

BILINGUAL

# REPORT

OF THE

Commissioner in the matter of the Investigation  
into the Circumstances attending the Explosion  
in the Drydock of Canadian-Vickers Limited,  
Montreal, June 17, 1932

S. A. BAULNE, Commissioner

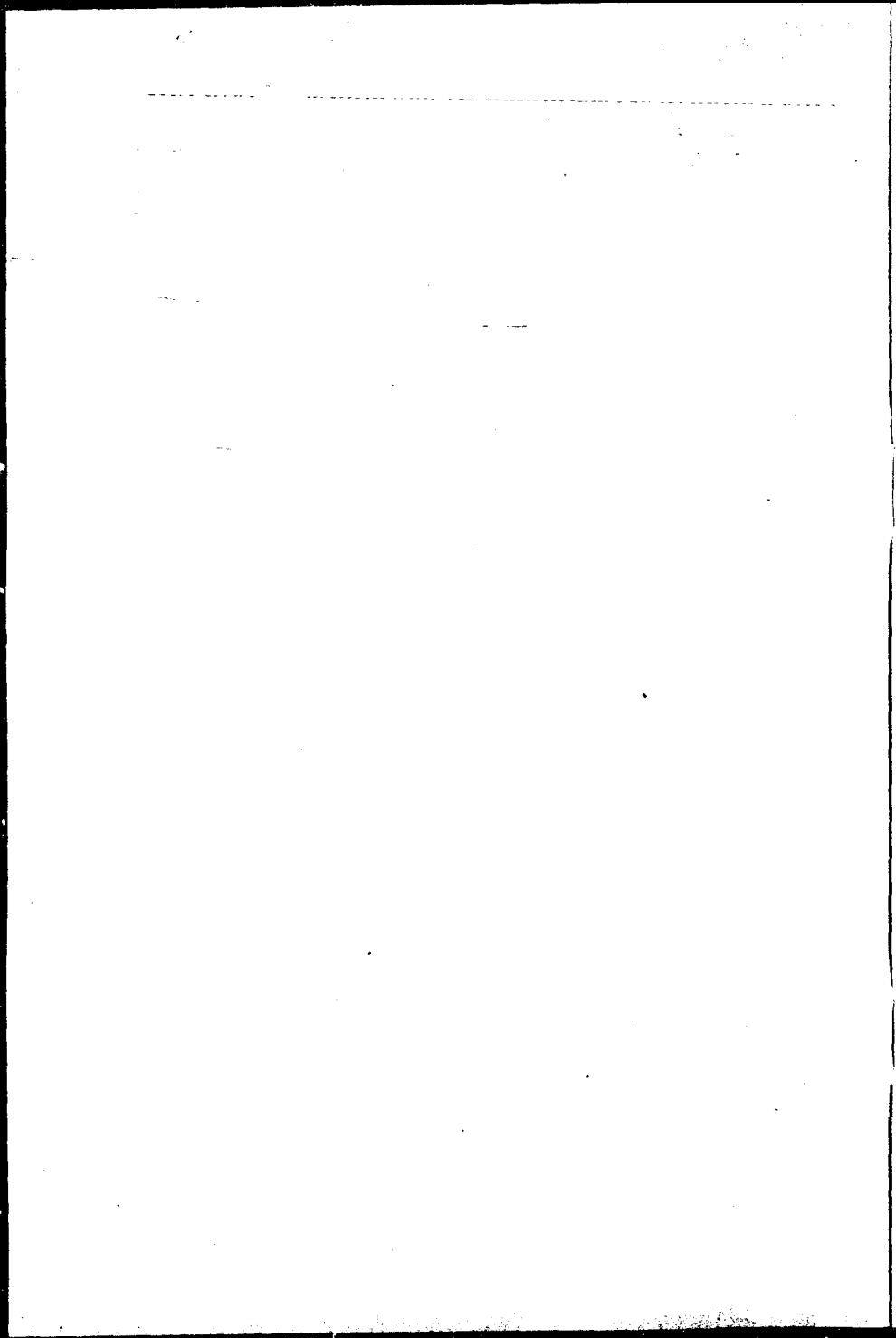
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OTTAWA  
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1933



(Copy of Commission)

BESSBOROUGH

CANADA

GEORGE THE FIFTH by the Grace of God of Great Britain, Ireland, and the British Dominions beyond the Seas, KING, Defender of the Faith, Emperor of India.

To all to whom these presents shall come or whom the same may in anywise concern.

GREETING:

WHEREAS pursuant to the provisions of Part I of the Inquiries Act, Revised Statutes of Canada, 1927, Chapter 99, His Excellency the Governor General in Council by Order P.C. 1465 of the twenty-fifth day of June, in the year of Our Lord one thousand nine hundred and thirty-two, a copy of which is hereto annexed, has authorized the appointment of Our Commissioner therein and hereinafter named to inquire into and report upon the circumstances attendant upon an explosion which occurred on the morning of Friday, the 17th June, 1932, in the drydock of the Maisonneuve plant of the Canadian Vickers Limited, where a number of employees of that company were engaged in repairing the ss. *Cymbeline*.

NOW KNOW YE that by and with the advice of Our Privy Council for Canada, we do by these presents nominate, constitute and appoint STANISLAS ALBERT BAULNE, of the city of Montreal, in the province of Quebec Civil Engineer, to be Our Commissioner to conduct such inquiry.

To have, hold, exercise and enjoy the said office, place and trust unto the said STANISLAS ALBERT BAULNE, together with the rights, powers, privileges and emoluments unto the said office, place and trust of right and by law appertaining, during Our pleasure.

AND we do hereby require and direct Our said Commissioner to report to Our Governor General in Council the result of his investigation together with the evidence taken before him and any opinion he may see fit to express thereon.

In testimony whereof We have caused these Our Letters to be made Patent and the Great Seal of Canada to be hereunto affixed. WITNESS: Our Right Trusty and Right Well-Beloved Cousin and Counsellor, Vere Brabazon, Earl of Bessborough, a Member of Our Most Honourable Privy Council, Knight Grand Cross of Our Most Distinguished Order of Saint Michael and Saint George, formerly Captain in Our Territorial Army, Governor General and Commander-in-Chief of Our Dominion of Canada.

At Our Government House in Our City of OTTAWA, this twenty-fifth day of June, in the year of Our Lord one thousand nine hundred and thirty-two, and in the twenty-third year of Our Reign.

By Command,

(Sgd.) THOMAS MULVEY,  
*Under Secretary of State.*

EXTRACT from a Minute of a Meeting of the Committee of the Privy Council, approved by His Excellency the Governor General on the 25th June, 1932.

The Committee of the Privy Council have had before them a report, dated June 22, 1932, from the Minister of Justice, submitting:—

1. That on the morning of Friday, the 17th June, 1932, an explosion occurred in the dry dock of the Maisonneuve plant of the Canadian Vickers Limited, where a number of employees of that company were engaged in repairing the ss. *Cymbeline*.

2. That as a result of said explosion and of the fire which broke out in the said ship immediately after, a number of workmen and firemen of the city of Montreal lost their lives and many others were seriously injured.

3. That it is expedient in the public interest that the circumstances attendant upon such a serious disaster be thoroughly investigated and reported upon by a Commissioner appointed under Part I of the Inquiries Act, chapter 99 of the Revised Statutes of Canada, 1927.

The Committee, therefore, on the recommendation of the Minister of Justice, advise that Stanislas Albert Baulne, Civil Engineer, of the city of Montreal, be appointed a commissioner under Part I of the Inquiries Act, chapter 99 of the Revised Statutes of Canada, 1927, to inquire into all matters pertaining to the said explosion and to report the result of his investigations to the Governor General in Council.

(Signed) E. J. LEMAIRE,  
*Clerk of the Privy Council.*

The Honourable  
The Secretary of State.

## REPORT

*His Excellency the Governor General in Council*

MAY IT PLEASE YOUR EXCELLENCY:

By commission issued on the 28th day of June, 1932, your commissioner was appointed to inquire into and report upon the circumstances surrounding an explosion which occurred on the morning of Friday, the 17th of June, 1932, in the dry dock of the *Maisonneuve* plant of the Canadian Vickers Limited where a number of employees of the said company were engaged in repairs to the ss. *Cymbeline*.

Your commissioner begs to present his report as follows:—

Receiving his commission on the 18th July, 1932, your Commissioner proceeded on the 20th July, 1932, to the Canadian Vickers Plant and visited the floating dry dock in the company of Mr. David B. Carswell and Mr. Euclide Malo, General Manager and Engineer respectively, of Canadian Vickers Limited. Mr. Carswell offered his full co-operation and help to your commissioner in the fulfilling of his duties as such.

Following the appointment of Mr. Lucien Beauregard, K.C., on the 27th July, 1932, to represent the Department of Justice, your commissioner held several meetings with Mr. Beauregard, K.C., in order to prepare for the sittings of your commissioner.

Your commissioner was sworn in as such on the 3rd August, 1932, by the Honourable Mr. Justice Adelard Fortier, one of the judges of His Majesty's Superior Court, for the province of Quebec.

The first sitting was held on Friday, August 5, 1932, in room 24, Court House, Montreal, at 10 a.m. and all interested persons were notified to be present.

At this sitting Mr. Lucien Beauregard, K.C., formally appeared for the Department of Justice, Mr. Aime Geoffrion, K.C., and Mr. J. Arthur Mathewson, K.C., for Canadian Vickers Limited, Mr. Charles Laurendeau, K.C., and Mr. Claude Choquette, K.C., for the City of Montreal, Mr. Ernest Bertrand, K.C., for the Attorney-General of the Province of Quebec, Mr. R. C. Holden, K.C., for the ss. *Cymbeline*, and the Honourable C. P. Beaubien, K.C., for the British American Oil Limited.

Your commissioner read his commission and the purpose of the investigation was outlined by Mr. Lucien Beauregard, K.C. The parties interested then agreed upon a course of procedure to be followed and your commissioner made a public appeal that anyone who could throw any light on the matter, or who wanted to testify should communicate with Mr. Beauregard, K.C., or your commissioner in order that such person or persons could be heard.

In the afternoon of the 5th August, 1932, the parties interested conferred in the offices of the Canadian Vickers Limited where the plans of the dry dock were examined and later visited the dry dock itself and the ss. *Cymbeline*.

Your commissioner held sittings on the 5th, 9th, 10th, 11th, 16th, 17th, 18th and 19th days of August.

Witnesses were examined amongst whom were: Mr. David B. Carswell, General Manager Canadian Vickers Limited; William J. Wardle, Shipyard Manager of Canadian Vickers Limited; Alexander Watson, Superintendent Engineer, Canadian Vickers Limited; George A. C. Cooper, Marine Superintendent, representing Salvage Association of London; Captain William Henry Mathews, Marine Superintendent for the owners of the *Cymbeline*; James R. Donald, Civil and Chemical Engineer, Managing Director of J. T. Donald & Company Limited; Roy Geddes, Chemist of the firm of Milton, Hersey & Company, Limited; William

Kemp, Chief Engineer of the ss. *Cymbeline*; James Chadwick, First Officer of the ss. *Cymbeline*; John Kirkland, head iron foreman; Thomas W. Harvie, manager of the Montreal Harbour Commission; and Christopher Carson, Acting Chief of the Montreal Fire Department. All the other witnesses were either employees of Canadian Vickers Limited or firemen of the Fire Brigade of the city of Montreal. Fifty-seven witnesses were examined and fifteen exhibits filed which are annexed to this report with a transcript of the evidence.

Every opportunity was afforded to the witnesses to express their opinions fully, each working man examined was asked for his opinion as to the cause of this casualty and for suggestions to prevent such a disaster from being repeated.

Your commissioner desires to acknowledge the hearty co-operation of all the officials. Mr. David B. Carswell, General Manager of Canadian Vickers Limited, was unstinted in his efforts to adduce all the facts before your commissioner

### HISTORY OF THE CASE

The steamer *Cymbeline*, which is a steel oil tanker owned by C. T. Bowring & Company, Limited, London, England, was on the 27th April, 1932, proceeding with a full cargo of eight thousand seven hundred tons of light Texas crude oil from Port Arthur, Texas, consigned to British American Oil Company, Limited, of Montreal. This crude oil was stored in her ten compartments which were numbered ten to one, starting from the bow. Steaming through the Gulf of St. Lawrence, the ss. *Cymbeline* grounded in a fog in the vicinity of Bagots Bluff on the island of Anticosti, and as a result, several of her forward tanks were punctured. The *Cymbeline* remained fast aground for a period of about six days when, after jettisoning about two thousand five hundred tons of oil from tanks numbers one and two at her stern, she was finally floated.

It was necessary to keep her afloat, to have installed air compressor on her deck and to pump air into her punctured tanks.

Accompanied by a salvage tug, the *Cymbeline* reached Montreal on the 6th May, 1932. Upon her arrival, Mr. Carswell, Mr. Wardle, Mr. Cooper and Mr. Boyle, of J. G. Whitney Company, agents for the ss. *Cymbeline*, proceeded on board to decide what should be done with the cargo in her punctured tanks, which was a problem because apparently six of the forward tanks were punctured and it was impossible to unload the oil still in these compartments without releasing the compressed air which would have caused the vessel to sink by the head.

The decision was finally reached to unload all the oil in the undamaged compartments and to unload as much oil as possible from the damaged compartments, and then to dock the vessel in the Vickers dry dock for a survey of the damage.

To maintain the buoyancy of the *Cymbeline*, the air under pressure in her tanks could not be released until the vessel was actually in dry dock. Once the vessel was in dry dock it was impossible to remove the oil from the damaged compartments except by letting it flow upon the floor of the dry dock itself. To have allowed this oil to leak into the St. Lawrence river would have been a contravention of the harbour regulations, and besides would have created a very considerable fire hazard as well as great damage to riparian properties and cause contamination of the water.

The officials of Canadian Vickers Limited affirmed to the parties interested that they were able to take care of any oil issuing from the damaged tanks of the *Cymbeline* by building a cofferdam at each end of the floor of the dry dock, whence it would be stored in the buoyancy tanks of the dry dock itself by passing through the manholes of these tanks as will more fully be explained hereinafter.

From the evidence, it would appear that no one thought that this method offered any risk or danger, and everyone agreed that it was the best course of procedure.

The dry dock of the Canadian Vickers Limited is a floating drydock built in 1912 by Vickers Limited in England named *Duke of Connaught*. It is a steel construction divided into three disconnectable sections. Its total length is six hundred and one feet, the length of the two end sections being one hundred and seventy-three feet with an overhang of twenty-five feet and that of the centre section two hundred and five feet. The width of each section is one hundred and thirty-five feet from outside wall to outside wall. The height of the whole structure from the top of the dock wall to the bottom of the dock is about fifty-eight feet. On each side of the drydock there are two steel wings about twenty feet wide and about forty-two feet high from the platform of the dock and fifty eight feet from the top of the wings to the bottom of the drydock. In the starboard wing are to be found the boiler room, the pump room, etc., and on top of these wings are located the cranes and other tools which may be necessary for its operation. The buoyancy of the dock is maintained by means of tanks or pontoons which are located underneath the floor of the drydock and the wings. These tanks or pontoons are divided into centre tanks and side tanks. The centre-tanks are those which are located under the floor of the drydock and the wing tanks are those which extend up into the wings. The depth of the centre tank from the floor of the drydock down to the bottom is about sixteen feet. The wing tanks are much deeper, some of them extending to the top platform of the wings and have, therefore, a depth of approximately fifty-eight feet, while others extend only to the engine or pump rooms which are located as mentioned above, in the port wing of the drydock, the depth of these tanks is about thirty-five feet from the bottom.

There are altogether forty-eight tanks of which twenty-four are centre tanks and twenty-four tanks as appears from the plan filed as Exhibit No. 1, the centre tanks being marked on this plan by letters D and C and the wing tanks by letters A and B.

All these tanks are ventilated: the centre tanks by means of a four inch pipe which is located a few inches underneath the floor of the deck of the drydock with an outlet at the top of the wing tanks; the wing tanks which do not extend up to the floor of the top of the wings, through a five-inch air pipe which has its outlet outside, and by a twelve-inch mushroom exhaust pipe; the wing tanks which extend up to the top of the wings, by hatches located on the top platform of the wall which open direct on the tanks. Ventilation plans were filed as Exhibits Nos. 3 and 5.

All these tanks can be filled or emptied individually. If it is desired to lower the drydock, water is pumped into the tanks and if it is desired to raise it, water is pumped out.

On the floor deck of the drydock are oval-shaped manholes large enough to allow a man to pass through them. These manholes connect direct to both the centre and wing tanks of the drydock. There are about one hundred and six of these manholes in the three sections but the two sections of the drydock used for the *Cymbeline* comprised seventy-six manholes and twenty-eight tanks only.

Previous to the *Cymbeline* being docked in the floating drydock, cofferdams were built at each end of the two sections and when everything was ready to receive the *Cymbeline*, the drydock was brought away from the wharf in order to sink it to the bottom of the River owing to the depth of water alongside the wharf being insufficient to lower her.

On the 14th May, 1932, the drydock having been lowered to a sufficient depth to allow the *Cymbeline* to enter it, the ss. *Cymbeline* was brought into the drydock which was then raised by pumping water out of her tanks. As the ship was being raised, the mixture of oil and water came out of her compartments and some of the manholes which were underneath these compartments were open so as to allow this mixture to be drained into the tanks of the drydock. It was found necessary to store this oil and water in thirteen tanks, namely, tanks

Nos. A6, B6, C6, D6, C1, C8, B8, A9, B9, C9, D9, C10 and D10. It is difficult to state what quantity of crude oil was so stored but the minimum was twenty tons and there might have been much more. After the water and oil were all stored, the manhole covers were put on and closed tightly. It is claimed that all these manholes were air and gas tight.

The floor of the drydock was then cleaned with sawdust and water. The damage to the *Cymbeline* was surveyed and found to be extensive. The repairs, which were discovered, would necessitate the removal of over eighty bottom plates from the bow to about abaft of the bridge.

All the undamaged tanks of the *Cymbeline* had been rendered gas free through steaming before she entered the drydock and, subsequently, the damaged tanks were emptied, steamed and rendered gas free and a chemist from the firm of Milton, Hersey & Company, Limited, was called to make tests and declared them so and fit for the work to be carried out. A certificate to that effect was issued, same having been filed as Exhibit No. 7.

Repairs were started on or about the 17th May, 1932, and necessitated the cutting with acetylene torches of a great number of plates. Nothing untoward happened in the process.

On the 17th of June, 1932, the repairs were almost completed and it was expected that the vessel would leave the drydock in the course of four or five days. The work that remained to be done to the bottom of the ship was the replacing of some plates and also the bolting and riveting of plates that had already been fixed under tanks numbers six, seven, eight and ten of the *Cymbeline* which were over tanks C6 and C7 of the drydock, and which contained oil.

Altogether on the 17th of June, 1932, there were about one hundred men employed, of whom sixty were working on the floor of the dock or inside the tanks of the *Cymbeline*.

As part of the work consisted in riveting, it was necessary to install small forges heated by coal on the floor of the drydock. These forges were about three and one-half feet high and stood on legs. The receptacles containing the coal were a little less than three feet above the floor of the deck. Rivets were heated in the fire and when red hot, passed to the men working inside the tanks to be thereafter riveted.

At about three o'clock a.m. on the 17th June, 1932, suddenly two explosions occurred in quick succession; in fact, in such quick succession that most of the witnesses thought there had been but one explosion. A fire of great intensity immediately followed, indicating that the oil was alight. As a result of the explosions, tanks C6 and C7 of the drydock were burst or punctured, fifteen workmen killed, and a great number so seriously injured that eleven died subsequently in hospitals.

The Fire Brigade of the city of Montreal arrived shortly afterwards and began to combat the fire. Fire Chief Gauthier and some of his men were standing on the port wall of the drydock directing streams of water thereon and on the ss. *Cymbeline* which had caught fire in the bridge structure, and the officers' quarters, and about one hour after the two explosions aforesaid, a third explosion of great magnitude took place apparently on one of the side tanks where Chief Gauthier and some of his firemen were standing, as a result of which Chief Gauthier and three firemen lost their lives. This explosion was undoubtedly the result of the oil vapour—and air mixture existing in tank D7 becoming ignited from the fire already in progress.

Through these explosions, tanks numbers C6, D6, C7, D7 and D8 of the drydock were burst or punctured. No explosions occurred on board the *Cymbeline*. The apparent cause of the fire on board the *Cymbeline* was that the fire from the tanks of the drydock passed through the space left by the



absence of some of the bottom plates, thus setting fire to the inflammable parts of the bridge of the ship.

The Harbour Commissioners of Montreal sent their fire tug, the *St. Peter*, to help fight the fire, but the *St. Peter* could not throw a stream of water high enough to reach the wall of the drydock and moreover, was only equipped with one stream.

The fire was completely extinguished during the afternoon of the 17th June, and it was ascertained afterwards that both the *Cymbeline* and the drydock had been very extensively damaged through the fire and the explosions.

Your Commissioner finds:

(a) That all parties interested agreed upon the method to be adopted for the drydocking of the *Cymbeline* and the manner in which the oil should be stored in the tanks of the drydock.

(b) That the General Manager and Engineers of the Canadian Vickers Limited were satisfied that the ventilation system of the tanks of the drydock was sufficient for the purposes for which it was going to be used.

(c) That the officials of Canadian Vickers Limited took it for granted that the floor deck of the drydock was absolutely air and gas proof.

(d) That everybody concerned was absolutely satisfied that there was no danger in adopting the method that had been decided upon. As a matter of fact, nobody including the working men employed by the Canadian Vickers Limited ever suggested that there could be any danger.

(e) That the explosions took place in the drydock and that there was no explosion on board the ss. *Cymbeline*.

(f) That before any repairs were started on board the ss. *Cymbeline*, the vessel was gas free.

#### CAUSE OF DISASTER

The primary cause is obviously the fact that oil was stored in the tanks of the drydock from which explosive petroleum vapour was generated but, however, this in itself would not be sufficient to cause an explosion without other agencies intervening.

The evidence does not disclose that the cause was an act of God or sabotage. The following possible causes may, however, be considered:—

1. *The crude oil stored in the tanks developed sufficient gas under pressure to result in an explosion.*

Your commissioner considers that this possible cause must be eliminated for two reasons:—

(a) Because this could have happened only if there had been no ventilation of these tanks. The proof disclosed that there was a four-inch air pipe in each tank and although such ventilation could not possibly produce free circulation of air in order to make these tanks gas free it was, however, sufficient to prevent any excessive pressure.

(b) Because the thickness of the walls of these tanks was nine-sixteenths of an inch and in order to bring about such explosion it would have required a pressure of about three hundred pounds to the square inch suddenly applied and it is impossible for such pressure to have developed in these tanks under the conditions prevailing at the time.

Having eliminated this possible cause in order to explain this explosion, it is necessary to show that a flame or spark came into contact with the gas as the presence of an explosive vapour alone would not bring about an explosion.

Several suggestions were made in order to explain how fire could have come into contact with this gas:—

*1. Ignition of inflammable gases coming through the hatches ventilating the tanks or from the mushroom exhaust pipe or other pipes ventilating said tanks.*

The evidence discloses that the first explosion took place in one of the centre tanks and as all the vents of the tank were over the wing tanks, this possible cause must be eliminated.

*2. A hole might have been burned through the floor of the deck of the dock by an acetyline torch out of control.*

The evidence shows that none of the acetyline torches was in use at the time of the explosion or shortly before so that this possible cause must also be eliminated.

*3. Red hot ashes from the little forges used to heat the rivets may have been dumped on the floor of the deck of the dry dock overheating same.*

Only a very small quantity of coal was used in those forges and even if the content had been dumped on the floor of the deck it would not be sufficient to heat the floor sufficiently to make it red hot which would be necessary in order to ignite the gas inside of the tanks.

*4. Leaks on the floor of the dock allowing inflammable vapours to escape.*

This in the opinion of your commissioner is the most plausible cause of this explosion. A mixture of one and one-half parts of gas to ninety-eight and one-half parts of air was sufficient to render it explosive.

If leaks existed in the floor of the dock and petroleum vapour escaped, these leaks might easily have been ignited from the forges which were used to heat the rivets and by the red hot rivets which were being passed from the rivet heaters to the men working inside the tanks of the *Cymbeline*. There are several manners in which such leaks might have developed:—

(a) *Steel plates which weighed over two and one-half tons might have been dropped on the floor of the deck in being lowered down from the wing of the dry dock by use of cranes and in falling rupture one of the plates of the floor or break a manhole cover.*—The evidence, however, shows that no plates had been lowered for some time before the explosion so that this possible cause must also be eliminated.

(b) *A leak through a seam on the dry dock floor or through a manhole cover.*—This is, in the opinion of your commissioner, the most likely cause of this gas escape. A seam or a manhole cover may be waterproof and yet not gasproof and moreover, the dry dock had been in operation for over twenty years and the very nature of the work under way involving the movement of heavy steel plates, the use of screw jacks, etc., could have loosened such seam or manhole cover.

The evidence discloses that one of the manhole covers was found at the bottom of one of the tanks which exploded, slightly bent upwards with two of the lugs broken. This, in the opinion of your commissioner, confirms his theory that the leak came through a seam. When the explosion took place, the plate gave way at this seam and was ripped off the rivets holding it and was lifted upwards by the explosion causing the manhole cover to be bent upwards thereby breaking two of the lugs of the manhole cover, loosening the others, and causing the latter to fall to the bottom of that tank. It is to be noted that all the manhole covers over the other tanks which exploded remained fast to the floor deck plates.

As against this theory it may be said that the explosion would have occurred before the 17th June, particularly when acetylene torches were used almost constantly during the first few days after the ship went into dry dock, but it must be remembered that before any gas could escape through the seams it was necessary for the tanks which were only half full of oil and water to become filled with petroleum vapour which gas is heavier than air, before there would be any pressure on the seams. Moreover, it was quite possible for gas to have escaped but owing to the weather conditions, same might have been blown off the dry dock by the wind or it might have happened that such gas did not come into contact with any fire. The evidence is to the effect that on the day of the explosion it was very warm and damp so that gas pockets might have formed on the top of the dry dock which exploded as soon as it came into contact with the hot rivets or the heated forges.

Your commissioner takes the liberty of making the following recommendations:—

(a) That in future, no crude oil, gasolene, benzine or any substance of an explosive nature be ever stored in the tanks of a floating dry dock.

(b) That no person should be allowed to work when using a naked light or fire on or near any tanks or receptacles containing oil, gasolene, gas, or other explosive substance unless these tanks or receptacles have been emptied and certified gas free.

(c) That no tanks or other receptacles containing gas, gasolene, crude oil, should be allowed to remain open and no oil tankers should be allowed to leave open any of their hatches or lids while in port, unless these tanks or receptacles are empty and gas free.

(d) That a commission should be named to frame rules or regulations governing the transportation of crude oil, gasolene, benzine or kerosene through our harbours and enclosed waters.

(e) That regulations be passed whereby all persons or corporations keeping or storing crude oil, gasolene, kerosene, benzine, or other highly inflammable substances should be equipped with special means to extinguish fire.

(f) That the question be studied of whether the Harbour of Montreal should be equipped with a powerful tug as the *St. Peter*, which is now in use in the harbour, is not in the opinion of your commissioner adequate for the protection of the Port of Montreal.

All respectfully submitted.

Dated at Montreal this 29th day of December, 1932.

(Sgd.) S. A. BAULNE,  
Commissioner.