline Act or the Volunteer Statute? − The Naval Discipline Act.
664. Then you are a paid officer? − I am a paid officer.
665. You are then liable to be called out by the commandant officer at any time, and are bound to go? − Yes, and act under orders. I am not a volunteer in any sense.
666. Have you any official regulations for the conduct of the Torpedo Corps? − Only the general regulations for our own guidance.
667. Have you any drill regulations? − Do you mean company drill?
668. You have no torpedo drill book, have you? − No
669. There is no standard drill book? − No.
670. Are you aware of any Imperial regulations, bearing upon the Torpedo Corps? − I am not.
671. Do you know of any instructions or drill pursued by other nations in relation to the Torpedo Corps? − Yes, and if we were going to lay down large mines − for example, one containing 250 lbs. of gun−cotton, with all the large appurtenances belonging thereto − we should have the necessary men and go through the regulations in that way. These regulations refer to the laying, testing, and firing permanent torpedoes, and not to extemporised work, which must be done according to the circumstances of the moment.
672. Have you done so? − No. We never laid one.
673. What is the largest mine ever laid down? − Full of explosives, do you mean?
674. Yes; was the Queenscliff one the largest? − Yes.
675. Have you ever laid any mines in either of the channels? − No.
676. Not in either of the channels? − No.
677. Do you know the rate of current in the West Channel? − I forget the exact rate, but five to six knots I should think.
678. At Queenscliff? − Yes, in the West Channel.
679. You were never at sea as a sailor? − No. *The Witness Withdrew. Adjourned until Tomorrow at Eleven 0'clock.*

Tuesday 29TH MARCH 1881.

Present:

Joseph Bosisto, Esq., M. L. A., in the chair;

R. J. Ellery, Esq. S.W. McGowan, Esq.,

J. Cosmo Newberry, Esq., Captain J. Phelan.

Mr. Kynaston L. Murray further examined.

680. Yesterday you said that in 1878 or 1879 you were ordered by the Minister of Railways to take charge of the torpedo work− can you be more specific and state the exact time.? − I think September 1878. Order dated 9/9/79, but it was not until the January following that I commenced duty and obtained the assistance of the six electricians.
681. You submitted yesterday a syllabus of subjects that were discussed once a week among the Torpedo Corps? −Yes.
682. With reference to the names attached to each subject, were those gentlemen supposed to be experts in the subjects they were going to read the paper upon? − Rather the opposite. I wanted to give a man a subject to get up that I thought he might be rather shady upon, so as to cause him to read books and go into authorities, and his paper would be thought over and discussed by the whole of us.
683. Those subjects were more for educational objects amongst one and another? − To fit the gentlemen for their duties.
684. "Chemical experiments," I see, is the first item on the syllabus selected for yourself to speak upon? − Yes, that had reference almost entirely to gases and the way in which oxygen and hydrogen gases are used in explosives, and also the effect they have upon batteries.
685. Had you received any particular chemical knowledge before you commenced your torpedo work? − Generally, I had heard lectures and read books.
686. You were not at any school? − No. A good many years ago I did a lot of experiments with Dr. Mac Adam.
687. But not as a pupil? − Not as a regular pupil. At the time I was fitting myself to take charge of the Tasmanian telegraphs, and I thought it was proper I should have more knowledge of chemistry than I possessed.
688. Did the Torpedo Corps attend regularly when any of those papers were read? − Yes, most of them being present.
689. And discussions followed? − Yes
690. From the discussions that followed then, you, as head of the Torpedo Corps, think they were getting full information and furnishing themselves in the knowledge of books that is necessary to be understood as members of the Torpedo Corps? − Yes, to fit them to act as officers.
691. You went on board the *Cerberus* on the Friday? − Yes, about nine o'clock on Friday the 4th instant.
692. Was that under instructions? − It was by the request of Captain Mandeville.
693. Verbal or written? − Written by the paymaster and secretary of the department.
694. Have you got the document with you? − No.
695. What was the nature of it? − Something of this kind− "Captain Mandeville desires me to inform you that he proposes to take the *Cerberus* down the Bay for big−gun practice, and would be glad" − or something to that effect− " if you could, or some electricians could accompany him, with a view to having torpedo practice at the Heads." That was the substance of the letter.
696. Signed by whom? − By Mr. Thompson,the paymaster, who acts as captain's secretary.
697. When you went on board what was the first thing you did bearing upon the torpedo work −− did you go to see if everything was all on board? − No, I did not.
698. Had you already assured yourself that everything was there? − I had already assured myself that everything was there.
699. At what time did the *Cerberus* leave her anchorage on the Friday? − A little after 9.a.m.
700. Were all the Torpedo Corps with you?− No.
701. How many ? − Two.
702. When did others come on board? − Only one other; he came on board at Queenscliff −− that was Mr. Doyle; I only had three with me including Mr. Doyle.
703. On the Friday after the *Cerberus* was steaming down the Bay, what did this Torpedo Corps do? − Nothing.
704. When did they begin to do anything? − On the Saturday morning, nothing in the matter of Torpedo work was done on Friday. We had the electric light on Friday night
705. After you had anchored? − After we had anchored opposite Queenscliff.
706. For what purpose was that electric light displayed? − To practice.
707. Then during the whole of Friday evening everything went off satisfactorily? − Perfect.
708. Did you remain on board all night? − Yes.
709. And then in the morning what time did the men commence, work? − After breakfast, about nine in the morning.
710. Did you have any programme of the day's work? − Yes.
711. Have you got that programme with you? − No, I gave it to Mr. Groves, but I can recite it from memory.
712. Have you got no copy of it? − No.
713. Do you think it would be forthcoming? − No, I hand in my rough notes;− [*The witness read the same.*]
714. They were written at the time? − Yes, during the day. My first memorandum is this− "February 21st, arranged with Groves what was wanted for the *Cerberus* down the Bay mile cable (the four old short ends), four buoys, circuit−closers, with sinkers, ropes, chains, &c.; junction boxes, with disconnectors fitted; Hooper's core−boat battery, small charges in tins, firing −key, differential and thermo, with little platinum wire; testing battery and detector, indiarubber tape and solution, flags lamps and heliographs."

Mr. K.L. Murray, continued 29th March 1881

715. Was that all the programme that was arranged?− Yes.
716. Was there no special programme arranged by you and given to Mr. Groves before the beginning of any experiments before that date? − Yes, there was; I gave Mr. Groves a programme on the 21st. I gave him a sketch.
717. Is that sketch forthcoming? − No.
718. Was the sketch you gave carried out by Mr. Groves and those under your control? − It was.
719. Did you remain on board conducting the experiments necessary all the time on Saturday? − I did.
720. Who conducted the experiments on the water in the boat? − Mr. Groves.
721. Who besides was with him? − Mr. Houston was with him to signal. He simply had the boat's crew.
722. The boat was under Mr. Grove's command? − Yes
723. And Mr. Houston was the one to signal you? − Yes.
724. About the signals − are the signals prepared under a code? − Yes, that is, they are the ordinary Morse's signals.
725. There is no difficulty therefore in understanding signals? − None whatever to those who are skilled.
726. All the signals that were given prior to the accident were correct? − Yes.
727. No error made? − No error made.
728. You commenced experiments, or the practice, or whatever you may term it, at nine o'clock on Saturday morning? − Yes.
729. What was the first thing done? − The first thing done was to get the different apparatus in certain positions on the deck− that is, in accordance with the pre−arranged method of laying them.
730. Which was all under your personal superintendence? − Yes. The joints were made in the cable, the junction boxes connected to it, and little mines placed in their proper position, and the circuit−closers and buoys in theirs; all laid out on deck.
731. Then all those joints and those arrangements were made by electricians? − Yes, by Mr. Schrieber, Mr. Houston and Mr. Groves.
732. And no one else had anything to do with it? − No.
733. Then what followed? − The circuit −closers were tested, and the firing battery tested. The firing battery, I think, was placed in position on the lower deck earlier in the day− that is, the cells were empty previous to that, and they had to be filled with solution, that is, the firing−batteries were charged and placed in position and tested. That took up all the morning, and then we had lunch; after lunch a large cable and the apparatus were placed in a boat, under Mr. Grove's personal superintendence, who was going to take them out and lay them. I do not think I missed anything of that − when I say I saw it all, I do not mean to say I saw every bit of wire twisted, but it was done under my personal superintendence. Then the cable and other apparatus was placed in the boat − the sinkers, however, were put in another boat, not the boat with the cables. Then a third boat took the cable boat in tow and pulled it away towards the shore, and the whole was laid as arranged.
734. Was this a branch series or a continuous series? − It was a branch series, (*The witness illustrated the same by a diagram)* As soon as the apparatus was placed I received a signal telling me so. I then attached the cable wire to the firing key, signalled back to the boat to Mr. Groves, that I had done so, and told him to bump the circuit−closers − that was done. I then told him to pick up the extreme end of the cable and fasten to it another small mine which he had with him for the purpose, and return to the ship.
735. At what hour was that? − Say, four o'clock, as near as I can state; when he was near the ship I fired that mine − my object was to test the disconnectors.
736. What did the last mine contain?− It contained about a pound of gun−cotton.
737. Will you tell us, now, where the end of the cable was during the time the boat was taking the mines out? − The cable was fastened to a bolt or a stanchion on board the ship, so as to prevent it going out too far, and the end brought up on to the binnacle stand and connected through a one−cell battery galvanometer.
738. Was it Hooper's core or an armored cable? − An armored cable.
739. Your battery was for testing for continuity? − Yes.
740. Then all the portion of the first day's work was finished? − Yes
741. You say that the thing was joined on to one cell of the firing battery, the galvanometer battery for testing for continuity.? − Yes.
742. Was that before you fired? − Yes.
743. But where was the cable just prior to the firing? − At the same place, only it was taken from the galvanometer and joined to the firing key.
744. The boat still being in the neighbourhood of the torpedoes? − Yes, still in the neighbourhood of the torpedoes.
745. The charges being so small, there was no changes to the boat? − And being under six feet of water, and not having more than one ounce and a half of charge.
746. You say you tested the strength of the battery? − Yes
747. What did the deflection show? − The test showed me that the battery would fire a fuse over fourteen ohms distance.
748. What was the resistance of the firing circuit overboard? − Ten to twelve ohms − it would be ten ohms without some joints, and I calculated those joints would be about two ohms.
749. Were these experiments performed in the channel? − About a mile off Queenscliff, or a mile and a quarter.
750. What was done after the third mine was fired by this system? − I signalled to Groves to put on an extra mine at the end of the line, that is, the fourth mine.
.751. What did the mine consist of? − About one pound of gun−cotton.
752. How was the end of the firing line placed at the time you were connecting them? − It was on the firing key.

Mr. K.L. Murray, continued 29th March 1881

753. The disconnection then between the battery and that mine was the safety−catch of the firing key, was that mine fired all right? − Yes.
754. Were the remains of those things removed afterwards? − Yes.
755. The circuit closers were still attached at this time? − Yes.
756. After all these mines were fired, according to your programme, the circuit buoys and cable were left in position? − Yes, with the end of the cable on board.
757. When did the boat return? − About 4 o'clock in the afternoon.
758. That boat which contained Groves and the seamen? − Yes.
759. When they arrived at the *Cerberus*, what then took place between you and those men? − Mr. Groves asked me if he should take up the cable, I said yes, and instructions were given by Groves accordingly to take it up, and it was taken up,
760. Was it taken up immediately? − It was commenced to be,
761. Did the boat then leave? − Yes, it left to take up the cable.
762. Groves remaining on board the *Cerberus?* − Yes, that is it.
763. When did they return? − Late in the evening, after the fatal explosion.
764. And they returned with the cable after the fatal explosion? − I think that, yes.
765. Was the cable in the sea and the end of it attached to the ship until after the fatal explosion? − Certainly not. They commenced to pick it up from the ship.
766. They took it from the ship end of the cable? − Yes, under−ran it into the boat. This would be about half−past four o'clock.
767. Were any further experiments suggested on board the *Cerberus?* − Yes; that is, practice −−− experiments I would hardly call them. When Groves came on board I was examining the contents of a small hand mine which had been intended to be exploded by being thrown overboard, but it did not go off, and I was examining its contents. Groves asked me what was the matter. I showed him the gun−cotton that was in the hand mine was wet, and that it contained a high tension fuse. I said I would like to fire one − to make one go, so I asked him to put a low tension fuse into the one with a little gun−cotton, and fire it. This he did.
768. How many hand grenades were there? − Some five or six. I think six.
769. How many were exploded in this way? − Only one, and four or five remained.
770. The mine did not exploded with your battery in the first place because it was a high−tension fuse? − Yes
771. Had you no mark to show if the hand−grenade is made up with high or low fuses? − Yes.
772. What are the distinctive marks? − It would be marked with a bit of pitch or something black underneath if it was high−tension.
773. Then this was known to be high−tension fuse? − It was suspected, but not with certainty, as the mark had been rubbed off. It had been made along time since; in fact, I did not know it existed until the morning of the Saturday.
774. This one that you opened and inserted the low−tension fuse in, what did it contain? − It contained three or four small discs of gun−cotton.
775. Were they damp? − They were wet.
776. Was that wet there from accidental causes, or was it caused intentionally? − Accidentally. It was not wet from the immersion at the moment; it must have been some previous immersion.
777. How did you come to that conclusion? − It was only in the water a moment or two, and the gun−cotton would not have saturated so quickly; and besides that, inside the tin were little rust marks, showing that the tin had been wet for a considerable time.
778. There was no water in the tin? − No water, in fact, it was sweating.
779. What became of the balance of the grenades? − I told one of the electricians to open them and let me see what was inside them.
780. How many? − I saw three opened, and in the third the gun−cotton was dry.
781. Where was the material put that was taken out of those grenades you were examining? − On the binnacle −stand. I believe the contents of all five or six cases were placed on the binnacle stand. I did not see it, but I believe so.
782. You saw those three hand grenades opened? − Yes.
783. And they contained nothing but dry gun−cotton? − I do not think they did. I saw nothing but dry cotton and the fuses.
784. You really saw nothing but gun−cotton − what size discs were they? − Half−ounce, or in other words inch discs.
785. There were still one or two hand−grenades unopened? − Two or three.
786. Where were they put? − Down on the deck under the binnacle− stand. They were opened, but I did not see the contents of them.
787. There were five or six opened, three of which you saw, containing what? − Gun−cotton, and nothing else that I saw.
788. The others that were opened were of the same kind, but you did not see the contents? − I did not see the contents.
789. Were they made by the one man? − All made by Groves.
790. The ones that were opened were taken at random? − Yes.
791. So that it was not likely that the others you did not see opened would contain anything but gun−cotton? − Certainly not; the third one a little distance out was thrown over. That was the one we exploded.
792. Had you inserted into that the low−tension fuse? − Yes.
793. And fired by the battery? − Yes.
794. Had you any high−tension firing apparatus on board? − None.
795. What would be about the total amount of gun−cotton placed on the binnacle table? − Six to eight ounces.
796. Can you account for wet material coming on board the *Cerberus* for experiments? − I cannot. I only know what Mr. Groves told me.

Mr. K. L. Murray, continued 29th March 1881

797. Do you know the number of similar hand−grenades you had in stock? − We have not any. Mr. Groves told me that he had made them some long time ago. and he brought them on board thinking they might be utilised.
798. Do you know where those hand grenades were kept before he brought them? − On board the hulk I suppose.
799. And they would be brought out of the magazines? − Yes I presume so.
800. If a mine of any size was used in experimental purposes or exercises and failed to explode, is it usual to put that back into stock? − No; I would not put it into stock at any rate. 801. Is it not quite against the rules? − Quite.
802. Who would be responsible for putting back a charge of that kind in stock? − I do not know, really; such an occurrence has not happened. I do not think it would be put back in stock.
803. According to your evidence, they must have been in the water before? − Yes.
804. At some previous experiments probably? − No I think the high−tension fuses had been put in with the intention of using them, but they had not been used because Groves had not any high−tension apparatus to use with them.
805. How could they become wet? − I have not the least idea.
806. Are you confident there was nothing else in the hand grenade you saw opened besides gun−cotton? − I did not see anything.
807. Is it usual to put anything else in a hand grenade? − No.
808. Is it usual to put gunpowder in along with the gun−cotton? − I never knew it done.
809. From your experience you know that gunpowder will deliquesce if exploded? − Yes.
810. Did you look into the hand grenade and see if there was anything like the remnants of gunpowder? − No.
811. You saw rust? − Yes. 812. But you saw no remnant like charcoal? − No.
813. You do not think gun−cotton would have been put in wet when the grenade was made? − Certainly not. It would be put in dry.
814. Could air get into the hand grenade? − Yes. I say it could get in as water got in, but it ought to be proof against air and water.
815. Then you cannot account how that the inside of this hand−grenade should be damp? − No; I only know it must have been under water some time.
816. Did it come direct from the Footscray hulk to the *Cerberus?* − Yes, I suppose so.
817. How long was it on board? − Not more than forty−eight hours.
818. Have you any reason to believe that any of those hand−grenades came in contact with water, either salt or fresh, after leaving the hulks and coming on board the *Cerberus?* − Certainly not.
819. Was there ever any gun−cotton on board containing nitrate of silver? − No, nor nitrate of potash.
820. Do you think it possible that the tin might have been wet at the time the hand−grenade was made? − I do not think so.
821. Your belief is, then, that those hand−grenades had been overboard for experiments? − They had been over board, but what for I cannot say.
822. Was there any other reason for their being put over board. What is the conclusion you arrived at when you found those hand−grenades wet? − I concluded they had been in the river sometime, and I was going to ask Groves when and why.
823. Was there any reason why they should be put into the river? − No; I want to know whether he had been carrying out experiments on his own account or not.
824. Was he allowed to carry out experiments on his own account? − I think so.
825. At the hulks? − I know nothing against it. He was in charge of the hulks and he had no orders not to do so.
826. Do you know whether Groves from time to time performed experiments by himself? − I do not.
827. Have you ever had any information from anyone that he did? − Yes.
828. How did you get your information that he did perform such − who told you? − I do not know.
829. in course of conversation? − Yes, in course of conversation.
830. There would be nothing wrong in his making experiments? − Certainly not.
831. Could you tell us whether Mr. Groves was at all addicted to chemical experiments? − I am not aware that he was.
832. The gun−cotton was laid upon the binnacle, did you particularly examine it after it came out of the hand−grenades? − I did not.
833. Then you can give no evidence as to whether it was salt water or fresh? − No.
834. Can you say whether anyone tasted it as a test? − I cannot say.
835. Will you go back to the time of the operations of torpedo practice −− what led to the under−taking of the torpedo being made which exploded? − The first I recollect was Captain Mandeville asking me if I had not a larger torpedo to explode, and I said "No, we have not any larger torpedoes with us." or something to that effect. Then Mr. Groves said, "There is plenty of powder on board." I remember his remark well; and Captain Mandeville told him then to charge a torpedo of about fifty pounds of gun−powder. 836. You heard this? − Yes, I heard it.
837. Did Captain Mandeville say anything that you heard more? − No, not that I heard.
838. Was it then decided where it was to be fired from? − Not then.
389. What did Groves do? − The next I saw was the torpedo being brought on deck − that is, the case with powder in it,.
840. Consisting of how much? − Seventy pounds weight, I am informed. I saw that it was nearly full − within 3 inches of the top.
841. Did you see the torpedo made? − I did not see the powder put in.
842. Did you see it completed? − No, I did not see all that was done then. I saw the torpedo shortly afterwards with some gun−cotton in it; some discs of gun−cotton on the top of the gunpowder loose.
843. Did you see it put in? − No.

Mr. K. L. Murray, continued 29th March 1881

844. What more did you see? − I said to Mr. Groves that I thought he would get enough dry cotton to put on the fuse, and I saw him tying some pieces on.
845. The pieces of gun−cotton you say were tied on the fuse; why was it tied on the fuse? − I did not ask him, but I know quite well why, because he had to break up those discs of gun−cotton to get the driest, and then it would not stick on.
846. There was no one complete disc. Was any force required to place on them? − No, on the contrary, it went on too easy.
847. After you saw the fuse fastened on, what did you see next? − I saw the lid put on.
848. Did you see any gun−cotton remaining on the binnacle stand? − No, it was all gone from the binnacle.
849. Had you any idea where the remnant was? − In the torpedo, I presume; that is what I believe.
850. Did you see the gun−cotton in the case just prior to the final putting on of the cover? − Yes.
851. Did you see sufficiently clear to see if any dynamite was in? − No, I did not.
852. You saw the lid put on? − Yes
853. Who put it on? − Groves.
854. Did he fasten it ? − Yes, I saw him doing it.
855. How did he fasten it? − He commenced to put some pieces of indiarubber tape round it, and then it was suggested that some white and red lead would be the quickest way and the best way to seal it up, and accordingly one of the engineers got some and put it on a piece of canvas or cloth and lashed it round the crack at the junction of the torpedo and the lid.
856. There was no crack in the case? − No.
857. Did you see Mr. Groves join up the fuse and the lid? − I did not.
858. It was a low tension fuse? − A low tension.
859. Who tied on the ends of the rubber tubes? _ I think he did; Mr Houston may have assisted.
860. Was there a join made near the torpedo with the firing line, to attach the firing line, or was the firing line continuous with the fuse? − I think − I am almost certain − it was continuous, passed through the lid and fastened to the fuse inside.
861. No joint outside? − No joint outside. I may be mistaken, but I do not think I am.
862. Who amongst those who witnessed that would be likely to give the best evidence as to what was inside? − Mr. Houston, who was assisting Mr. Groves, more than anybody. else.
863. You say Captain Mandeville said to you "Have you got a larger torpedo?" − and my answer was "No."
864. And you then were ordered − he may not have used the exact words. but that is the meaning of it , he may have said "cannot you fire a larger one." You are understood to say that the suggestion was made to Captain Mandeville by Mr. Groves that there was plenty of powder on board the ship? − Yes.
865. Can you give the reason for using this larger torpedo? − No, I looked upon it as practice.
866. Who was around Captain Mandeville at the time? − I do not think anyone was about us. I do not remember anyone near.
867. You mean no one but the officers of the ship? − I do not know that any one was within a few yards of us.
868. Was there much conversation at the period between the visitors and the officers of the ship? − I cannot say. I was engaged in my own work.
69. They did not interfere with you? − No. I wish to say emphatically, I did not see more than five visitors on board the ship at any time, and when the explosion occurred there was not any stranger on board.
870. Were those ladies and gentlemen visitors? − Yes.
871. Were they ordinary visitors from the cliff? − They were friends of Mr. Collins and Captain Mandeville I think.
872. They were not men of experience in naval or torpedo practice? − Captain Harrison was one. He was on board. He was the only one I knew by name or in any way.
873. Then your impression was that, when the torpedo was ordered, it was for further practice? − Yes.
874. What particular practice was supposed to be got out? − I had an idea of going in the boat at first with the view of attempting to see if I could feel the effect of the explosion fifty feet off from the explosion through the water.
875. If you had an idea of testing the shock in the water at a certain distance − what distance below the surface was it arranged to submerge this mine? − About two feet.
876. Would not the placing of the mine at a depth of two feet have the greatest effect in throwing up a vertical column of water rather than giving a lateral shock? − Yes, it would. That was what I wanted to do.
877. This is the largest torpedo you have ever exploded? − Yes.
878. The heaviest charge? − Yes.
879. You had not previously seen the effect of a similar charge? − No.
880. What was the largest charge you had seen before this? − Nothing approaching it.
881. You saw the torpedo and the lid fastened on? − Yes.
882. Go on and tell us what more was done with it ? − Then a piece of wood was brought, to act as a float.
83. Did anyone suggest that? − I do not know. It was the natural course. The wood was about eight feet by six inches by two inches.
884. Did you see that wood, which was to be the float, attached to the torpedo? − Yes
885. It was attached by means of slings? − Yes
886. Did you say anything with reference to the float? − Yes. Mr. Groves was lashing it close to the torpedo, and I told him to lengthen the slings, so as to be two feet from it.
8 87. Did you say anything more? − I do not think I did.
888. Did you think the float was sufficiently large and buoyant to maintain the torpedo in the position you required? − Yes, I thought so.
889. Did you know the specific gravity of the gunpowder? − No.

Mr. K. L. Murray, continued 29th March 1881

890. Could you tell us when this torpedo was made up what was the position of the firing line? − It was laid on the deck coiled.
91. Had this firing line been used before during the day? − No.
892. Had you tested this firing line for insulation? − No, it was a new line.
893. Had it been used before? − It may have been used before.
894.But it had not been tested for insulation? − No, it had not, that is, with instruments.
895. Did you see the torpedo and the float placed in the boat? − Yes.
896. Was the wire attached to the fuse then? − Yes.
897. Was it attached in the way you would think satisfactory? − Quite.
898. How did the boat leave the vessel? − Stern first.
899. And the wire? − The wire came over the bow, led inside the boat.
900. Was the line led from the stern of the boat forward clear of the rowers, or was it under or over the handle of the oars, was there any man in the bow of the boat to look after the leading of the line? − Yes.
901. When that firing wire was cast clear of the oars, the oars should be inboard? − Yes.
902. And the firing wire was over the oars? − Yes.
903 Then the oars should be inboard, to allow the wire to clear itself? − Yes.
904. Did you see the boat moving off? − Yes, but I did not pay particular attention to it.
905. You did not notice whether the firing wire was over or under the handle of the oars? − I did not.
906. Had that firing wire been placed under the oars, outside the oars. would there have been less risk of fouling? − I do not know, I am not much of an oarsman.
907. Do you know why the boat went stern first? − I do not.
908. As the boat receded from the *Cerberus* the wire was paid out on board the *Cerberus*? − Yes from the ship.
910. Did it appear to be paid out regularly and carefully? − Yes, it was in a coil.
911. Was any body looking after the coil? − Yes. 912. How was it paid out from the *Cerberus,* did it lie on the deck ? − Yes.
913. Who paid the wire out? − I think Mr. Richards. 913a. Then there was nothing between the coil and the rail of the ship? − No.
914. Then it went over the rail of the vessel? − Yes. 915. What was the rail of the vessel? − Galvanized iron.
916. Is it not the usual way in a case of that kind to send the firing line in the boat with the torpedo? − I do not think so, unless you are paying out a long line.
917. Would not such a course prevent any accident by accidental explosion occurring to the boat? − You mean from the firing battery?
918. Yes? − Yes.
919. If such a course had been adopted there would have been no possible chance of an explosion occurring from the battery? − None.
920. It would have obviated any accidental explosion from the contents of the torpedo? − Certainly, from an electrical cause, the firing battery could not have been connected to the mine until the line was brought on board, any more than it could when twisted around my hand as it was when the explosion occurred.
921. Do you know the usual practice of paying out wire when a large torpedo is being sunk at any given distance from the ship? − The cable is laid first from wherever it may be, and the mine attached to it afterwards.
922. It is not unusual with torpedo launches to carry cable drums on board? − Yes.
923. Then when the torpedo is sunk is not the cable paid out from the dram? − I think it is paid out first, and only short pieces on the steam−launch; but that is where the cable is used and when permanent work is being done.
924. Did you see the whole of the line paid out? − Yes.
925. Was anything said on board to those in the boat during the paying out of the line? − When it was nearly paid out Mr. Richards called out that it was nearly out.
926. What did he say? − I forget the words. "You have got it all," or something like that.
927. Was any reply made? − Yes, a signal was given, which I understood to mean they understood; and the men ceased on their oars.
928. Do you know what was the condition of the tide? − It was carrying the boat with it, the tide was running in.
929. It was carrying the boat away from the ship? − Yes.
930. Up towards the west end of the Heads? − Towards the west channel.
931. When Mr. Richards sang out the firing line was nearly out, where was the line? − On my hand −− the end of it was fastened to my hand.
932. I understood the firing line was in a coil on the deck? − Yes.
933. Did you lift that coil to get the end before they started to pay it out? − No, it was coiled with the lower end free; it was given to me by one of the men.
934. And you held it? − Yes 935. During the whole of the time the coil was being paid out? − Yes.
936. What occurred after that moment when it was said the whole of the coil was paid out? − I next noticed the mine lifted out of the boat, and put over, and then I noticed almost immediately afterwards that the boat was foul of the torpedo, and could not get away.
937, The torpedo was placed over the side of the boat − on which side? − It was over the starboard quarters, and the ship was between it and Queenscliff.
938. Was the boat between Queenscliff and the ship? − No.
939. You saw the torpedo put over the starboard quarter of the boat? − That is what I saw− that is the right hand side looking forward.
940. When you saw the torpedo put over the starboard quarter of the boat, did it disappear from sight? − Yes.
941. After receding below the gunwale of the boat? − Yes.

Mr. K. L. Murray, continued 29th March 1881

942. And you saw no more of it? −(The witness explained by a diagram the position of the "Cerberus" and the boat.)943. How far was the boat from you when you were looking at it? − I thought about 80 to 100 yards.
944. Then you saw sufficiently clearly what you state? − Yes.
945. You were near enough to see everything going on? − Yes.
946. After you lost sight of the torpedo from the boat's side, did you feel anything through the wire? − No.
947. No tug or strain? − No.
948. No attempt as if it was trying to wrest itself from your grasp? − No. I held the wire in my hand; it passed under my foot, and I do not think the slack on the deck was ever paid out from any strain from the outside.
949. Are you quite positive of that? − Yes
950. You have no doubt about it? − I have no doubt about it.
951. Was all calm and quiet about you? − Yes, quite.
952. No excitement? − No.
953. No anticipation of an immediate effect? − Nothing extraordinary, every one was looking on.
954. You are quite sure in your own mind there was no strain upon the wires from the boat? − Quite sure.
955. Do you think if the torpedo was sinking rapidly that there was time enough for the slack wire on the deck to have been pulled taut before the explosion took place? − Oh, yes, certainly.
956. Then you infer it was not sinking rapidly? − I inferred it was on the surface.
957. How long was it between the time that the boat stopped and the time of the explosion? − Half a minute.
958. Will you describe the position of the firing key? − Yes. It was fastened to the binnacle stand.
959. Was the battery wire attached to it? − Yes.
960. Have you got the key here? − No.
961. How was it attached to the stand. What was the stand composed of ? − Wood. There might have been some iron about it, but it was principally wood. The firing key was tied to the binnacle stand.
962. At the time was the battery connected with the firing key ? − Yes it was.
963. Where did you stand at the time ? − At the corner of the binnacle stand, and the firing key being at my left and behind me.
964. Will you explain to the Board your position − ? I will. − *(The witness did so)*
965. Your left hand was on the binnacle stand, and your right hand was −− ? − In the air, holding the wire, about level with my face.
966. What distance was the firing key then from your left hand? − Close to my left hand. I may have been touching the key.
967. You standing in that position, what then took place? − The explosion. I saw the explosion next.
968.That is you saw the boat and the people in it blow up in the air ?− Yes.
969. Did you feel any electric sensation at the time of the explosion? − None whatever.
970. Could you tell the Board what you consider the resistance the human body would offer in the position you stood? − Six thousand ohms.
971. You battery would be incompetent to fire through such a resistance? − Yes.
972. What was your evidence in making such a statement? − Because it could only fire through fourteen ohms, according to my final test.
973. Is that battery still on board the *Cerberus?* Yes.
974. In testing the resistance of your body how were the terminals connected with your hands? − I had a brass cylinder about an inch in diameter in each hand, and I had previously wetted my hand in fresh water.
975. What dress had you on? − Uniform; blue cloth coat and blue trousers.
976. What does the uniform consist of ?− Blue cloth coat, with stripes on my arm, and gold buttons.
977. Is there gold lace down the trousers ? − No.
978. Any apparent gold ?− No; only lace on my arm.
979. Had you epaulets on ? − No.
980. Had you any nails in your boots? − I do not think so; my boots are sewn. There might be some nails in my heels.
981. Then the wire was under the sole of the foot? − Under the sole.
982. Not from the toe to heel? − No.
983. Are you positive at this time that the cable by which the mine was fired was not in contact with the ship? − Quite so.
984. Were you looking towards the boat when the explosion occurred? − Yes.
985. In the event of an accident occurring in consequence of an explosion caused through filling cylinders with an explosive material, or whilst inserting and securing fuse, or in making the connections and firing the charge in connection with the *Cerberus,* whom would you consider responsible for the accident? − That is rather hard to define.
986. Would it be the officer in command? − I always looked upon the gunner in charge of the explosives as responsible for making up the torpedoes, and I consider that so yet.
987. And who is responsible for the explosion? − It would depend upon what was the cause of the explosives. If it were caused from a fault in the battery I would consider myself responsible.
988. But in this case you do not consider yourself responsible? − I do not.
989. You held the firing line in your hand, and you intended at the signal to have joined the firing line to the key? − Yes.
990. Did you intend to fire the mine yourself? − I did.
991. You always made yourself responsible for the firing key? − Yes. I would never leave anyone in charge of the firing key. That is the reason I did not go in the boat.

Mr. K. L. Murray, continued 29th March 1881

992. You are quite clear you had not the firing key in your hand? − Quite.
993. Cannot you trust your own electricians with rhe firing key? Yes, but I always think that the officer in charge should occupy the most responsible post.
994. Would not it, in your opinion, have been better to have been free of that, so as to have observed everything you are responsible for more than the mere firing? − No, that is what I maintain as my responsibility − the part connected with the electric arrangement.
995. But you would have been responsible if through any false connection the firing had taken place prematurely? − Yes.
996. If by some means the firing line had been connected with the battery line? − Yes, exactly, and therefore I kept the firing line in my own hand.
997. You think there was nothing else you were responsible for? − Except the electric part.
998. What was said − was any particular remark made when this explosion took place prematurely? − Mr. Hugsman, I think, said, "However could that have happened," and Mr. Richards also made a similar remark.
999. Did any one ask you if you had the wires connected? − No, Mr. Richards said "Why, the wires are not connected."
1000. Where were the electricians? − Within a few yards of me. Mr. Houston had been assisting Mr. Groves in making up the mine, and Mr. Schrieber was close behind me, and Mr. Doyle was not far behind me.
1001. None of them quite close to you ? − None of them quite close to me.
1002. With reference to your dress, did you have any kind of material at all about the dress ?− On my arm I had stripes and gold buttons.
1003. There was nothing that would make a connection between one point and another ?− From the firing key to the line there would be nothing.
1004. Have you tested the wire since as to whether it is perfectly insulated?− I have not.

The witness withdrew.

Adjourned to Thursday next, on board the "Cerberus" at Half−past Eleven 0'clock.

MONDAY, 4th APRIL 1881

Present:

Joseph Bosisto, Esq., M. L. A., in the chair;

R. J. Ellery, Esq. S.W. McGowan, Esq.,
J. Cosmo Newberry, Esq., Captain J. Phelan.

Mr. Alexander Muir Houston sworn.

1005. What are you? − I am employed in the Railway Telegraph office, Spencer street.
1006. Have you been there long? − I have been in the Railway Department seven years.
1007. How long have you been acting as an electrician? − I have been doing electrical work all the time I have been in the department, but when I was at up−country stations I had various other duties to perform.
1008. You belong to the Naval Torpedo Corps as an electrician? − Yes.
1009. How long have you been attached to the Naval Torpedo Corps as an electrician? − Since it was formed. I think it was in 1878. 1010. You were on board the *Cerberus* at Queenscliff on the 5th March last? − Yes, I was.
1011. Did you witness the accident ? − Yes.
1012. Did you witness the charging of the torpedo? − I saw the greater part of it..
1013. What did you see with reference to the charge ? − I saw a case if powder brought on deck .
1014. Did you see the lid taken off? − Yes, I saw the lid taken off, and Mr. Groves took some grains of powder that were on the lid off, and then he sent for the armourer to solder the wires onto the lid.
1015. Was the lid damp, or what was the reason for the powder sticking to the lid ?− There were only three or four grains, sticking to the lid. 1016. Did you see the under side of the lid ? −This was the under side.
1017. Did it appear to be rusty? − No. The reason he took those grains off was because when the armourer was soldering it would get hot of course.
1018. Where were you standing then ? − Close to Mr. Groves and the powder case. The powder case was close to the binnacle stand.
1019. Were you right or left of Mr. Groves − you know where the key was? − Yes; I was on the right−hand side. The powder case was between the binnacle stand and the Captain's skylight.
1020. You saw the gunpowder in this torpedo ? − Yes.
1021. Did you see anything else put into it ? − No; but I saw the gun−cotton in, though I did not see it put in.
1022. Did you see the surface of the gun−powder in the case before the gun−cotton was put in ? − Yes.
1023. Was it quite clean − nothing else but it ? − Nothing but gunpowder − that was when the lid was taken off.
1024. You were there when the hand−grenades were opened ? − Yes.
1025. Did you assist to open those hand−grenades ? − No.
1026. Did you assist to take any of the contents out ? − No, I do not think I did.
1027. Did you see the contents after they were taken out of the hand−grenades ?− I saw some of them.
1028. Where were the contents put ? − On the binnacle stand.
1029. Can you tell us what those contents consisted of ? − Not exactly, I just saw them casually when I was going about. I did not examine them minutely to see what they contained.

Mr. Alexander Muir Houston, continued 4th April 1881

1030. What did they consist of ? − What I saw was gun−cotton.
1031. Nothing else ? − I saw nothing else.
1032. If there had been dynamite among the gun−cotton you would have seen it; you know the way dynamite is done up in a cartridge ? − Yes.
1033. There is a particular yellow greasy look ? − Yes. 1034. The gun−cotton is a sort of dirtyish white ? − Yes.
1035. You could have seen the one from the other ? − I m not sure, there were only five or six wads of gun−cotton there, and it might have been on the other side, and might have escaped my notice.
1036. Did you notice whether they were wet or dry ? − They were wet.
1037. When? − When they were taken out of the hand−grenade.
1038. Could you say what condition they were in when they were put in ? − No.
1039. How long were they on the binnacle between that and the time when they were put into the torpedo ? − A few minutes − perhaps ten minutes.
1040. Were they on sufficiently to dry them all ? − No.
1041. What kind of day was it? − It was sunny in the morning and cloudy and cold in the evening.
1042. When the gun−cotton was on the binnacle ? − There was no sun to affect them or to dry them at all.
1043. Was this case that was made exposed to the rays of the sun at all ? − It was standing on the deck, but there was very little sun then.
1044. But what sun there was would fall upon it − there was no protection ? − As soon as the lid was taken off a door−mat was put on top to prevent danger.
1045. If there were only five or six wads of gun−cotton on the binnacle, were the other hand−grenades under the binnacle, or where were those that had the contents still in them ? − I did not notice where they were.
1046. Could you tell us whether anything besides the gun−cotton which was placed on the binnacle was put in the case by Groves, whether he emptied the contents of any of the other grenades into it ? − No, I was not by him all the time, he sent me away to get a Hooper's core, and while I was away he might have done anything without me seeing it. He told me to go away and measure 100 yards of Hooper's core, to attach to the mine, and Barnes and I went straight away and did it. Whilst I was doing that he might have put in anything. I could not say while I was absent what he might have put in.
1047. You saw no dynamite on board at all ? − No.
1948. Did you see Groves move the gunpowder inside the torpedo ? − When the lid was taken off he put his hand in and just smoothed it about, just felt it in a curious sort of way. I think he took up a handful and looked at it just as one would do naturally.
1049. You saw the lid put on ? − Yes, I assisted to put the lid on.
1050. You saw it taken to the boat ? − Yes.
1051. Was there any cover put over it in the boat to keep it from the rays of the sun at all ? − No.
1052. Was it any kind of a sunny day then ? − No it was not. It as just about the same as it is now, a cloudy afternoon.
1053. So that the outside of this torpedo could not have got hot by the sun's rays ? − No, it could not. We were handling it constantly, and we would have felt any effect of the sun. If it was getting heated at all while on deck it would be getting hotter and hotter, and we would have felt it before we put it in the boat.
1054. Have you known while you have been engaged with the Naval Torpedo Corps any accident to arise from explosion or any premature explosion ? − I have not been present at any.
1055. Has any premature explosion taken place during your exercise in the river ? − I have been to all the meetings, and never at all with us; but I thought you meant to include the accident that happened at Captain Mandeville's house.
1056. No, you are astray. During your practice in the river, was there any premature explosion while you were present ? − No.
1057. Was there any loose wire on the deck at the time that the insulated wire lay on the deck ? − No, there was no loose wire about.
1058. No bits ? − No, the wire was all on the drum the other side of the ship, away from, the mine, away from the battery, and not near the place where the operations were carried out.
1059. Has there been any occasion in which the boat has got nearly filled with water through the explosion of a mine in the river ? − No, not that I know of. I never heard of such a thing happening.
1060. You never got a wetting from that cause ? − No, not from that cause, the explosion of a mine.
1061. Did you see White have the wire in his hand when holding it near the rail of the vessel ? − Yes, I saw him holding the wire − he was passing it over the rail. Of course when it was running away Mr. Richards was standing close by and White was at the rail and had it in his hand.
1062. It was not touching the rail ? − No.
1063. At the time of the explosion were you standing in a similar position ? − No, I was standing on the port side of the binnacle.
1064. Near to whom? − Near to Mr. Richards.
1065. Is that on the same side as Mr. Murray stood ? − Yes.
1066. How far was Mr. Murray from you ? − Only a couple of yards, and Mr. Richards was close to me, about two yards away.
1067. Did the three form nearly a triangle ? − Yes.
1068. Then you were in a position to see what Mr. Murray was doing ? − Yes.
1069. Will you describe what you saw Mr. Murray doing just before the explosion ? − He was standing close to the binnacle stand, and he had the wire attached to the torpedo round his finger, I think; or it was by his side, but I did not pay particular attention to Mr. Murray. I was looking at the torpedo more than anything else.
1070. How long before the explosion did you see Mr. Murray's position ? − As soon as the torpedo was put in the boat Mr. Murray took up his station by the side of the firing key, and remained there.

Mr. Alexander Muir Houston, examined, continued 4th April 1881

1071. How long before the explosion was it you can speak of Mr. Murray being in that position? − I saw him at first directly he took up his position there, and he did not leave it. I did not keep my eyes on him continually, but I saw every time I looked round, I saw him in the same position.
1072. Had he a firing line in his hand ? − He had a line attached to the torpedo in his hand, and a battery wire was attached to the firing key, which was fixed to the binnacle stand.
1073. The Board want to know whether, at the time of the explosion, Mr. Murray continued in the same position that the had done throughout − you say you saw him several times before the explosion ? − Yes.
1074. How long was the last time you saw him before the explosion ? − Perhaps fifteen seconds prior to the explosion.
1075. He was then in the position you describe ? − Yes, which I have described.
1076. How long after the explosion did you see Mr. Murray and notice his position ? − I saw the explosion, and immediately turned around and looked at Mr. Murray.
1077. Instantly ? − Instantly.
1078. What was Mr. Murray's position then ? − He had his hand up in the air with the wire attached to his finger.
1079. Then there were fifteen seconds elapsed between the two sights of him you had ? − I saw him about fifteen seconds before the explosion and I saw him immediately after, so that there were about fifteen seconds between the two sights. I saw him while the boat was foul of this torpedo; I looked around and saw him. From where I was standing I could see both almost with just a turn of my head, and I looked round to see what he was doing, and I saw he had not the wire connected.
1080. What did you see them doing in the boat? − I saw Groves and another man trying to clear the torpedo.
1081. What did you see first ? − I saw them lifting the torpedo over the side of the boat.
1082. Which side of the boat was that from you − the side next to you or the side furthest from you ? − They went this way − *(the witness explained his meaning by a diagram)* − the boat's bows towards the *Cerberus,*. We saw the men stooping over the side clearing the torpedo from the oars.
1083. You distinctly saw them doing that ? − Yes.
1084. What portion of the line appeared to be foul of the oar ? − I could not see.
1085. Was it the bight of the line or the main part ? − I could not say, it appeared to me in the lashing that was lashing the torpedo to the float.
1086. How long was it before the explosion ? − I could not say exactly; it was more than half a minute.
1087. Was it two or three minutes ? − I could not say exactly.
1088. Did the time appear long to you ? − It appeared a good while to me.
1089. Were you anticipating that the boat should be away from the torpedo ? − Yes. As soon as it was over I was anticipating the boat would be pulled towards the ship; that was the object of going stern first.
1090. Were you looking at it at the time the explosion took place ? − Yes, I saw it clearly and distinctly.
1091. Then you saw the explosion take place − then you turned round to see Mr. Murray ? − Yes, I saw Mr. Murray while Grove's body was turning round in the air, so it could only have been a few seconds before I turned round to look at Mr. Murray, a couple of seconds.
1092. you measured the hundred yards of wire ? − Barnes, the seaman, got it off under my direction, and he measured it off in arm lengths.
1093. Did you test the wire for insulation ? − No.
1094. In what condition did the wire appear to be in, that was the hundred yards when you brought it to Mr. Groves ? − Quite good, no flaws in it. The wire was all right, and the outsides that serve for insulating wire was all complete and good and sound.
1095. Apparently? − I saw it closely, because I was doing it through my hands. It was fresh off the drum.
1096. And had never been used before? − I do not think it could have been, because I cut it off the long piece. I took it over to Mr. Groves and said, " I think here are a hundred yards, " he said " Yes, that will do. "
1099. Did you see the wire when it came back again after the explosion ? − One of the sailors − Neville − tied it on to a form that was thrown off the deck into the sea, to help Jasper, and that was the form I took away, and the end of this wire was tied to it.
1100. Then, when you jumped into Jasper's help, you pushed forward ? − Yes, and one end of the wire was attached to the form and the other end was down in the sea; that is how the wire was so broken and kinked from the usage it received.
1101. Is it your opinion that everything was perfectly complete in all its parts just before the explosion took place − that is, without forming the circuit, was everything in good order and in its proper place ? − Everything was properly placed ready to explode the torpedo without danger.
1102. Was it customary on such occasions, or in your practice, for Mr. Murray to always personally take charge of the firing line and key ? − The battery was always attached to the key, and Mr. Murray took charge of the firing line and joined it up with himself when the mine was ready. Everybody would clear away from that, then he would attach the wire to it.
1103. It appears that he held the wire in his hand from the time the torpedo left the ship until the time of its accidentaly exploding ? − Yes.
1104. In all previous practices would Mr. Murray hold the firing line in is hand too ? − When, it would be attached to the mine, perhaps Mr. Holmes and myself, or Mr. Groves and myself, would take the mine away to the place where it was to be exploded; then, as soon as we would take the line, Mr. Murray would take the other end of the line as soon as we took up the mine to go away with it, and he would keep the firing line under his eye and charge.

Mr. Alexander Muir Houston, continued 4th April 1881

1105. He never departed from this rule? − Never. He would wait till we came back to the ship or got a long distance; but we generally came back to the ship; and as soon as we got aboard, he would look to see we were all on board, and then he would pull out the insulating stop and put down the firing key.
1106. There is one other point: do you recollect on any occasion Mr. Murray. in practice , putting one of the electricians in charge of a firing line at a distance from the key − say twenty yards or ten yards − or did he always observe the same rule you have just now stated ? − No, not to my recollection; he could always see the firing line himself. The position he took up was to command a view of the firing line and all the operations.
1107. Supposing you took the mine away in a boat, could you see the end if the firing line during all your operations ? − Yes.
1108. Even a hundred yards away ? − Supposing you were a hundred yards away, you could see where the end of the wire was.
1109. Could you see the bearing of the wire ? − I never took sufficient notice.
1110. Was it made a rule with you when you were in the boat that you should see the end of the wire that was joined to the torpedo ? − We could see Mr. Murray, and we could see he had the wire in his hand, and you could pull away from him with your face towards him, and you could observe all his movements at the time.
1111. It is a question of practice we want know − could Mr. Groves when he was in that boat have seen the bearing of the wire ? − If he had been watching Mr. Murray he could see whether he was connecting it.
1112. Could he see eighty yards off whether he had the wire on his finger or not ? − No.
1113. Could you at eighty yards off tell whether Mr. Murray had the wire over his finger ? − If you saw this hand up like that, and a wire as thick as that hanging down from his hand, I think you could see it.
1114. Were all the officers and members of the Naval Torpedo Corps that day perfectly sober ? − Yes.
1115. There was none in any excited condition ? − No.
1116. You would have seen if there was anything ? − I was with them all day, and could have seen if anything of the kind had taken place, and I do not think they would have anything themselves without asking me , which they did not.
1117. We speak also of the crew ? − Yes everybody was perfectly sober.
1118. Were you at luncheon at twelve o'clock ? − Yes.
1119. Was there anything more than what is usual ? − No.
1120. In your practice in the river did you ever take the firing line with you in the boat and lead it back from the torpedo to the firing point ? − I cannot remember that clearly now − it is some time since. The mud has been round the hulks, and we have not been able to use even a bucket. We have had to go away.
1121. Have you at any time taken the firing line with you and brought the firing line back to the firing point when the torpedo was laid ? − Not that I remember.
1122. At the inquest you stated you thought the oars might have been the cause of the explosion ? − Yes.
1123. Will you tell the Board why you thought so ? − The reason why I thought so was, that I thought it was foul between the float and the torpedo, and that the force used to free it had by some means exploded the powder.
1124. You might have some grounds for that − why do you think that such a thing could have exploded the powder ? − I thought so then; I do not think so now. It was a mistaken theory, I dare say.
1125. Have you any other theory formed in your mind? − No.

The witness withdrew

Mr. Oliver Richards sworn

Mr. O. Richards, 4th April 1881

1126. What are you ? − Gunner in the Royal navy.
1127. You were on board the *Cerberus* on Saturday, the 5th March, at Queenscliff ? − Yes.
1128. What experience have you had previous to the 5th March with reference to torpedo explosions and electrical work ? − I passed through a two months' torpedo course on Her Majesty's ship *Vernon*, at Portsmouth.
1129. That course was enough to give you all the practical knowledge you required ? − Yes.
1130. Is it necessary for every gunner to go through that course. ? − Every gunner goes through the same course,
1131.You saw the large torpedo on the deck of the *Cerberus ?* − I did.
1132. Did you see it prepared ? − Yes, I saw the charge in the case.
1133. What did it consist of ? − Powder and gun−cotton.
1134. How much gun−cotton ? − What I saw was loose in the case on the top of the gunpowder, and I should say there might be about a handful; It might be about nearly a pound weight, I could not say exactly.
1135. Did you see anything else loose ? − No.
1136. Did you see any dynamite ? − No.
1137. Was there any talk about there being dynamite present ? − No, not at the time that the torpedo or the case was preparing, there was no talk of dynamite; I do not think it was ever mentioned.
1138. Do you think, if there had been any dynamite amongst the gun−cotton, you would have seen it ? − I could not say.
1139. You know the difference between the two ? − Yes, I saw simply the gun−cotton on top of the gun−powder.
1140. You do not think it would have escaped your notice? − It might have.
1141. But it is not at all likely ? − No.
1142. Did you see the gun−cotton that came away from the hand−grenades ? − Yes.

Mr. O. Richards, continued, 4th April 1881

1143. Where was it present ? − When the last circuit −closer buoy was bumped, Mr. Groves was returning to the ship in the cutter. Mr. Murray said to me, "We will throw one of the hand−grenades. " I took a hand−grenade from the deck, coiled the wire in the left hand, and held the hand−grenade in the right.
1144. Preparatory to throwing ? − Yes, I threw the hand−grenade as far as I could throw it.
1145. About what distance ? − About fifteen yards, I suppose , from the starboard side of the ship. It did not burst, I hauled it on board myself, and Mr. Schrieber took the lid off, and found it contained gun−cotton only. I showed Mr. Murray, and Mr. Murray, looking at the fuse, said it was a high tension fuse. Mr. Schrieber then gave the tin or hand−grenade to Mr. Murray, who was standing close by at the binnacle, or the standard compass. I did not see any more of the hand−grenade. At or about this time Mr, Groves had returned in the cutter. I will not be positive, but I rather think Mr. Murray showed Mr. Groves the hand−grenade. I think Mr. Groves fitted another hand−grenade with a low tension fuse, and he threw it himself, that fired or exploded. 1146. Was the third case tried ? − That was the only one.
1147. You did not see any other case opened ? − No; the next I saw was the large case being prepared to be fired. When the lid was put on it was not water tight. We got some red lead, and put it around the edge of the lid, and a strap of canvas over that.
1148. The point the Board want to get at is this − just now you said you saw the gun−cotton put onto the top of the gunpowder? − I saw the gun−cotton on the top.
1149. Was the gun−cotton at that time attached to anything ? − No, loose on the top of the powder.
1150. Then you saw the lid − was it not charged ? − There was about a quarter of a disc of gun−cotton placed on the fuse.
1151. That was all you saw with reference to the contents of the mine ? − Yes, then I saw the lid put on, and saw it put in the boat.
1152. Was it lifted into the boat carefully ? − Yes, there was a plank, and two men carried it, and the torpedo was slung horizontally, and carried from the quarter−deck to the gangway on the port side, and placed in the stern sheets of the boat.
1153. Did you observe, after the torpedo was placed in the boat, in what way the wire − that is, the insulated wire − attached to the torpedo was passed over or alongside the boat − was it under or over the oars ? − Over the oars.
1154. How many were there in the boat ? − There were four oars in the boat, but only two in the crutches.
1155. That would be over the main part of the oars ? − Outside the boat.
1156. Was it over the inboard part of the oars ? − Outside the boat − outside the crutches.
1157. The movement of the oars would cause the wire to be knocked about ? − Yes.
1158. Was there any intention to pull the boat stem first when the wire is passed in ? − He gave the order to back.
1159. Did you imagine that he would have backed out first ? − I thought over it at the same time − a quick thought − and I did not see any disadvantage with regard to the backing or pulling. If there was any advantage , I think the backing would be the safest.
1160. Is there not a likelihood of fouling the leading wire that was at the torpedo at that time − was it more or less likely to be fouled by the oars by backing from the ship or going bows first ? − In the other case the wire would be clear of the oars.
1161. Did you notice everything that was in the boat − was there anything in the boat besides the torpedo ? − No.
1162. Was there any boat battery? − No.
1163. No spare wire ? − No, there was no spare wire passed in the boat. I stood in the gangway, and saw the torpedo placed in the boat. I watched them go astern. When there was about two or two and a half fathoms of insulated wire, I held up my hand. I said to Mr. Groves, "you had better stop." He said "All right, " and stopped the boat, Mr. Murray said "We have plenty of wire," and I said, "The boat is still going slowly astern," but the slack wire was on the deck when the torpedo exploded, so that there was no strain on the wire.
1164. White held the wire ? − He was paying it out over the stern of the *Cerberus.*
1165. Had he still the wire in his hand at the time of the explosion ? − I did not see that.
1166. Was the wire taut at all ? − No, I think not.
1167. If the wire had become taut from the torpedo to the stern of the ship White would have felt it ? − Yes, but I think it was slack wire at the time.
1168. Tell us what was Mr. Murray's position just at the time of the explosion ? − At the time of the explosion Mr. Murray was standing about two feet, I should think, on the port side of the stand of the standard compass. I was standing at the right hand of Mr. Murray. *(The witness marked in a diagram the position he held in relation to Mr. Murray.)*
1169. Before the explosion took place, can you recollect exactly the position Mr. Murray stood in regard to the firing wire and the firing key ? − Before the explosion, I noticed Mr. Murray standing with a wire in his right hand, his hand raised in that position − *(describing the same.)* I know the firing key was on the stand of the standard compass, the binnacle stand − that is, the key lashed with yarn to the binnacle stand. I did not see his left hand; and when the explosion took place I looked round quickly over my left shoulder. I do not know whether I said "Oh my God, Mr. Murray, what's the cause of this?" I made some exclamation to Mr. Murray "What is the cause of this?"
1170. There was some little confusion for a moment or two amongst those on deck? − No, I saw no confusion, I did not know whether there was any connection made, and I still saw Mr. Murray with his right hand raised and the wire in his right hand. 1171. Was there any excitement for a moment ? − No everything was very cool.
1172. What was the answer ? − I could not say what Mr. Murray said.
1173. Did you see Mr. Murray's position just prior to the explosion − at the time of the explosion ? − At the time of the explosion? 1174. Did you see him before the explosion ? − Yes just in the position I saw him.
1175. Had he moved at all when you turned around to him ? − I do not think he moved at all.

Mr. O. Richards, continued, 4th April 1881

1176. Did you see any loose wire on the deck − loose bits of copper wire ? − There might have been, but I did not see any.
1177. Could you tell whether the whole of the persons concerned, the officers and the electricians,were perfectly sober ? − I think I could vouch for that.
1178. Do you recollect whether there were any newspaper reporters on board at the time of the accident ? − I do not think there were. There was a reporter of the *Herald* went down with us, but I do not think he was on board at the time of the accident.
1179. Do you recollect his name? − Mr. Atherton. 1180. You are not sure ? − I am almost sure he was not on board.
1181. When did he go on shore ? − He went on shore at Queenscliff.
1182. With the Captain ? − No, I think he went previous to the captain.
1183. You said at the inquest the explosion took place as soon as they began to lift the oars from the rowlocks to free the wire ? − Yes, I saw the men lift the loom of the oar − that is the handle part − out of the crutch or rowlock; and it appeared to me that the wire being over the oar, the men raising this oar, so as to get the oar perfectly free as soon as possible, so that the wire would slip over the oar, and just at this time the explosion took place.
1184. Can you form any idea in your own mind as to the cause of the explosion ? − No, I cannot form the slightest; it is one of the greatest mysteries I ever saw.
1185. Did you ever see any explosion of this kind before − that is, an accidental explosion ? − No, not an accidental explosion.
1186. Has anything struck you about the affair in any way as liable to lead to accidents, anything you would have done in a different way yourself ? − I did not see anything; everything that I saw was properly done.
1187. Was it done in the way you have seen it done in England − that is, the wire to be paid out from the vessel and the torpedo in the boat − is that usual ? − I think, as a rule at home, the coil is taken in the boat and brought back to the ship.
1188. That was the only thing you saw different ? − Yes. 1189. That is the visual practice ? − Yes.
1190. Can you tell us this. Do you recollect any rigid rules laid down with regard to this kind of practice on board the *Vernon* in regard to those in charge of the mine, and those in charge of the firing key ? − I never saw any boat practice in the *Vernon;* simply they had an electric contact mine, and the go and bump them.
1191. Just linking on the answer you gave just now − is there any rule of this kind, that those in charge of a mine as poor Mr. Groves was, is in duty bound to see the end of the line attached to the torpedo, to keep it in view the free end of the line ? − Yes.
1192. In that case the end of the firing line is always in your sight − the thing is in your own hands as it were ? − Yes.
1193. Is it not the rule there, that the man in charge of the mine shall keep the end of the firing line in view ? − I would not say whether there is an order to that effect or not, but I know when the firing line has been brought back to the ship there is a small line paid down from the ship and the firing line hauled on board.
1194. At this time there would be no boat or anything near the mine ? − No, the boat would leave and come back with the line.
1195. From what you know of your own knowledge of torpedo practice, if you went in a boat with a torpedo, and you had the coil of the firing line in the boat with you, would you feel greater absolute safety under those circumstances than if the firing line was being paid out from the ship ? −I should feel myself perfectly safe if I knew the officer on board who had a charge of the firing line, but certainly not with strangers.
1196. Supposing you had the firing line in the boat with you and an accident, such as has recently taken place, were to occur, would you feel it was possible to account for it in any way ? − I should think it impossible that it could have occurred.
1197. Would you feel greater confidence if you had the line entirely under your control in the boat ? − As I said before, if I had a gentleman that I would place implicit confidence in I would as soon he had the wire as have it in the boat, but not with a stranger.
1198. You would consider it an element of danger to have the wire out of your sight ? − Yes,
1199. Have you been much in company with Mr. Groves during the experiments ? − No.
1200. Was Mr. Groves in the habit of experimenting much with explosives and combustibles as a matter of duty and so forth? − I have heard that he had made experiments, but I have never been with him at the experiments.
1201. Did you ever hear of any accidents or accidental explosions on those occasions ? − The only thing I know was with the captain.
1202. That was in his own house ? − Yes.
1203. Had Mr. Groves any more experience in torpedo practice than yourself ? − We went through the same course, and he had just the same experience as I.
1204. What was the general opinion amongst the officers of the Naval Torpedo Corps as to the character of Mr. Groves, speaking now with reference to his knowledge of his work ? − I believe, as far as I have been told, they had every confidence in him.
1205. You heard nobody doubting his ability and knowledge ? − No.
1206. Did you ever see him make any attempt to make any experiment that appeared to your mind to be foolish ? − I never did.
1207. Was he always steady in his habits ? − Very steady.
1208. What were his exact relations with the chief officers and the electricians − was he supposed to be subordinate to Mr. Murray ? − Oh, yes.
1209. Was there any special understanding then that Mr. Groves should have entire charge of the loading of torpedoes ? − What I understood was, that Mr. Groves had charge of the hulks and stores, and would be under Mr. Murray. Whatever was required, Mr. Murray would give orders to Mr. Groves.

Mr. O. Richards, continued, 4th April 1881

1210. Mr. Groves would be going beyond his duty if he did anything in excess of what Mr. Murray instructed him in the shape of loading ? − Yes, Mr. Murray, of course is a lieutenant, and Mr. Groves ranked with, but after, a sub−lieutenant.
1211. From what you know of Mr. Groves, with reference to being a careful kind of man, do you think he was likely to have put dynamite into that torpedo, supposing he had it about him ? − He might have done. I could not say.
1212. When you say he might have done it, do you infer from that, that the man who did it would not be very careful ? − Not if he did it without authority.
1213. Did you know him put dynamite into such a torpedo ? _ No, because dynamite is not to be used.
1214. When you say he might have done it, why do you say that ? − I could not say he would not do it.
1215. You do not have an impression in your mind that he showed that he was in any way foolhardy at times ? − No.
216. Was not he rather venturesome ? − He was one of those men that was always very lively about his work.
1217. And made light of things ? − Yes.
1218. Did Mr. Groves bear, on board the ship, in all his duties, a character of carefulness ? − Yes.
1219. Was he thoughtful and careful ? − As far as ever I heard or knew.
1220. But it would not be consistent with your remark as to his character for carefulness and so on, that he should put a bit of dynamite in that torpedo ? − I would not like to say
1221. You only give it as your opinion that it might be done ? − I could not say that he would do it, or that he would not do it, but he might have done so.
1222. Supposing dynamite was on the binnacle at the time the gun−cotton was there, was Mr. Groves a man, in your opinion, that would be likely to put it into the torpedo, not arising from wilfulness, but was he a man so indifferent to these explosives, that he would think nothing of taking it and putting it in the torpedo? − He might have done it.
1223. Do you remember ever having heard Mr. Groves make use of the expression "It will all go up" ? − I have never heard him myself, but I heard that he made use of the expression that it would all go up together, but never in my presence.
1224. You have not formed any opinion, since you gave your evidence at the inquest, as to what was the cause of the explosion ?− No, if I had thought at all upon it, I would tell it. I have thought over it ever since, and I have followed out lots of things, and thought in my own mind, but I could never see the cause of it.

The witness withdrew.

Mr.William Alfred Holmes sworn

Mr. William Alfred Holmes 4th April 1881

1225. What are you ? − I am a telegraphist at the Spencer street Telegraph office. also, electrician to the Naval Forces.
1226. How long have you been connected with the Naval Torpedo Corps ? − Since its commencement.
1227. When was that ? − Gazetted 1879, I think.
1228. Did you not have to do with the Naval Torpedo Corps before it was *gazetted ?* − We did some practice. 1229. But *gazetted* about March 1879? − Yes.
1230. Have you any experience anywhere outside the colony with reference to that which bore upon the Naval Torpedo Corps? − I have been in the Telegraph department in Victoria three years and a half, and previously I was seven years in the London Telegraph office.
1231. But not connected with any Naval Torpedo Corps ? − No.
1232. Are you in possession of any regulation bearing upon your work in the Naval Torpedo Corps ? − We have no rules framed by ourselves, but so far as is practicable we carry out everything according to the rules of the Chatham School of Engineering.
1233. Do you know whether they in any way bear upon the practice of the torpedo being taken from a ship to be exploded ? − So far as the Chatham School of Engineering is concerned, it would not be so, because their experiments are carried out in the River Medway.
1234. Are there any rules in the Chatham code for the guidance of the people who take out mines in boats, in reference to the placing of the firing line ? − I believe there is not.
1235. Do you know the Chatham regulations ? − I have read them over, and I think I know them.
1236. What is the rule about a boat party in charge of a mine ? − The Chatham regulations would not give it.
1237. Can you tell the board whether you have had any torpedo practice before joining the Naval Torpedo Corps ? − I was in the Torpedo Signal Corps of Victoria for nearly twelve months.
1238. What particular regulations do you refer to when you speak of the Chatham regulations ? − Certain rules are laid down for the guidance of all those who are connected either with field mining or sub−marine engineering − they are general instructions, as a rule. 1239. Do you refer to any particular book ? − No.
1240. Only to general instructions ? − Taken principally from rough notes.
1241. Are you aware of any torpedo drill books by the land and sea forces at home ? − Not drill in the way that we have land drill, with certain movements for men under all circumstances.
1242. Could you tell the Board what is the practice usually adopted with your corps here in attaching the mine to a firing line, and laying it out for firing − will you describe to the Board the mode of proceeding usually adopted ? − With short cables we should connect our lines to the torpedo, take it and lay it, and bring our lines into the boat, back to the firing status. 1243. That was the practice you adopted ? − Yes.
1244. How do you make that compatible with the fact that the reverse operation was adopted on board of the *Cerberus ?* − In this case, which I have previously mentioned. the thing has been generally

Mr. William Alfred Holmes, continued, 4th April 1881

arranged beforehand, on this occasion it was an *extempore* arrangement, which will account for its being done in a different way. 1245.How could you account for it. Would it not have been just as easy to have done it in the other way ? − I can see a number of reasons why it would be better to have our line connected with our firing station − that does not necessarily mean in connection with our firing battery, such, for instance, as for the purpose of testing.
1246. We are talking of firing off such an explosive as this large torpedo ? − I am saying there are reasons why firing lines should be taken outwards rather than brought inwards.
1247. What reasons ? − For testing.
1248. Suppose then the mine laid out, and the wire connected with the ship, and you want to make a test, would you make that test whilst the boat was in proximity to the mine ? − No.
1249. Would not that test be made just as well when the firing line had been brought home ? − It could in this case.
1250. In any case ? − No, not without loss of time.
1251. Do not mix up two things − not without loss of time, you say? − Yes.
1252. Of course when you talk about bumping a circuit − closer, you do not mean bumping a circuit − closer with a large mine attached ? − It would be perfectly safe if we had a testing battery.
1253. In practice was it always usual for Mr. Murray to have charge of both firing key and firing line ? − Yes, it was.
1254. In your former experience, do you recollect whether that was the rule ? − I never saw any mines exploded before.
1255. Were you not at Dromana ? − Yes.
1256. You saw mines exploded there ? − I was on the pilot steamer, and did not see the shore practice.
1257. Supposing that you were carrying out a mine in the boat, would you feel a greater degree of safety if you had the firing line in the boat, than if that firing line were connected, in the hands of anyone either ashore or afloat, that was being paid out, either ashore or afloat, in the charge of some person ? − Possibly now I should.
1258. Were you not always so ?− I have not done always. On many occasions I have taken them out.
1259. You have said it was the standing rule, and there were certain exceptional cases where it might be departed from. Would you not have felt absolutely safe if you had the firing line, torpedo, and all in the boat ? − Of course I should. If the line had been in the boat it would have been impossible for a mine to have been fired electrically.
1260. Have you ever carried out a mine yourself, or deposited a torpedo ? − Several times; I think in every case where we have done it.
1261. What size were those mines ? − Small tins, about the size of a jam tin, for experimental purposes.
1261. In that case, did you always take the firing line with you and bring it back to the firing point ? − Not always.
1263. Was not it a standing rule you should do so ? − No; it would depend upon how the mines were being laid down, their position, and the convenience for laying them down; it was sometimes more convenient to make all our connections on shore and take them out, than to take the firing line back again.
1264. Have you ever had anything to do with the laying of large mines ? − No.
1265. Not at Dromana ? − Yes, there.
1266. What size were they ? − In two hundred and fifty pound cases.
1267. What were they charged with ? − One with dynamite and one with gun−cotton.
1268. What kind of firing line was used then ? − One was a single core armoured cable.
1269. Did you have anything to do with splicing the torpedo onto the cable ? − I think not.
1270. Do you recollect whether the cable was in the boat or the bottom of the sea at that time ? − As far as I can remember it was taken from the shore.
1271.The firing line was taken from the shore and not brought back to the shore ? − Yes, not brought back to the shore.
1272. What is your position in the Naval Torpedo Corps ? − I am simply one of the electricians, we were all *gazetted* at the same time and all rank together, ranking after Mr. Murray; Mr. Murray is chief electrician.
1273. We have had it in evidence here that you are second in command to Mr. Murray ? − Not that the command has been given me − if work has to be done Mr. Murray would give me something to do, the same as he would the others.
1274. Do you know, from your own knowledge, whether there was any dynamite on board the *Deborah ?* − I cannot say further, but in two or three days after the explosion I saw a tin containing what I consider, about three quarters of a pound of dynamite.
1275. What condition was it in ? − It looked to me to be bad, it had oozed through the paper, and there was a black tarry substance had oozed through.
1276. Whereabout was that ? − It was in the furthest magazine on board the *Deborah;* it was fetched from there and brought back again.
1277. What size was that ? − Similar to the hand−grenades.
1278. Do you recollect any potassium being on board ? − Yes.
1279. What for ? − Mr. Groves requisitioned for it, we did not know it was there until we saw it.
1280. Are you aware of the nature of the potassium ? − Yes.
1281. It was very explosive ? − It is dangerous stuff to handle, and in contact with water it burns quickly.
1282. You do not know what it was wanted for ? − No; on one or two occasions Mr. Murray has done one or two small experiments and used a small amount; when talking about mechanical mines he would show how after being placed in water it would explode.
1283. What is bromide of potassium used for ? − I do not know.
1284, Are you aware there was some there ? − No.
1285. Do you know what became of the potassium ? − It was taken away.

Mr. William Alfred Holmes, continued, 4th April 1881

1286. It was taken out of the *Deborah ?* − Yes,
1287. How was it not entered in the books ? − I cannot say.
1288. How came you to take it away ? − I told Kennedy, the man in charge, I would take it way.
1289. Then you told him of it ? − Yes.
1290. Do you know that it is the rule when anything is taken away it should be entered in the store book ? − If I knew of it I did not think of it at the time; it is since that time my attention was drawn to it.
1291. Where was it taken ? − To Spencer street.
1292 Where is it now ? − Mr. Murray has it at Spencer street.
1293. Do you know why it was removed ? − It was taken away by Mr. Murray's authority.
1294. Do you know, personally, why it was removed ? − I do not know any other reason than that Mr. Murray would think it safer to have it himself, he considered it dangerous to have it on board the ship.
1295.Did Mr. Murray say anything like this to you − "This must be taken away, it is too dangerous" ? − It was to that effect.
1296. Reverting back a moment to a former question as to your experience at the Dromana camp of instruction, can you state what regulation was in force on shore in regard to the end of the firing cable ? − It was taken into the guard tent and a sentry placed over it.
1297. Did you take anything else away except the potassium at that time? − Some fulminate of mercury.
1298. How much ? − About one ounce. 1299. What was it in ? − A small powder flask.
1300. Where did you find it ? − With the other stores. 1301. Where ? − In the laboratory store.
1302. Why did you take it away ? − Because we considered it would be safer with us in the laboratory we have close to the railway station − this fulminate was covered with water, it is always kept in that way. It is only dried when we want to use it.
1303. You saw the dynamite on board, why did you not take it away ? − I preferred leaving some one else to take it.
1304. Did you not consider it dangerous ? − But more dangerous for me to carry it about.
1305. Did you report it to anyone when you saw that dynamite was left on board ? − There was no one to report it to. Mr. Murray knew it was there. Mr. Murray was there with me at this time.
1306. Did any conversation ensue between Mr. Murray and you at the time you took the fulminate of mercury away in reference to the dynamite ? − That he considered it was dangerous.
1307. That was all ? − That it had deteriorated to some extent; also he wondered how it came there.
1308. Did you tell Kennedy you were taking away the fulminates of mercury ? − Yes, it would not be found in the store book ; we made it ourselves on board the *Deborah,* under Mr. Kruse's direction.
1309. Do you know how the dynamite got there ? − No; we looked through the store books and could not find any entry of it. 1310. You did not make it on board ? − No.
1311. Were you aware that there was a twenty−five pound case of gun−cotton on board ? − I know nothing of it except that it was found under Grove's bed, and placed in the magazine by my instructions.
1312. Do you remember what date it was you visited the hulks after the explosion ? − It would be on Tuesday, on the eighth of March.
1313. That was the occasion on which you made all these removals ? − No, on the following Saturday. On the first occasion Mr. Houston accompanied me, and on the second occasion Mr. Murray came.
1314. When you speak of about three−quarters of a pound of dynamite being in the magazine, you refer to some dynamite in the small hand−grenade tin ? − Yes.
1315. Still done up in paper covering ? − Yes, about half−ounce cartridges.
1316. Did you open them ? − No.
1317. Then you would not know whether they were in a plastic condition ? − I did not open any of them − any paper. There was an ounce or so loose in the case of a different kind of color to that with which the case is filled.
1318. And you judged from the appearance of that ? − No. from the appearance of the paper surrounding the cartridges.
1319. What did you refer to this other piece for ? − Only it belonged to a different lot of dynamite.
1320. Was that plastic ? − It seemed to be so.
1321. Are you aware what the condition of the dynamite is generally when it is in a dangerous condition ? − I could not tell by looking at the dynamite itself, but if I saw the paper surrounding it saturated with the greasy substance I should think it unsafe.
1322. What would that greasy substance be ? − Nitro−glycerine.
1323. Do you know the paper appears greasy directly they are wrapped ? − Not to the same extent.
1324. Did you ever go on board the *Deborah* before that with Mr. Murray to investigate or look over stores to see if there were any combustibles there ? − Not with the idea of seeing what combustibles were there.
1325. What did you go for ? − Our practices were carried out on the hulks.
1326. Did you ever take anything away before that ? − No.
1327. Did you ever see any fulminate of mercury there before ? − That was the only fulminate we had made.
1328. Did you ever see the potassium there before? − No, I did not know it was there.
1329. Who signs the requisition ? − I am not certain about that; if it is anything Mr. Murray requires for himself he signs the requisition.
1330. In the face of the inquest and the probable enquiry into the cause of the accident, why did you take the things away from the *Deborah ?* − Because we thought they would be safer away.
1331. Have you formed any theory as to the cause of this accident ? − None whatever, beyond the probable presence of dynamite.

The witness withdrew.

Mr. James Drummond Doyle sworn.

Mr. K. L. Murray, continued 29th March 1881

1332. What are you ? − Chief operator of the Railway Telegraph Department, and electrician in the Naval Torpedo Corps.
1333. Do you hold any particular position in the Naval Torpedo Corps as an electrician ? − No.
1334. Equal with the rest ? − Yes, equal with the rest, except my name appears first on the list, that is all.
1335. Then on that account would you be a little higher in rank than the rest ? − No.
1336. Do you come next to Mr. Murray ? − The question has never been debated. Mr. Murray gave us to understand we held equal rank.
1337. Were you on board the *Cerberus* on Saturday the 5th of March ? − Yes.
1338. What part of the vessel were you in at the time of the torpedo was being prepared ? − On the quarter−deck.
1339. Standing near where ? − Near the starboard side of the ship.
1340. How far from the torpedo ? − No distance; I was walking about.
1341. How many feet or yards ? − It is hard to say. I was walking about so much, I had no particular duty to do.
1342. Did you see the gunpowder case that was to be the torpedo, that had the lid taken off ? − Yes.
1343. Did you see the gunpowder in it ? − Yes.
1344. How far was it from being full ? − Three inches, or thereabouts.
1345. Did you see anything else put into it − did you see the gun−cotton put in ? − No.
1346. Did you open any of the hand−grenades ? − Oh, yes.
1347. What was taken out of it ? − Nothing but gun−cotton and high tension fuse.
1348. Where was that put ? − The gun−cotton on the binnacle stand.
1349. Was there any other hand−grenade opened ? − Several were then opened.
1350. How many were exploded ? − Two were exploded, I think, but I could not be sure.
1351. Three ? − I only distinctly remember one being exploded.
1352. You say several were opened ? − Yes.
1353. What were their contents ? − The one contained nothing but gun−cotton, and the high tension fuse, as I said before; the other, I presume, contained gun−cotton also.
1354. But you did not see it ? − I did not particularly notice it, but I knew it was there; that is to say I knew there was more gun−cotton on the binnacle stand than could be accounted for by the gun−cotton I saw placed upon the binnacle stand.
1355. You mean the gun−cotton on the binnacle stand was more than one hand−grenade would contain ? − Yes.
1356. You do not know how many were opened ? − Not for certain.
1357. How many would you suppose ? − Three or four.
1358. How much gun−cotton would those three or four contain ? − Eight to ten discs.
1359. Large discs ? − No, quarter−ounce.
1360. Then you really saw only one hand−grenade opened ? − That is all.
1361. Were there any on the deck under the binnacle stand ? − Not that I know of.
1362. You saw the gun−cotton on the binnacle stand ? − Yes.
1363. After they had finished opening all the cases they did open ? − Yes.
1364. Did you see any dynamite on the binnacle stand ? − Yes.
1365. What was in it ? − It was with the lumps of gun−cotton.
1366. In what form ? − Part of it was still in its wrapper, but there were some loose grains, not many, on the wood of the binnacle stand.
1367. Are you quite clear of that ? − Quite clear.
1368. Did you make any observation about it ? − None whatever.
1369. What condition were the grains in ? − Granular, not caked up, the grains were all separate, and they were black.
1370. Have you any idea where they came from ? − No, beyond that it must have come from some of the hand−grenades.
1371. Did it excite your attention ? − No. 1372. Had you seen dynamite before ? − Yes, several times.
1373. Have you seen it strewed about with gun−cotton ? − I have known it to be in the same small tin as gun−cotton.
1374. Did you ever know it to be in hand−grenades ? − I have known it to be in a hand−grenade, I have never seen it.
1375. How did you know it ? − From being told by Mr. Groves.
1376. When did he tell you that ? − If I asked him what was the charge, he would say there was some dynamite there, or so many ounces of gun−cotton and dynamite.
1377. Did he ever say why he put the two together ? − I have heard him say that the dynamite was easier to detonate.
1378. The dynamite you saw was black ? − Yes, I have seen dynamite of a red color, but it was not of that color.
1379. Have you seen the same kind of back dynamite on board the hulks ? − Yes.
1380. Is there any of that there now ? − I do not know.
1381. When were you on board of it before the last − have you been there since the accident ? − Yes.
1382. On what date ? − Before the accident, I was there on Saturday the 19th February.
1383. What were you doing there ? − On that day we went down the bay for a trip.
1384. Did you take any dynamite with you that day from the *Deborah ?* − Some tins were placed in the boats − small mines; and I did not know then − I have since heard − that dynamite was in one of them.
1385. You do not know yourself ? − No.
1386. You have seen dynamite on board the *Deborah ?* − Yes.

Mr. J. D. Doyle, continued 4th April 1881

1387. Of what kinds ? − I have seen one or two packages made of red earth, and also some of darker earth, and I have seen Mr. Groves burn them.
1388. When you went down on the 19th of February did you explode the mines ? − I was not present when it was done.
1389. Did you go on board the *Deborah* after the accident ? − Yes, on Saturday the 12th.
1390. Were you in company with Mr. Holmes and Mr. Murray ? − No, on Saturday the 12th I went by myself on board the *Deborah*
1391. Did you see Mr. Murray and Mr. Holmes there ? − No they were not there that day.
1392. You did not meet them there on the 12th, that was the week after the accident ? − I went on board the hulks by myself, that was on the Saturday; I went by the two o'clock train.
1393. About half−past two you would be there ? − Yes.
1394. That would be the Saturday after the accident ? − The Saturday after the accident; there was nobody there that day but Mr. Richards and myself.
1395. Was Mr. Richards in charge of the *Deborah* there that day, or was it Kennedy ? − I take it that Mr. Kennedy is in charge, but Mr. Richards inspects.
1396. When you went on board, whom did you see ? − I first saw Neville, then Mr. Richards; there are two men there.
1397. Did Mr. Richards go with you ? − No, he was on board first.
1398. Then you saw Neville and Richards ? − Yes. 1399. What did you go on board for ? − Private business; to see Mr. Richards. 1400. How did you know he was there ? − I arranged to meet him.
1401. What for ? − To overhaul Mr. Grove's papers and pack up the traps, and so on. Mr. Richards being an intimate friend of Mr. Groves.
1402. Why were you wanted there ? − I was not wanted, but I was an intimate friend of Mr. Grove's, and I went more to have a chat than anything else. 1403. Where do you live ? − East Collingwood.
1404. Then you went on purpose ? − Yes. 1405. Did you or those with you find anything of an explosive character ? − No. 1406. Did you go into any rooms of the hulk ? − Yes.
1407. Did you look for any explosives there ? − No, we did nothing all that day.
1408. You say you went into the rooms ? − We went into the laboratory, as Mr. Groves called it, but we did not touch anything.
1409. You did not see any dynamite or gun−cotton or anything of that sort ? − No, nor did we look for it.
1410. When you went away, did you take anything away with you ? − No.
1411. Nothing belonging to the stores of the ship ? − Nothing.
1412. When you left the ship did you make any remark that you had been there to Mr. Murray ? − No.
1413. Between that and the 19th ? − No, I had nothing to do with the business there.
1414. You gave no intimation as to what you saw, or said anything ? − No.
1415. Had you any knowledge of the explosives on board the hulk *Deborah ?* − I have never been in the magazine.
1416. Have you any knowledge of the manufactory of the fulminate of mercury on board that hulk ? − No; that is to say, some time ago we made some −−− some good long time ago.
1417. Whom do you mean by "we" ? − I mean the officers of the corps under Mr. Murray.
1418. Did you see when the fulminate of mercury was being made any dynamite on board that hulk ? − Not at that time. I have seen dynamite, but only a few packages at a time, in Mr. Grove's hand.
1419. What quantity ? − Three or four ounces, or two− ounce cartridges.
1420. Who was making it ? − Mr. Murray.
1421. Who else ? − Mr. Holmes, Mr. Houston, Mr. Schriber, myself, and Mr. Kruse.
1422. You say the dynamite you saw amongst the gun−cotton on board the *Cerberus* was black dynamite ? − Dark grey. 1423. Very easily seen amongst the gun−cotton ? − The grains were outside the heap.
1424. You had no difficulty in seeing it ? − No.
1425. You have no hesitation in saying you plainly saw it ? − Quite certain.
1426. And you think anyone else could have seen the dynamite if they had seen the gun−cotton ? − They could.
1427. Would it be conspicuous amongst the gun−cotton ? − No, there were only a few grains, and the cartridge paper was of a white color, like gun−cotton.

The witness withdrew.

Adjourned to to−morrow at eleven o'clock.

MONDAY, 5th APRIL 1881

Present:

J. Bosisto, Esq., M. L. A., in the Chair;

R. J. Ellery, Esq. S.W. McGowan, Esq.,
J. Cosmo Newberry, Esq., Captain J. Phelan.

Mr. James Drummond Doyle further examined.

Mr. J. D. Doyle, 5th April 1881

1428 Yesterday we got to that part where you were describing the differences between the two dynamites, one being of red description and the other black ?− Yes.
1429. And you said the black was what you saw on the binnacle table ? − Yes.
1430. Was it really black ? − It was greyish−black. It was a black gunpowder with out the glaze.

Mr. J. D. Doyle, continued 5th April 1881

1431. You feel quite clear that you saw the dynamite then ? − I have no doubt about it.
1432. Did you trace it from the binnacle table into the torpedo ? − Not distinctly.
1433. Did you see Groves take up the gun−cotton and put it in the torpedo ? − No
1434. Then you did not see it removed from the binnacle stand ? − No.
1435. Did you see the gun−cotton in the torpedo after you had seen the gun−cotton on the binnacle stand. ? − No.
1436. Did you look into the torpedo at all before the lid was put on ? − No.
1437. Then you are not distinct that there was any gun−cotton or anything else except gunpowder in the torpedo ? − Not from my own seeing.
1438. Were you standing near enough to see what was being done with the torpedo after the lid was taken off ? − I was not near enough all the time. I was leaning against the starboard rail of the ship a long time.
1439. Did you see any dynamite taken out of the hand−grenades ? − No.
1440. Can you tell us whether any of the dark colored dynamite had been used in the hand−grenades previously ? − Not to my own knowledge.
1441. Have you ever seen any of this dark dynamite on board the *Deborah ?* − Yes.
1442. When ? − I cannot say for certain, but within six months.
1443. Are you aware whether more than one lot of dynamite went on board the *Deborah ?* − No. I have, since the accident , learned that five pounds were supplied in April 1880.
1444. How did you ascertain that ? − I enquired by letter from Mr. Thompson, the paymaster.
1445. Did you get a reply ? − Yes, a telegram saying, " Tell Mr. Murray five pounds in April last."
1446. Do you know of any other parcel being obtained besides that ? − No.
1447. Can you tell the Board whether there was more than one kind of dynamite in that parcel ? − No; I never saw the parcel.
1448. You do not know from whom that was obtained ? − I think, but do not know, from McLean Brothers and Rigg.
1449. You do not know what hulk it went to ? − No.
1450. Did you ever take any dynamite yourself ? − I never had any in my hands except to look at it.
1451. Did you ever see any taken on board ? − Never.
1452. Have you heard since where that dynamite came from ? − I think from McLean Brothers and Rigg.
1453. That is from hearsay ? − Yes.
1454. Have you seen dynamite sufficiently often to really know when you see it ? − Yes.
1455. Either in the form of package or loosely ? Yes, it is always in cartridges.
1456. You said you saw some loose, would you know it if it was loose? − Yes, especially if along side the cartridge paper.
1457. Was it alongside the cartridge paper ? − Yes, I saw one cartridge paper, and that was broken, and a few grains were loose − they were on the white wood of the binnacle table, easily discernible − the wrapper was broken.
1458. Did the outside of that cartridge look clean ? − I could not say.
1459. Is it very rough paper the dynamite is done up in ? − Yes.
1460. Was it simply unfolded or torn ? − My impression is that it was torn close to the edge.
1461. Any small fragments of that kind would have gone through the grating of the binnacle table ? − Yes, in this case they happened to be clear of the holes.
1462. You did not see this black dynamite on any former occasion ? − Never.
1463. Not on board the hulk ? − I have seen Mr. Groves produce one or two or three or four cartridges −− always small quantities −− of the black dynamite. I have also seen one of the red dynamite .
1464. Did you ever see any red dynamite on board the *Deborah* except the isolated cartridge ? − No.
1465. Did you see any after the accident in the laboratory store−room ? − I saw one tin of dynamite in ounce cartridges, I suppose − I had never seen those small ounce cartridges before − the cartridges I saw were larger ones, and the cartridge I found on board the *Cerberus* appeared to be a large one of two ounces instead of an ounce.
1466. Did you ever see Mr. Groves make those hand−grenades ? − Yes.
1467. Have you seen him put dynamite in ? − I cannot say for certain. I have known there has been dynamite in.
1468. How have you obtained that information ? − From conversation with him.
1469. In those cases was it dynamite alone or dynamite and something else ? − I have known him put both dynamite and gun−cotton in one.
1470. Are you sure? − Yes.
1471. You never saw one made ? − I cannot remember that I did distinctly, if you ask me, do I know , as a fact, dynamite has been used, I reply Yes.
1472. But the question is, was the dynamite with gun−cotton ? − I know they have been used together.
1473. Can you tell us whether the five pounds of dynamite that was obtained and used, from time to time, on board the *Deborah,* was dark colored or light colored ? − No.
1474. And you do not know whether they were ounce cartridges or half ounce cartridges ? − I never saw it as a large parcel, and never inspected the stock until Saturday the 19th.
1475. There was a diagram which shows the position of Mr. Murray on the port side of the binnacle stand *(handing the same to the witness .)*
1476. Lying on the starboard side of the lump of gun−cotton ? − Yes.
1477. Can you call to mind, when Mr. Groves was preparing the torpedo, on which side of the zinc case containing the gunpowder did he stand ? − Mostly on the port side.
1478. Is that the same side as Mr. Murray stood ? − Yes, the same side.
1479. At the time you saw it you were on the starboard side of the ship ? − Mostly.
1480. Did you go across to the binnacle stand at all ? − Yes, when the powder was brought we all went over.

Mr. J. D. Doyle, continued 5th April 1881

1481. Was it at that time you saw the dynamite ? − Before that.
1482. Did you call anyone's atention to it ? − No.
1483. Did you see Groves move round about this torpedo ? − Yes, a great deal of time was occupied in preparing this −− the armourer had to make two trips down to the stove to make soldering joins to the lid.
1484. The torpedo was not exposed all that time ? − No, it was covered by a door−mat.
1485. Then, Mr. Groves would not be all that time preparing the torpedo ? − During this off−time, as I may call it, our attention was otherwise engaged.
1486. Did you see Mr. Groves doing anything to the torpedo whilst the lid was being prepared − you did not see him remove the mat at any time to put anything in ? − No.
1487. During this time were you stationed at the starboard side of the ship ? − No, not stationed.
1488. You were wandering about at your own will ? − Yes. 1489. No duty to Perform ? − No duty to perform.
1490. Is the duty of the charge of the firing line and firing key ever divided out amongst the members of the corps ? − Not as a rule. Mr. Murray has charge of the firing key. 1491. Mr. Murray, as a rule, has charge of both ? − Yes.
1492. Then, at the time the torpedo went away, none of the electricians were at the stations except Mr. Murray ? − No, except Mr. Murray.
1493. Had you any official instructions from Mr. Murray that day ? − No, I was a kind of spare man, I joined the ship on Saturday morning at ten 0'clock at Queenscliff.
1494. And did you report yourself to Mr. Murray ? − Yes. 1495. Did you ask him if he had any special duty for you ? − No.
1496. He did not assign any special duty to you ? − No, when I arrived everything was arranged in the order in which it was to go into the boats.
1497. Are you aware whether Mr. Houston had any special duty assigned to him that day ? − He was chiefly employed in signalling.
1498. Did you perform any duty at all that day ? − Yes, I was sent to examine the firing battery, to see it was all connected up properly. 1499. On the main deck ? − I think they call it the after steerage.
1500. You know all the witnesses we have had from the *Cerberus* and the Torpedo Corps pretty well, do you not ? − Yes.
1501. If any or all of them have said they saw no dynamite, do you know them sufficiently to believe they would know it if they saw it; what answer do you give to that ? −The two gunners, Tubbs and Richards would have a knowledge of explosives; the others have not.
1502. The electricians are all familiar with the appearance of dynamite ? − Yes, they are.
1503. They would know dynamite from gun−cotton ? − Yes.
1504. Then there can be no doubt that if they saw it they would not make any mistake as to its being gun−cotton ? − Certainly not. 1505. The two you have mentioned would know if it was dynamite ? − Yes, if they saw it.
1506. Were they not about ? − They were there.
1507. They state distinctly they did not see it, do you feel confident you did see it ? − Yes, I have no doubt of that whatever. 1508. You made no remark to anybody ? − No.
1509. Did you make any remark to anybody after the explosion that you saw it ? − I do not think so. I will tell you what happened. The explosion took place at a quarter−past−five, and then the men, Jasper, Hunter, and Houston, the men who were rescued, were brought on board. I went down below to the cabin with Huston, to offer him dry clothes, and then returned on deck. Then I immediately got into a boat and went to Queenscliff railway station, to telegraph to my wife and everybody else's wife about it, knowing the thing would be reported in the newspapers; so I left the ship before six.

The witness withdrew.

Mr. A. Augey Dufresse, Captain of the *Finisterre*, examined.

1510. The Witness : −− I have read all that has appeared in the Argus and other newspapers in respect to the accident being enquired into by this Board, and all the evidence given at the inquest, and also that given before this Board. I have never seen an accident like this. I was sub−director in the Torpedo School of Instruction in Boyardville, and I have never met with an accident like this. On one occasion I experienced a little explosion − a drop of nitro glycerine which was exploded on a stone floor, scratched by the sole of a boot. I am convinced that nitro− glycerine, placed between two hard substances, would explode. I have never seen in the same torpedo gunpowder and gun−cotton at the same time. I have never been witness of a case like this which s now being enquired into.
1511. Have you ever known of an explosion taking place by gun−cotton alone by a blow ? − No, never.
1512. In the event of a very small portion of dynamite being in a torpedo along with gun−cotton and gunpowder, would it be more liable to explosion if it received a blow outside ? − I have never seen a torpedo filled with those three explosives. I am of opinion that if the dynamite was in good condition the danger would not be increased by the mixture; but if the dynamite was in a half decomposed state, or had been in contact with water, it might possibly tend to increase the danger. 1513.You think the danger would be only slightly increased ? − Slightly increased.
1514. Would it be very dangerous, or only slightly more dangerous ? − The danger could not be increased very slightly, especially if the component parts were in good condition; there might be a possibility it would slightly increase the danger, but I have no reason to express a general opinion that there would be a great increase of danger.
1515. Have you formed any theory as to the cause of this special accident ? − My opinion is that probably nitro−glycerine exuded from the cartridge and came in contact with the metal of the fuse, which might have been exploded by rough handling in that state, if the nitro−glycerine had been exposed to the concussion of hard substances.

Mr. A. Augey Dufresse, continued 5th April 1881

1516. Would the rolling of the gunpowder inside the torpedo be likely to cause it ? − No, the rolling of the gunpowder would not make such a concussion as to cause it. 1517. Would a blow from the outside cause it ? − Yes. 1518. Without the presence of dynamite, can you account in any way for the accidental explosion ? − I do not see any reason why the explosion could have taken place without the dynamite.
1519. In the event of a sudden jerk of the firing line, would it act on the fuse in any way to cause an explosion inside ? − There is a possibility that a jerk of the wire might cause an explosion from the friction on the fuse itself, but I think it highly improbable.
1520. Will you explain the usual practice in the French navy when making torpedo experiments similar to this with large torpedoes, say of seventy pounds weight; that is, is it the practice to take the line and the torpedo together in the boat and bring the line back again to the vessel; or is it the practice to take the line from the ship as the boat is taking out the torpedo and so to let the wire run out ? − In all cases in torpedo practice the wire is taken in to the boat along with the torpedo, and the wire is brought back to the ship after the torpedo is laid.
1521. Always the case ? − Always the case, like laying a boat anchor. 1522. Would there be any formality, or any regulation on board the ship, or at the firing station, when the firing line was brought back towards the battery, with reference to taking the firing wire to the firing key, or point of safety ? − There is always an officer in charge of the firing key, to whom the firing wire is brought; that officer makes the connection and fires the charge. That officer is an officer of experience in torpedo practice, and has passed an examination at the torpedo school. The officers and non−commissioned officers, and a certain part of the sailors, have to get a certificate from the School of Torpedoes; otherwise they would not be employed in torpedo service; they get, besides their certificate in the navy, a special certificate for torpedo service. Those are the only persons entitled to serve in the torpedo service.
1523. They are not allowed to handle any torpedo apparatus unless they have a certificate ? − Just so.

The witness withdrew.

Captain Wagemann examined.

Capt. Wagemann 5th April 1881

1524, It has been shown in evidence that the gun−cotton attached to the fuse was in a loose and damp condition. Under those circumstances, do you consider the theory that you conveyed in your letter to the newspaper (*see the Argus of 16th March 1881.)* still holds good ? − No, if it were loose and damp, I think it would not be possible to cause an explosion by friction alone between the fuse and the loose damp gun−cotton. 1525. Do you think it possible that the ignition of that fuse could be caused in any other way, as by rough usage or jerking of the wire ? − Certainly; as soon as the jerk was sufficient to move the wire in the interiors of the fuse, the motion alone is sufficient. 1526. What condition would black dynamite be in to render it dangerous ? − The black dynamite is, in my opinion, less dangerous than the red dynamite, because the difference between them is this, that the red dynamite is composed of nitro−glycerine 75 per cent, and burnt infusorial earth 25 percent. The dangerous condition of the dynamite depends on the ability of this admixture to suck up and keep the liquid dynamite. The black dynamite has, instead of infusorial earth, a powder which we make from wood. Black dynamite will suck up more nitro−glycerine than the red, and retain it better, but they make the black dynamite especially to be used under water, because you can place it perhaps a week in water without seeing any great quantity of nitro−glycerine exuding. The black dynamite made here, so far as I know, is the same as the lithofracteur, and this lithofracteur consists of those ingredients I mentioned before, but it is composed with different ingredients; for instance, the ingredients of blasting powder are supposed to contain the same ingredients. 1527. Infusorial earth is the principal absorbnt in the lithofracteur ? − Yes. 1528. And the wood powder is the absorbent in the other ? − Yes.
1529. What is the appearance of the black dynamite when in a dangerous condition − The black dynamite made here is different from that you have been describing as made in Hamburg ? − In the colonial dynamite there is infusorial earth and, as far as I know, charcoal. 1530. That is one of the constituents of powder ? − Yes.
1531. Under what circumstances is dynamite dangerous; what would it look like ? − In the case of exuding nitro−glycerine the inside of the parchment paper would be wet. 1532. What would be the outside appearance of the paper; might it look clean ? − Yes it looks clean, but if there is such exudation of nitro−glycerine that the nitro−glycerine passes through the folds, then of course the nitro−glycerine is perceptible on the outside.
1533. Being put into a case with dry gunpowder and comparatively dry gun−cotton, what would become of the nitro−glycerine ? − It would be absorbed by the gunpowder immediately and lose all danger. In proof of this I may mention that a new blasting powder is about being introduced which is combined with nitro−glycerine to facilitate the simultaneous combustion; in order to prevent the absorption of the nitro−glycerine by the powder, the grains of powder have to be coated with an impervious varnish, prior to the mixture with it of the nitro−glycerine.
1534. Have you anything you would like to state as to the cause of this accident ? − My opinion as to the decomposition and acidification being an element of danger, from the result of experiments, is that it has been shown that decomposition takes place so slowly that no sufficient heat for ignition of nitro−glycerine could be developed.

The witness withdrew.

James Jasper sworn.

James Jasper 5th April 1881

1535. What are you ? − Able seaman 1536. You were in the boat on the 5th of March, with Mr. Groves and others ? − Yes. 1537. You were there at the time of the accident ? − Yes. 1538. Can you tell us what was in the boat − the torpedo and the firing wire, some of it ? − Yes. 1539 Was there anything else you saw − did you see any battery in the boat ? − No. 1540. You know a boat battery ? − I cannot say I understand it.

James Jasper, continued 5th April 1881

1541. You know one when you see one ? − Yes.
1542. You did not see one ? − No.
1543. Was there anything in the boat of consequence belonging to the torpedo work that you saw ? − I saw nothing.
1544. Was there any conversation of any consequence bearing upon the work you were doing from the time you left the *Cerberus* til the time the torpedo was put into the water. Did Groves say anything to you or anyone else as to what he was going to do, as to whether they would have to be cautious ? − He gave the ordinary directions.
1545−6. Were you pulling an oar ? − No.
1547. Where were you sitting ? − On the port bow.
1548. You saw the torpedo in the stern sheets > − Yes.
1549. You saw the wire leading from the torpedo to the ship ? _ Yes.
1550. Which way did it lead ? − It led from the stern of the boat forward over the oars. outside of the gunwale.
1551. Did you see what was the cause of the delay after the torpedo was put over the side ? − I saw one of the oars was foul of the torpedo.
1552. In what way was it foul; could you describe it ? − I could not say which way it was foul.
1553. Did they try to pull the oar in ? − Yes, one man tried to clear the oar.
1554. You would be able to what kind of usage the case had − did it bump against the boat ? − No.
1555. Was there no sea on ? − Very little.
1556. Was there any poking at the case with a boat−hook or anything ? − When the torpedo was slung, it was slung with what they call a bale−sling. My thumb is supposed to be the torpedo *(an illustration)* The torpedo ran fore and aft; and the only knock they gave it was alongside the ship; they tightened the strap.
1557. How was that done ? − With the boat−hook; that was before we left the ship's side at all.
1558. Was there no bumping alongside of the boat when it was overboard − was there any blow made at the torpedo when it was in the water to draw it clear or anything ? − Not that I saw.
1559. You would have heard anything like a blow ? − I should have seen it; I was looking at it.
1560. Did it appear to you as if the oar was foul of the wire or the sling ? − I could not say how it was foul.
1561. How long a time after the case was overboard do you think elapsed before the explosion took place ? − I should think about a minute or a minute and a half, that was after it was over the side.
1562. When the oar fouled that firing line − do you think that it fouled the firing line or the bight of the firing line seized on the head of the torpedo ? − It was impossible for me to see how it was foul; I know it was foul, because they were trying to clear it when the explosion took place.
1563. Had anybody said anything during this foul ?− Timberly said to me "If anything was to happen, you would be in the best place." Groves said " he would look out that nothing happened until they were clear of it.
1564. Do you think that referred to Mr. Murray ? − I cannot say, but I suppose it referred to somebody on board the ship.
1565. Was there anything else in the boat that might cause a contact − you did not see any copper wire about ? − The rowlocks that the oars were pulled at were brass.
1566. There was nothing in the shape of a box or anything that might contain a battery ? − Not that I saw.
1567. If there was anything there should you have seen it ? − Yes.
1568. Did you see anything in the shape of a boat battery in the boat ? − No. if it had been there, I should have seen it, I should have known it, if I had seen it.

The witness withdrew.

John White sworn.

John White 5th April 1881

1569. What position do you hold ? − I am armourer on board the *Cerberus,* and rate as the chief petty officer.
1570. At the time of paying out the line from the ship to the boat where did you stand ? − At port quarter.
1571. Had you the line in your hand ? − Yes.
1572. For what purpose ? − To ease it over the rail as the boat went out.
1573,. You saw the boat stop when the wire was said to have been paid out ? − Yes, still she was drifting a little with the current; but they stopped pulling.
1574. Were you looking at the boat at the time ? − Yes.
1575. Did you see the torpedo being put over the side of the boat ? − Yes.
1576. At that time had you the wire tight in your hand ? − No, merely passing it loosely over the rail; I did not hold it tight.
1577. Would you have felt any tug ? − I should have felt a strain.
1578. Did you feel a strain at that time? − No.
1579. Are you sure of that ?− Quite sure.
1580. Nothing made you grasp it more or anything of that kind? − No.
1581. Was the line ever taut from the time it left the ship ? − No, it was not very taut when the boat had started, there was not much line overboard at first, but as the boat went out the wire was paid out.
1582. You think there was no tug sufficient to have disturbed anything in the inside of the torpedo? − There was no tug or strain sufficient to do that.
1583. Did you see the torpedo loaded ? − No.
1584. You did not see the contents ? − I saw some gun−cotton in the disc inside.
1585. What position did the gun−cotton occupy ? − It was lying loose, but I saw Mr. Groves tie a disc to the fuse.

John White, continued 5th April 1881

1586. did you see any discolored substance amongst the gun−cotton of any kind ?− No.
1587, Do you know what dynamite is ? − I cannot say I ever saw it to my knowledge.
1588. Did you see anything like black lumps on the binnacle ? − No, I cannot say I did.

The witness withdrew.

Mr. James Drummond Doyle further examined.

Mr. J. D. Doyle 5th April 1881

1589. You were going to tell us something you said about the dynamite? − The first mention I made of dynamite was on the Sunday morning, the next morning after the accident, to Mr. Holmes, in the Spencer street Telegraph Office. I then called to mind the exact charge of the case, and told him there were forty pounds of powder as I thought − there was seventy pounds in fact.
1590. You described the torpedo to him ? − Yes, that was the first mention I made of it.
1591. Then did you say to him you saw bits of dynamite in it ? − Not that I saw it in the torpedo.
1592. Was there any other conversation about the dynamite then between this time and the inquest ? − Not that I remember.
1593. You talked to none of your other comrades about it in the meantime ? − No.
1594. You saw where Mr. Murray stood at the time of the accident ? − Yes.
1595. Describe it − but first where did you stand ? − I stood some little distance from Mr. Murray, still on the starboard side.
1596. On the opposite side of the binnacle stand to Mr. Murray ? − Yes.
1597.Is that the binnacle stand that was between you and Mr. Murray ? − Yes, I was looking more Mr. Murray's way than the other way, but was not paying particular attention to anything, and then, immediately before the explosion. I saw Mr. Murray, and I saw that he had not changed his position.
1598. What position was he in at the time, just before the explosion ? − I am not quite sure.
1599. In your evidence before the inquest you stated that Mr. Murray was in a certain position; you corrected yourself afterwards. Under these circumstances you are not quite sure as to how it was ? − No.
1600. Whereabouts was Mr. Murray standing ? − Two or three feet away from the binnacle stand.
1601. In what position ? − With his right hand raised up, holding the end of the wire in his hand.
1602. Did you see where the wire went to from his hand ? − I could not see the wire from where I stood. Mr. Murray's left hand I am not certain about , it may have been resting upon the table.
1603. Did you see him holding the firing key in his left hand, did you see his left hand on the firing key ? − No.
1604. You stated at the inquest you did, and now you wish to say you did not, is that so, do you hold the same opinion as you stated there ? − I hold the opinion that he had his left hand on the firing key.
1605. Did you see his left hand on the binnacle stand, or the firing key, or did you see it at all ? − To the best of my belief, his hand was on the firing key.
1606. Did not the binnacle interfere with your seeing ? − I do not think so, there are four uprights to the binnacle stand, and it is easy to see through them.
1607. Before the jury you said "I do not adhere to my statement that immediately after the explosion I saw the firing key in Mr. Murray's hand" − do you still say so ? − I was asked as to whether the firing key was a fixture or not.
1608. Did you see Mr. Murray with his hand on the key after the explosion ? − That is a misprint.
1609. Did you see Mr. Murray's hand on the key after the explosion or on the binnacle stand ? − No, because I rushed immediately to the stern of the ship.
1610. Have you come to any conclusion in your own mind as to the cause of the accident ? − I think, very likely, it happened in this way, the torpedo in which the explosives were contained got a cant, and then a mass of this loose gunpowder, weighing perhaps twenty or thirty pounds, fell down on the dynamite.
1611. That is pre−supposing dynamite was there ? − Yes.
1612. You could not account for it at all except under the supposition that there was dynamite in the tin ? − No; I am strongly of the opinion that the torpedo was not exploded electrically.

The witness withdrew.

Adjourned.

APPENDICES

TORPEDO ACCIDENT AT QUEENSCLIFF

Memo. For Major Ellery.

It appears in the late fatal torpedo explosion at Queenscliff the case containing the charge was of zinc.
In endeavouring, therefore, to ascertain the cause of the accident, it has been suggested that electrical action sufficient for the explosion may have been set up between the zinc of the case and the iron of which the *Cerberus* is built. It is common practice to attach the earth−wire of the charge to the metal case, which thus becomes the earth−plate, but if this course was not adopted, it is easy to understand how the earth connection, though left loose, might come into contact with the case. Assuming that there was this contact, and further, that some portion of the copper of the firing−line came in contact with the iron of the body of the vessel, the zinc, the iron, and the sea constituted what is termed a sea−cell, and a simple test with the galvanometer has shown that under these circumstances a considerable current passes along the wire. The only difference between this sea−cell and a cell consisting of a tumbler of sea water with slips of zinc and iron, would be in their internal resistances; the electro−motive force would be the same, but the internal resistance of the small cell would be considerable, while that of the sea−cell is inappreciable, and may be regarded as nothing.
It becomes of importance to enquire what amount of probability there is in this hypothesis.
By the well−known law called Ohm's law, the electro−motive force in any circuit, measured in volts, divided by the current circulating in the circuit, measured in vebers, is equal to the total resistance of the circuit. Given any two of these quantities and the third can at once be ascertained.

Poggendorff (as quoted in Sabine) gives the electro−motive force of zinc and iron in concentrated solution of chloride of sodium (Na, Cl, common salt), as −−

.476 of a Daniell's element
= .476 x 1.079 volt.
= .514 volt.

From tables given in Everett's "units and Physical Constants, " the value would appear to be .564.
It is found thus −−−−
Difference of potential between copper of wire and iron ... ... = − .146
" " " iron and sea−water ... ... = − .605
" " " sea−water and zinc ... ... = + .565
" " " zinc and copper of wire ... ... = + .750
Total = .564

The latter being the more recent is probably the more reliable authority.
The first and fourth of these differences of potential are for contacts in air. I do not know what difference, if any, there would be for contacts in sea−water. In the case of the accident, one of these contacts was probably in air, the other may have been either.
The detonating fuse usually made use of for submarine purposes is numbered 12 in the table given in the Chatham Instructions in Military Engineering. It consists of a bridge of .3 inch of fine platinum wire, the resistance of which, when cold, is .325 ohm; at the firing point, .74 ohm, and the current sufficient to fire a charge through it, .75 veber.
A more sensitive detonator, numbered 13, is sometimes used for land service. It is made of finer wire, and its resistance, when cold, is about 1.08 ohm, at the firing point, about 2.6 ohms; and the current to fire a charge through it, .32 veber.
The wire used in the unfortunate experiment was, I understand of No. 15 B.W.G., the sectional diameter of which is .072 inch (see Molesworth's Pocket Book) and the resistance per mile, about 10.6 ohms, or at a rate of 166 yards per ohm.3
Assuming that the fuse used was No. 12, and the electro−motive force to be as
given by Everett, we have, for the firing current :−− Total resistance in circuit
= .564
.75 = .725 ohm, and this resistance consists solely of the fuse and the wire, that of the cell being nothing.
If the resistance of the platinum wire did not increase as the temperature of the wire increases, we should have −−−
Total resistance of circuit ... ... .752 ohm.
Resistance of fuse when cold ... ... .325 ohm.
Leaving for resistance of the conducting wire ... .427 ohm.
Which resistance = about 70.9 yards.
This is the greatest length of wire through which the current would fire the charge on the supposition that the resistance of the wire is constant.
Through that distance the charge might not be expected to explode, but I could not assert that it would not explode.
The current would probably heat the wire, though perhaps but slowly, the resistance

of the wire would increase with the temperature, and this increase would most probably reduce the current to a strength at which it would not fire the charge. It is in the first rush of the current through the conductor that the danger would lie, for that first rush might raise the wire temperature considerably higher than that at which it could maintain it, and that higher temperature might be dangerous.

From Bloxom's Chemistry, 3rd edition, page 503, I find that "gun−cotton is more easily exploded than gunpowder. The latter requires a temperature of at least 600 degrees F., whilst gun−cotton may explode at 277 degrees F.,and must explode at 400 degrees F." It further appears that the average temperature at which gun−cotton explodes when in the condition most favourable to its rapid heating is about 300 degrees F., and this, it is important to note, is a temperature much nearer the lower than the higher of the two limits given. According to the Chatham Instructions in Military Engineering, the resistance of the platinum wire increases .07 per cent, per degree Fahr. As its resistance at 60 degrees F., is .325, at 277 degrees F., it would be −−−

$$.325 + \frac{.325 \times .07 \times 217}{100} = .374 \text{ ohm}$$

And at 400 degrees F. it would be −−−

$$.325 + \frac{.325 \times .07 \times 340}{100} = .402 \text{ ohm}$$

For the lower of these resistances we have −−−

Total resistance of circuit	.752 ohm
Resistance of fuse at 277 degrees F.	.372 ohm
Resistance of wire	.378 ohm

Which resistance = about 62 3/4 yards. And for the higher −−

Total resistance of circuit	.752 ohm
Resistance of fuse at 400 degrees F.	.402 ohm
Resistance of wire	.350 ohm

which resistance = about 58 yards,

Through any length of wire considerably exceeding 62 3/4 yards, therefore, contact of the wire with the body of the vessel would be comparatively safe.

Through all lengths of wire between 62 3/4 yards and 58 yards the charge should certainly explode.

Bearing in mind that the resistance of the best made wires and fuses will vary as the quality of metal, the size of the wire, and, in the case of the fuse, as the lengths of the wire vary, it will be apparent that no sane person would for a moment trust his own life or the lives of others to the chance of a charge not exploding through any length of wire at all near the higher of the limits I have given.

Different results follow from using the more sensitive fuse, No. 13, and by taking the lower value for the electro−motive force. The results are embodied in the following table : −−

Electro−motive force.	No. of fuse.	Length of No. 15 wire between which explosion may be expected.
.564	12	62 3/4 yrds −− 58 yrds
"	13	86 Yrds −− 70 "
.514	12	51 1/2yrds −− 47 "
"	13	50 3/4 yrds −− 43 "

For lengths exceeding the greater length the charge may not be expected to explode. For lengths shorter than the less the charge should explode.

I have measured the resistance of the length of wire actually used, and found it to be .69 ohm, which corresponds to a length of about 114 1/2 yards.

The fuse was probably a No. 12 fuse. It was, I understand, made by the Naval Torpedo Corps. The resistance of a similar fuse also made by the same corps, I have measured and found to be .3 ohm. That fuse, therefore, was rather more sensitive than the average No. 12, fuse and could be fired through a slightly greater length of wire.

In such a circuit as that in question, the fuse of itself forms so large a portion of the total resistance of the circuit, that a slight variation in its resistance has a very appreciable effect. The resistance of the fuse when cold is equal to that of about 54 yards of No. 15 wire. If the bridge of the fuse consisted of 2−inch instead of 3−inch of platinum wire, its resistance would be about .1 ohm less. Hence, to maintain the same strength of current an addition would fire such a fuse, more than 161 yds. might be added without decreasing the efficiency of the current.

The true cause of the explosion will probably always remain more or less a matter of uncertainty, but a careful consideration of the results I have given will show that it is not very improbable that the explosion was due to a sea−cell current.

At any rate, the rates disclose a source of danger which cannot safely be lost sight of in torpedo experiments. I am not aware whether this source of danger has hitherto received such attention. If it has not, it may be because it is not usual to experiment with large charges in zinc cases. It seems clear that no officer in charge of an ironclad should allow experiments being made from on board with charges in such cases. Though comparatively short lengths of wire

such experiments may be dangerous as earthplates of different metals in a telegraphic circuit are mischievous.
The foregoing remarks, being purely theoretical, are submitted with some diffidence. I should like to see some experiments made on No. 15 wire and No. 12 fuse, with a zinc, iron, and sea−water battery. By connecting a number of cells abreast, so as to make of the whole one large cell, a sufficiently low internal resistance might be obtained. Or better still, experiments might be made on board the *Cerberus* with a zinc case similar to that which contained the fatal charge, or a zinc plate of equal surface and the materials of an ordinary No. 12 fuse.

H. MOORS

Westbury street, St. Kilda, 19th April 1881.

APPENDIX B.

Transport vapeur
Hobson's Bay, 6th Avril 1881.

Monsieur,
A` la question qui m'est adress'ee __ "Est−il consid'er'e comme necessaire dans le service de la marine francaise que la commandant d'uu batiment soit continuellement pr'esent a'bord pendant des exp'eriences de torpilles faites 'a bord de son batiment?"
Je ne erois r'espondre qu'en citant l'art, 232 de notre r'eglement __ "Le capitaine commande lui−m'me lors des appareillages et des mouillages, pendant le combat, et g'en'eralement dans toutes les corconstances importantes."
Je ne erois ponvior r'esponfre d'une facon plus cat'egorique, les cas n'etant pas autrement indiqu'es dans nos r'eglements.
A la rigueour, il appartiendrait a` une commission d'enqu'ete, les cas n'etant pas autrement indiqu'es peuvent s'etendre les derniers mots ___ "Circonstances importantes."

Veuilez agr'eer, Monsieur, Passurance de mes sentiments distingu'es.

Le Cap. de vaisscau commandant,
A. A. DUFRESSE.

M. lc Secretaire du "Torpedo Board of Enquiry, " Melbourne.

Steam Transport *Le Finistere*
Hobson's Bay, 6th April 1881.

Sir,
To the question which has been addressed to me ___ "It is considered neccessary in the practice of the French navy that the commander of the ship should be always on board during torpedo experiments made from his ship?"
I can only reply by quoting Article 232 of our Regulation __ "The captain commands in person when getting under way or anchoring, during an action, and generally in all important circumstances."
I do not think that I can answer in a more categorical manner, the cases not being otherwise pointed out in our Regulations.
Strictly speaking, it would be for a commission of inquiry to judge for itself how far the last words __ "important circumstances" __ may extend.
Be pleased to accept, Sir, the assurance of my special regard.

A. A. DUFRESSE,
Captain commanding the ship,

To the Secretary of the Torpedo Board of Inquiry, Melbourne.

By Authority: ROBT. S. BRAIN, Acting Government Printer, Melbourne.

1880−1

VICTORIA

TORPEDO

CORRESPONDENCE RELATIVE TO THE REPORT OF THE BOARD APPOINTED TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH THE FATAL ACCIDENT TO A BOATS CREW OF THE "CERBERUS" BY THE EXPLOSION OF A TORPEDO.

PRESENTED TO BOTH HOUSES OF PARLIAMENT BY HIS EXCELLENCY'S COMMAND.

Captain Mandeville to the Honorable the Chief Secretary.

Sir, Naval Officer, Williamstown, May 16th 1881.

I have the honor to acknowledge the receipt of your letter (No. 1746) of the 7th May, forwarding me a report of the Board appointment to inquire into the circumstances of the recent torpedo accident, stating that you will be glad to receive any remarks I may think proper to make on the report and evidence, and expressing your wish that I shall state what steps I propose to recommend for the better organization of that branch of the Naval Service which the report concerns.

In reply, I have the honor to say −−

!st. That I have nothing to add to the able report which Mr. Murray has already made concerning the circumstances of the accident, and the manner in which the electricians carried out the experiments entrusted to them.

2nd. There are, however, some portions of the board's report upon which I may offer some remarks.

3rd. The report of the Board appears to have been written without due information having been obtained concerning the relative duties of the Naval Torpedo Corps and the crew of H.M.S. *Cerberus.*

4th. Paragraph 12 of the Board's report states that there is a *"* division of authority on board the *Cerberus,* not only between the commander and the Naval Torpedo Corps, but also between the electricians themselves. These divisions add greatly to the possibility of accidents occurring."

There is no divided authority whatever on board the *Cerberus.* Each officer has his own individual duty to perform, and it would occasion the greatest confusion if one officer arbitrarily interfered with another's work, merely because he happened to be a senior in command. The division of labor carried out, as it is, under proper discipline, tends to prevent accidents, not to create them.

5th. The same paragraph (12) states that "the electricians belong to the Railway department, and not the ship." I protest against this paragraph being regarded , as if it is intended to be so regarded, as a censure on the method adopted by the Government for the efficient working of the Torpedo Corps.

I do not require electricians for service on the *Cerberus.* The crew is quite able to manage all electrical work required for ships or boats. The special electricians are for work ashore, and only come afloat to gain further knowledge in their profession. On this occasion Mr. Murray informed me of that which he desired to be done, and I gave him permission to do it. There was, I may say, nothing out of the way in the explosion of the large torpedo. Mr. Groves and I have exploded scores of such mines, from 7lbs. to 80lbs. weight of powder.

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6th. The same paragraph (12) concludes by saying that my authority appeared to extend "only to saying that he (Captain Mandeville) would be glad if they would accompany him, with a view to having torpedo practice also." The board must be aware that I cannot force auxiliaries for service for four days together. The terms in which I expressed my desire to give the corps an opportunity of practice were dictated by my sense of courtesy to gentlemen permanently employed on shore, who could not afford to sacrifice their time for several days together, and were compelled, in most instances, to lay themselves under the compliment of "asking leave" to join the cruise. The difference between "command" and a "request" is well understood by the strictest disciplinarian.

7th Paragraph 13 says that Mr. Groves was the only one of the corps who had "previously seen a practical illustration of the discharge of large torpedos, and this seems to have originated the desire to conclude the day's experiments with the one that proved fatal."

I believe that this is correct; but I am at a loss to know if the Board intends the mention of the fact to be taken as an indirect censure upon the day's proceedings. Experience can only be gained by experiment, and the ignorance of the Torpedo Corps as to the effect of a large torpedo appears to me to be the precise reason why they should explode one under the direction of the officer appointed to instruct them.

8th. Paragraph 14, with paragraph 18. contains, I think, the only part of the Board's report upon which I am called upon to report.

9th. Paragraph 14 says "Captain Mandeville was ashore at the time of the accident, partly to witness the effect of the explosion from the shore, and for other purposes not stated. He was without a field−glass, for the purposes of actual observation, and was not watching the explosion at the moment. His only lieutenant was also on shore, having leave of absence from the ship for the night. From these facts it is evident he did not consider it of importance that he or his lieutenant should be present at the time of carrying out an important, and, in their case, a novel, experiment, namely, that of firing a fully loaded stationary mine from the deck of an ironclad vessel."

The "other purposes not stated" was the payment of a compliment to Captain Harrison, R.N. a naval officer who had come off for the purpose of seeing the ship, and to whom I wished to extend the courtesy customary on such occasions by taking him ashore in my own galley.

I did not require a field−glass; and though watching for the explosion, and knowing with tolerable certainty when it was likely to occur, the unhappy accident which has been the subject of the Board's report caused the explosion to take place prematurely, and prevented by observing any more than the upheaval of water.

My lieutenant, Mr. Collins, was absent from the ship after working hours, on leave, which I consider he was well entitled to, or I should certainly not have granted it.

Owing to the reductions in the service, I have no actual second−lieutenant, but my third officer, Mr. Richards, is a gentleman in whom I have every confidence, and I left him in charge. It is true, as the Board points out, with I venture to think some asperity, he is only a "Chief Gunner," but I may be permitted to call your attention to the fact that a chief gunner in the navy, ranks with a lieutenant in the army, the actual rank of officers when in the Imperial Service who now hold important commands in the Volunteer Force of Victoria.

The experiment which resulted so fatally was not to me a "novel experiment," and I did not consider it of importance that either I or my first−lieutenant should be present.

10th. Paragraph 18 says, "The Board consider it a matter for regret that both Captain Mandeville and Lieutenant Collins should have left the *Cerberus* whilst such an operation as firing the first large submerged mine from the ship was pending an operation which, even if conducted with strict order and formality, and the utmost scrupulous care in every detail, still entailed a certain amount of risk on those immediately concerned with it, and therefore, according to all usage of both naval and military service. imperatively demanded the presence and supervision of every officer."

As I have already had the honor to say, I did not and do not consider that either Lieutenant Collins or myself ought necessarily to have remained on board, but I have felt, and feel, sincere regret that I was not nearer to the scene of the accident which ended so disastrously, though my presence there could not have mended matters. The Board themselves say, paragraph 13, that " there was general carefulness throughout the day's work, that the battery and leading wires had been properly arranged on board, that no mishap occurred up to the time of the explosion, and that the utmost sobriety and quiet existed among the men employed;" while they, in paragraph 20, express "their regret that they are unable to discover with certainty the exact cause of the explosion of the torpedo." though, unanimous in the opinion that the disaster was brought about by an electric current in some unexplained manner."

As I have had the honor to already explain, I am responsible for the discipline of my ship, but not for the accidents occurring by electric currents.

11th. I have no remarks to make on the evidence; but in Appendix B, attached to the report of the Board, is a letter from the captain commanding the French steam transport *Finistere.* replying to a question addressed to him concerning the practice of the French navy as to the necessity for the commander of a ship to be on board during torpedo experiments. Captain Dufresse replies, "I can only reply by quoting Article 232 of our Regulation __ 'The captain commands in person when getting under way or anchoring, during an action, and generally in all important circumstances.' " I do not think I can answer in a more categorical manner, the cases not being otherwise pointed out in our Regulations. Strictly speaking, it would be for a commission of enquiry to judge for itself how far the last words "important circumstances" may extend.

I am not acquainted with the internal discipline of the French navy, nor should I consider and English officer bound to follow precedent there existing; but you will observe that Captain Dufresse's reply leaves the question of "important circumstances" to be settled entirely by the officer in command, subject, of course, to such future enquiry as his superiors may choose to institute.
I have been, however, lieutenant on board H.M.S. *Excellent,* gunnery ship at Portsmouth, when important experiments were being instituted, and the commander of that vessel, the present Admiral Boys, did not consider it his duty to remain on board when experiments were made, neither did the Captain of H.M.S. *Vernon,* Torpedo Training Ship.
While desirous to pay every deference to the finding of a Commission appointed by the Government, I beg leave to point out that, so far as the report of the Torpedo Board has touched me personally, it has made reference only to the management and conduct of my ship, and I cannot respectfully submit that Messers Joseph Bosisito, Robt. L. J. Ellery, Samuel W. McGowan. J. Cosmo Newbery, and Jas. Phelan, however competent they may be to judge matters of scientific interest, are not qualified to report upon the discipline of a man−of−war.
With regard to the last paragraph of your letter, I shall have the honor to reply to you at length in a separate communication.

I have the honor to be,
Sir,
Your most obedient servant,
C. T. Mandeville
Capt. Commg. Naval Forces.

The Hon. Graham Berry. Chief Secretary

(Enclosure])
Chief Electician Murray to Captain Mandeville.

Railway Telegraph Department, Spencer Street Station.
Melbourne, May 9th 1881.

Sir,
I have the honor to submit for your earnest consideration the following comments upon the report of the Torpedo Accident Board recently published, which, while it states at the outset that "the direct evidence shows that it is highly improbable that an electric current sufficiently intense to ignite the fuse was either intentionally or accidentaly transmitted," and adds that "the battery and leading wires, as shown to the Board, appeared to have been carefully arranged," concludes by stating that they are unanimous in the opinion that the disaster was brought about by an electric current in some unexplained manner."
I regret that the Board have not been able to explain more definitely the cause of the explosion, and now beg emphatically to protect against its decision, as being in direct opposition to the evidence taken before them; nor do I consider that they have any justification whatever for their assertion that the Naval Torpedo Corps have evinced a want of training and practical knowledge. With your permission, therefore, I shall proceed to state hereunder my reasons for dissenting from the conclusion of the Board.
Paragraph No.4 of the report, after approving generally or the battery arrangements, finds fault with the large number of cells used, stating that this would be "an element of danger in case of defective insulation or of accidental metallic contact with any portion of the ship." The number of cells used was not too great, as the battery has been tested by me that same morning, and found not to be capable if firing more than fourteen ohms resistance. The circuit for which it was made up had a resistance of not less than twelve ohms; and all torpedo authorities lay down the rule that firing batteries *should have considerable excess of power.*

I cannot agree that there would be an element of danger in the firing battery in case of defective insulation of the firing line, because, unless there was also a defect in the insulation of the wire leading from the battery, which is acknowledged to have been perfectly insulated, no circuit through the battery could have been formed at all. Further, even supposing both these wires to have been faulty, and the line wire to have been in contact with the metal of the ship, I maintain this would have been an element of safety and not of danger, as, under these circumstances, the battery would be short−circuited through the ship, and no current would pass to the firing line. This it would have been easy for the Board to prove by actual experiment, but they took no steps to ascertain whether any of the defects in the insulation of the firing line were so situated as to be in contact with the ship at the time of the explosion, and whether, if so in contact, any current would pass through into the torpedo. I did test this after the Board's visit to the *Cerberus,* and found that no current passed over the line. Further, I found that the defects in the firing line, even if they had existed at the time of the accident (which is denied), were so situated that they would have been in the sea, and not touching the ship, at the time of the explosion.
In paragraph 5 the Board refers to the possibility of the accident having been caused through the current set up by a "sea cell " − that is, a galvanic cell formed by the iron of the ship, the sea water and the zinc case of the torpedo − and attach a report from Mr. H. Moors, captain in the Torpedo and Signal Corps, of calculations made by him with a view to prove the value of this supposition. Mr. Moors is a theorist, unused to practical working, and he therefore

ignores, when making his calculations, a most important condition, namely, the resistance of the point of contact (supposing there to have been one, which is denied) between the very small surface of wire thought to be exposed to the presumed defect and the iron rail of the ship, which is thickly covered with paint. His calculations, therefore, are entirely untrustworthy and misleading; but, seeing the very great importance of the point, it would seem reasonable that the Board should have practically tested the matter, as well as to have obtained these theoretical views of Mr. Moors. They, however, made no attempt to do this. When they experimented from the deck of the *Cerberus*, although they used twice the surface of zinc which was present at the time of the explosion, and which, by decreasing the resistance of the sea cell, fully made up for the extra saltiness of the water at Queenscliff, Mr. Ellery made the remark, "there is no heating current there." Moreover, the contact with the ship at the time of the experiment was made by scraping away the paint from the iron railing and wrapping around it several turns of the clean copper wire, so that the conditions were much more favourable for showing the presence of a heating current than any that could have possibly existed at the time of the accident. I may add that though the Board did not think it necessary to test the heating power of the current, I did so, previous to the Board's visit to the *Cerberus*, and found that the current was not sufficient to heat a short length of platinum wire equal to the bridge of a fuse.

In paragraph 6 the Board proceed to throw discredit upon the evidence of one of the witnesses who is also one of the electricians. The report states as follows :− "One witness only (Doyle) stated that he saw grains of black dynamite lying on the binnacle table alongside the gun−cotton, but he did not see the torpedo. Doyle was subjected to a careful cross−examination, and under it his evidence became less reliable."

I would point out that Mr. Doyle stated, not that he only saw *grains* of dynamite, but that he saw a *cartridge* of dynamite. His answer to question No.1366 is as follows : − "Part of it was still in the wrapper; and there were some loose grains, not many, on the wood of the binnacle stand.'" Further questioned − "Are you quite clear of that?" he replied, "Quite clear."

I have closely scrutinised his evidence, and cannot find that the Board have any grounds for saying that it became less reliable under cross−examination, or that he altered or varied what he said about the dynamite in the least possible degree, at any time, and he still maintains that the dynamite was present, and that it had disappeared from where he saw it after the torpedo was made up, and before the explosion. In the same paragraph the Board go on to say that "supposing, however, that the dynamite was in the case, it would not have increased materially the danger of accidental explosion, unless it were in bad condition, that is to say. unless the nitro−glycerine had separated from the absorbent material and remained free."

I would remark upon this, that it was shown in the evidence that the cartridge of dynamite seen by Mr. Doyle must also necessarily have come out of one of the small hand−grenades, which were shown to have been wet, so that the dynamite would be therefore in a bad and dangerous condition.

It is further contended by the Board that the exuded nitro−glycerine would have been absorbed immediately by the gunpowder; but *all* experts do not acknowledge this to be the case; and besides, it is only reasonable to assume that the dynamite was only in contact with the wet gun−cotton, mixed with which it was replaced in the torpedo.

Further, I would call attention to the evidence given by Mr. Ellery at the coroner's inquest (and which I attach) as to the danger of dynamite. That gentleman stated that, "If free nitro−glycerine was present, it would account for the explosion, and that, in his opinion, the explosion was caused by nitro−glycerine which had exuded from a piece of dynamite which had been subject to the action of water."

In replying to questions 1515 and 1517, Captain Dufresse says, "My opinion is, that probably nitro−glycerine exuded from the cartridge and came into contact with the metal of the fuse, which might have been exploded by rough handling in that state, if the nitro−glycerine had been exposed to the concussion of hard substances." He further testified that a blow from the outside would cause the explosion, and that he does "not see any reason why the explosion could have taken place without dynamite."

Paragraph 10 states that "Neither the chief electrician (Mr. Murray) nor any of the members of the corps appear to have acquired, either by instruction or actual practice, a safe knowledge of torpedo operations, or of the exact properties and characteristics of the explosives used in torpedo service. "I deny the truth of this, or that it is established by evidence. How, then, has it been ascertained? Is it from the mode of instruction by which the electricians obtained their knowledge? If so, how did the members of the Board (Messers. Ellery and McGowan), who are also officers of the Torpedo and Signal Corps, acquire the proficiency which enables them to pass judgement? It is true Mr. Ellery spent a week or two at one of the torpedo depots in England; but the practical experience which has made him an authority on torpedo matters has been gained, if I mistake not, entirely in this country, and I do not think Mr. McGowan, and Mr. Moors of the same corps, who is quoted as an expert, have had any opportunities to acquire knowledge which have not also been available to the members of the Naval Torpedo Corps.

I do not know what the Board mean by "a safe knowledge of torpedo operations," but I do know that since I have had the honor to belong to your service, I, with the other electricians, have spared neither time or trouble to make myself thoroughly competent to perform the duties of a torpedo officer. As you are aware, the members of the corps have been for many years performing duties connected with practical applications of electricity, and as the science of torpedo warfare consists to a large extent of the arrangement of electrical circuits, preparing and testing

cables, and the manipulation of batteries and scientific electrical instruments, all of which our previous work fitted us for, I submit the Board are not justified in stating that we have had no previous training.
During the last two years we have had frequent and regular drills, and much practice in the use of explosives for submarine mines; and although only small charges were used, the same care was necessary, and was always displayed, as if a large quantity of explosives was being handled.
The late Mr. Groves, who had been Gunnery Instructor ~ on board H.M.S. *Excellent* at Portsmouth, has re−delivered to us on numerous occasions the lectures on explosive compounds which it had been his duty to deliver to the sub−lieutenants of the Royal Navy. In this way we have derived much important information upon all kinds of explosives; and, in addition to this, most of the authorities on gun−cotton and gunpowder, as well as the whole of the information procurable on nitro−glycerine and its compounds, had been carefully studied by the members.
In the same paragraph it is made to appear that I stated I had studied torpedo work "under Captain Mandeville;" my reply, fairly read, means that while under your command I studied this work, not that I had learned the duties from actual teaching by you.
Allusion is made in paragraph 11 to the syllabus of subjects for discussion by the Naval Torpedo Corps handed in by me, and one of my answers is distorted so as to mean something quite different to what I intended. The Board say that "each member of the corps had a subject for study, leaving it to be inferred that no one member was perfect in his work."
On the other hand, I assert that, if the subjects are fairly judged, it will be found that Mr. Groves was an expert of guns and gunpowder, the subject he was intended to handle. Mr. Haysmans is an expert on locomotive torpedoes; I claim to be an expert on galvanic batteries; nor do I admit that any of the officers were incompetent to handle the subjects chosen for them, although all might not necessarily be experts. The preparation of each lecture by its author would involve a certain amount of labor; and a discussion on the subject, which would follow its delivery, would be engaged in by all officers present, so that any deficiency on the part of one would be made up by the superior knowledge of others, and the result could not fail to be beneficial to all.
Finally, the inference drawn by the Board was not warranted by anything I said. When under examination, I afforded them an opportunity to ascertain my personal knowledge by saying in reply to the question, "Did I consider myself, when first placed in charge of the Torpedo Corps competent to fulfil the duties? − "Perhaps not, but I proceeded to make myself competent;" and in reply to the next question, "Did l now consider myself competent?" I answered "Certainly, l do." I would submit that, if the Board attached such weight to my remarks as to the proficiency of myself and fellow electricians as to base its estimate of our capability upon what l said, surely they should have allowed those questions and my replies to appear in my printed evidence; but, although l pointed out to them in a written communication that an omission had been made, and requested that the deficiency might be supplied, the Board declined to supply it.

Paragraph 12 speaks of a division of authority between the commander of the *Cerberus* and the Naval Torpedo Corps, and the electricians themselves. I do not know where any evidence is to be found to support this view. It is true that your letter to me was couched in the ordinary courteous terms which are usually employed between gentlemen, but none the less l did regard it as a command to be obeyed by me if my other duties in the Railway Department would permit. When on board the *Cerberus*, l am of course, as much under your command as any other officer. As for differences between the electricians themselves, there is not the slightest warrant for making such assertion.

In reply to paragraph 13, l may state that the *idea* of firing the large mine did not originate with any member of the Naval Torpedo Corps, and it distinctly appears in evidence that no excitement or eagerness was shown. On the contrary, the Board themselves are good enough to admit that "there was general carefulness throughout the day's work, that the battery and leading wires had been properly arranged on board., that no mishap occurred up to the time of the explosion, and that the utmost sobriety *and quiet existed amongst the men employed."*

I really cannot see how paragraph 15 of the Board's report bears upon the matter at issue, or what right they have to censure me for having taken away a small quantity of chemicals, namely, a piece of potassium and less than an ounce of fulminate of mercury, the latter being immersed in water. My reason for removing these substances was that I thought it best to keep them in my own charge, where they now remain, as, after the death of Mr. Groves, there was no officer resident on the hulks in whose charge they could be placed.

Paragraph 17 − I deny that there is any evidence to support this. The electricians of the Naval Torpedo Corps are blamed for laxity and want of caution in loading the mine, an operation which was solely in the hands of Mr. Groves, than whom no one is believed to have had more practical knowledge in the handling of torpedoes and explosives, and whose unfortunate death has deprived the Board of the only evidence that could be conclusive as to the actual contents of the mine.

Secondly, that the firing battery employed was excessive, and indicates a want of judgement. This statement l have replied to previously.

Thirdly, l have previously given reasons why l deny the conclusion of the board, and challenge proof.

Fourthly, "The most important error was committed in sending away the torpedo to its destination, leaving the battery end of the firing line on board ship." To this l reply that there are no regulations which would apply to all cases. The practice on which the Board's assertion is based does not apply to extemporised work, such as that we were engaged in. If the torpedo

had been one to be placed in position where it was to remain any length of time, the method of laying it would have been different, or if any operations required to be performed in the boat, which would occupy any length of time, a time during which it would be convenient for a skilled officer to hold the end of the firing line, and so ensure its being in a safe condition, it would doubtless be proper to send the line with the torpedo; but in the case in point it was intended to fire the mine directly the boat had returned to the ship. which was not expected to be more than five or six minutes from the time of starting. It was not, therefore, inconvenient in any way for me to hold the line, and l maintain it was as safe in my hands as if it had been in the boat.

Fifth. It is not, as stated by the Board, the *practice* of the Naval Torpedo Corps to have both the battery end of the firing line and the firing key in the hands of the same person while a torpedo is being placed in position. The practice is, in cases where, as in the one in question, a single torpedo is to be fired immediately, at a short distance from the firing station, for the firing line to be taken out from the station, the end being kept in the hands of the officer in charge; but in cases where a torpedo was to be laid at some distance from the firing station, and where the work of laying would occupy a considerable time, the firing line would be taken out with the torpedo and brought back to the firing station, whether that station were on shore or on board a ship, and in the latter case the officer in command would, as the Board says is the proper course, to pursue, not perform any operation himself until the line was brought back to the firing station, when he would connect it to the firing key, and fire the mine. As to the propriety of the practice for which the Board seeks to impute blame on us, l maintain there can be no doubt. The torpedo was an extemporised one, such as are frequently use in actual warfare. It was not stationary but drifting, and in placing it, therefore, the practice would necessarily be to place it as was done on the occasion of the accident. Extemporised mines of this character, and placed in this way, with the end of the firing line at the firing station, must necessarily be used for countermining and for other kinds or torpedo work where speed is the principal element of efficiency.

Another system, one which has been recently devised, and is strongly recommended by the best torpedo authorities, is where the torpedo is hauled into its position through the sinker. In this case the cable would first be laid from the firing station and be attached to a buoy in connection with a sinker. When it became desirable to place the torpedo, it would be taken out, connected, and hauled into its proper depth. This would necessarily occupy a considerable time, during the whole of which the boat and its occupants would be immediately over the torpedo connected with the firing line, *the other end of which would be in the firing station,* a condition exactly similar to that which existed in the case referred to in the Board's report.

Paragraph 19 − l do not see how the Board can say with any degree of propriety that it appears from the evidence that no notes were taken during the trip of the *Cerberus,* whereas, as a matter of fact, my evidence (questions 713−4) shows that l handed in and read my rough notes, written at the time, from which to write afterwards a full account of our proceedings. I may here state that at the conclusion of my evidence before the Board, the Chairman asked me if there were any further points l wished to remark upon, before l could answer, a member suggested that it would be better to wait until the Board had visited the *Cerberus.* In this way any further questions, and any further remarks from me, were postponed; and l regret that the Board did not recall me, so that l might have been asked my opinion as to the cause of the explosion; also to explain my reasons for removing the small quantity of potassium and fulminate; and l also wished to have an opportunity of explaining other points upon which l thought the Board required information.

In summing up, l beg to point out that three ways are suggested by which the explosion may have been effected :− 1 Electrically. 2. By friction in the fuse. 3. By concussion, and the consequent explosion of nitro−glycerine set free from the dynamite.

The Board adopted the electrical theory, and mention three ways in which an accidental explosion may have been brought about :−

a. By the connection of the battery line with the firing wire by means of a firing key.

b. By the wire being badly insulated.

c. By the action if the sea cell.

The first is a matter within my own personal knowledge, and l speak upon it therefore with positive certainty, and affirm that no contact was made, a fact which is confirmed by the evidence of all who were present. I therefore dismiss it, as the Board appear to have done.

The second and third theories l have shown to be equally untenable; and I would again point out that the Board could easily have decided both questions practically by going to Queenscliff and applying tests, under circumstances exactly similar to those which existed at the time of the accident; and such being the case, l protest strongly, as an act of injustice committed by the Board, against the question being allowed by them to remain one of theoretical electricity, when they could have disposed of it by practical experiment in a few hours.

2. The theory of friction in the fuse had been discarded by the Board.

3. There is left, therefore, only the dynamite theory. l submit that the Board have rejected most unjustly the positive evidence of Mr. Doyle. During cross−examination it was unshaken, and it was indirectly substantiated by the evidence given at the coroner's inquest by Charles Evans, A.B. and by Chief Petty−officer Kennedy, whose evidence, as printed in the *Argus,* I attach, but neither of whom were called by the Board. Further, it is shown that the dynamite could only have come out of one of the hand−grenades, which were wet inside, and therefore it would necessarily be in the condition which Mr. Ellery, at the inquest, and Captain Dufresse, before the Board, declared to be dangerous, and in their opinion likely to explode upon concussion.

I submit, therefore, that the evidence points to the fact that the presence of dynamite in the charge was the circumstance that led to the accidental explosion, and l would suggest, in conclusion, that the report of this Board, with these comments, be submitted to Captain Dufresse, an experienced torpedo officer, and one entirely unprejudiced, with a request that he will kindly give you the benefit of his opinion upon the whole question.

I have the honor to be,
Sir,
Your most obedient servant,
K. L. MURRAY
Chief Electrician, Naval Torpedo Corps>

Captain Mandeville, R.N., Chief Naval Officer, &c., &c.

[Enclosure No. 2]
Chief Electrician Murray to Captain Mandeville.

Victorian Railways, Telegraph Engineer's Office,
Melbourne, 13th May 1881.

Sir, I have the honor to acknowledge the receipt of your memo, in which you point out that, in my comments on the report of the Torpedo Board, l have omitted to remark, upon the latter part of clause 19, which says − " The voyage of the *Cerberus* to Queenscliff, on the 4th and 5th March 1881, resembled more a voyage for pleasure than one for the purpose of improving the defences of the colony."
I did not lose sight of this remark, but thought you would prefer to deal with it yourself. l can, however, give it a direct and most unqualified denial. It is nothing but a gratuitous insinuation, utterly devoid of foundation.
I regard the trip from the first as one which would afford us an opportunity for practice in the channel near Queenscliff, where we could see the effect of the rapid current upon the laying of cables, circuit closers &c., and that thought was present always both with me and the other electricians.

I have the honor to be, Sir,
Your most obedient servant,
K. L. MURRAY
Chief Electrician>

Captain Mandeville, R.N., Chief Naval Officer,&c., &c.

Captain Mandeville to the Honorable the Chief Secretary.

Sir, Naval Office, Williamstown, May 17th 1881
I have the honor, as requested, to forward for your information the attached letter from Mr. Doyle, electrician in the Naval Torpedo Corps, received by me through Mr. K.L. Murray

I have the honor to be, Sir,
Your most obedient servant,
C. T. MANDEVILLE
Captain Commanding Naval Forces

The Honorable the Chief Secretary,&c., &c.

[Enclosure}
Chief Electrician Murray to Captain Mandeville.

Victorian Railways, Telegraph Engineer's Office,
Melbourne, 16th May 1881.

Sir, I have the honor to forward herewith a communication from Mr. J.D. Doyle, one of the electricians of your department, in which he protests against some remarks in the report of the Torpedo Board in which he thinks reflect upon his personal veracity.

I am, Sir,
Your most obedient servant,
K. L. MURRAY
Chief Electrician>

Captain Mandeville, R.N., Williamstown.

[Sub−Enclosure]

Electrician Doyle to Chief Electrician Murray.

Sir, Telegraph Branch, Victoria Railways May 13th, 1881.

As my evidence before the Torpedo Board on a simple matter of fact has been deemed by them to be not reliable, l would beg your permission to ask further enquiries be made, as l consider my personal truthfulness is at least called in question, though not directly impugned; nor do l think it just, that an injury should be inflicted on my character without my having an opportunity to defend it until after the injury was done.

It is impossible that l can have been *mistaken,* as the board says. l have twice declared on oath, and again affirm, that l *did see* the cartridge of dynamite, it was a two ounce cartridge, and that the dynamite was black in color. l described circumstantially and minutely its appearance and its position on the binnacle stand of the *Cerberus.* Nothing transpired during my examination by the Board to lead me to think they had not the fullest confidence in my veracity. Had l thought it possible they would discredit my statements l would have insisted on further enquiry, and l would have myself gone to McLean Bothers and Rigg's to ascertain what particulars l could about the dynamite supplied by them. But when l left the board−room, the Chairman thanked me for the information l had given to the Board and for the trouble l had taken in waiting upon three occasions. l was, therefore, much surprised to find that they had attacked my character in their report, which has been widely published in the newspapers, without giving me any warning or opportunity of vindicating myself.

It appears that the dynamite (seven ounces) now on board the hulk *Deborah* differs in color from that seen by me on board the *Cerberus,* and this seems to be one of the reasons why the board declines to believe my sworn statement. I maintain this is a proof of my *bona fides,* and not that l had spoken falsely or mistakenly. Had l wished to invent a false story about dynamite, l could, after Mr. Grove's death, have gone on board the hulk, examined the color of the dynamite there, and made my false statement to correspond. But the fact is that l have never, even to the present moment, seen the contents of the packages of dynamite on board the hulk.

The board appear to overlook that there is not only a difference in color between the fatal cartridge and those now remaining, but also a difference in size. The fatal cartridge was a two−ounce one. (*see my evidence,* question 1465), while those on board the hulks are ounce cartridges, l again maintain this is a proof of my entire truthfulness, as no one wishing to tell a false story would fail to notice these points and their probable bearing upon the manner in which is evidence would be received; while l, not fearing to be disbelieved, did not attempt to reconcile the differences in color and size of the two dynamites.

In justice to me, the Board should have examined one of the employees of McLean Brothers and Rigg, who supplied the 5lbs. of dynamite in April 1880. Possibly one of them could even now testify with certainty to the color, number, and size of cartridges when delivered; and this might − and l hope will − yet be done. lf it is shown that some two−ounce cartridges of black dynamite were delivered to Mr. Groves, it will, in a measure, strengthen my evidence, but, in any event, l am confident that l have nothing to modify or withdraw.

Neither was Kennedy, the chief petty officer, examined on oath by the Board, although he gave evidence at the coroner's inquest, and could, no doubt, have given fuller and more important information to the Board, as he was always left in charge if the hulks during Mr. Grove's absence and since his death, and had frequent access to the explosives.

It is unfortunate for me that no one else on board the *Cerberus* saw the dynamite, but l think something can be said to account for this, though l did not think it necessary to remark upon this point before. l will now remind you that l arrived on board the *Cerberus* at 10a.m. on the 5th March, when most of the preparations were being made for the day's torpedo work. It was not certain that l could come, as l might have been prevented by business; therefore no special place was kept for me in the day's programme. During the afternoon, Mr. Groves and Mr. Houston were in the boats, Mr. Schreiber was much occupied with the mechanical work, you took general charge of the arrangements, while l was not detailed for any special duty; and in this way l account for my having leisure to look around me and see the dynamite, while others did not.

The officers of the ship would not interfere in our torpedo work proper, any more than we would interfere with them at the turret guns or engines.

Again it will be remembered that the gun−cotton and dynamite were not on the binnacle stand for more than half an hour at the most, probably for a less time. The dynamite, therefore, might easily escape the notice of any one not directly interested; and l look upon it as a providential circumstances (although it has proved unpleasant to me personally) that l did notice it, and so was able to testify with certainty as to its presence.

l did not mention the dynamite to anyone on board the *Cerberus,* because l had no occasion to do so, and because it did not excite my special attention. l have told the Torpedo Board (question 1589) when l first made mention of it, and l think my narration of the facts is such as would convince any impartial tribunal that l am strictly truthful.

There is another way in which further enquiry can be made into the dynamite question. After the fatal explosion, there yet remained on the *Cerberus* some unexploded tins, covered with pitch.

These have, since the Boards visit, been removed to the hulks, where they now remain.

I beg to suggest that they be opened, in the presence of the board, with the view to ascertaining if they contained black dynamite.

I have pointed out that I cannot possibly be MISTAKEN at to the presence of the dynamite, and l now ask what motive is or can be alleged that would actuate me to make a false statement? l was not personally concerned with the mine, so that l need not have feared blame on any account. No personal motive, therefore, could induce me to commit perjury.

On the other hand, l can show that the Board had prejudged the case, and were determined to find that the explosion was caused electrically. During the enquiry, one of the members of the Board told me, in conversation, that he was sure the mine had been fired electrically, by accident. As this gentleman is not an electrician, it is only reasonable to assume that he derived his reasons for forming this pre−expressed opinion from information given him by members of the Board who were skilled in electrical knowledge. l therefore feel myself justified in boldly stating that the Board had prejudged the case, and that they rejected my evidence, and neglected to enquire further into the supplying of the dynamite, because it would not coincide with their views as to the explosion having occurred through neglect on the part of the electricians.

After this conversation, which took place away from the board−room, l was further examined on oath. When asked my opinion as to the cause of the explosion, l stated "l am confident the torpedo was not exploded electrically." The Chairman said, "You cannot be confident, you may say you are strongly of the opinion," on which my words were modified to that form. This again indicates what were the views of the Board, and how they would not receive certain evidence. When under examination by them, l felt that l was before an adverse court, who tried to make me, as well as the other witnesses, say something unfavourable to you, myself, or the electrical arrangements generally. l, nevertheless, answered their questions, often of an inquisitorial nature, fully, fairly, and truthfully, and now beg to request that you will take such steps as you think fit to enable me to clear my name from the slur which the torpedo board has attempted to fasten upon it.

I have the honor to be,
Sir,
Your most obedient servant,
JAMES DRUMMOND DOYLE
Electrician, Naval Torpedo Corps.

K. L. Murray, Esq., Chief Electrician, Naval Torpedo Corps.

By Authority; ROBR. D. BRAIN, Acting Government Printer, Melbourne.