CANADA
DEPARTMENT OF MINES
MINES BRANCH
HON. W. TEMPLEMAN, MINISTER; A. P. LOW, LL.D., DEPUTY MINISTER;
EUGENE HAANEL, PH.D., DIRECTOR.

(REPRINT)

PROCEEDINGS

OF

Conference on Proposed Legislation to Regulate the Manufacture, Importation, and Testing of Explosives

Held in Room 16, House of Commons, Ottawa, Sept. 23 and 30, 1910

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OTTAWA,
September 26, 1910.

SIR,—I beg to transmit, herewith, a copy of the proceedings in connexion with the Conference on the proposed legislation to regulate the manufacture, importation, and testing of explosives, held in Room 16, House of Commons, Ottawa, on September 23, 1910. At the said Conference it was resolved that the proceedings be immediately printed, and placed in the hands of those in attendance, so that the recommendations of Captain Desborough—H. M. Inspector of Explosives—could be deliberately considered, and dealt with at the adjourned meeting to be held in Room 16, House of Commons, Ottawa, on Friday next, September 30, at 10 a.m.

Hoping you may find it convenient to be present.

Yours very truly,

(Signed.) EUGENE HAANEL,
Director of Mines.

CONFERENCE ON PROPOSED LEGISLATION TO REGULATE THE MANUFACTURE, IMPORTATION AND THE TESTING OF EXPLOSIVES

ROOM 16, HOUSE OF COMMONS,
OTTAWA, September 23, 1910.

The Conference met at 10 a.m., Dr. Eugene Haanel, Director of Mines, in the chair.

Captain Desborough, H.M. Inspector of Explosives, Home Office, London.
Thomas C. Gibson, Deputy Minister of Mines for Ontario, Toronto.
Joseph G. S. Hudson, Mines Branch, Dept. of Mines.
Winthrop Brainard, Vice-president Hamilton Powder Company, Montreal.
J. Murray Wilson, Manager Hamilton Powder Company, Beloeil Station, Que.
G. A. Wutty, Manager Hamilton Powder Company, Windsor Mills.
D. W. Brainard, Dominion Cartridge Company, Montreal.
E. J. Johnston, Dominion Cartridge Company, Brownsburg, Que.
W. D. Barclay, Gen. Man. C.N. and Q. and L. St. John railways, Quebec.
E. Tiffin, Intercolonial railway, Moncton, N.B.
A. J. Hills, Supt. C.N.O. Ry., Toronto.
M. J. Butler, Gen. Man. Dominion Iron, Steel, and Coal Company, Sydney, C.B.
D. H. McDougall, Asst. Gen. Man. Dominion Iron, Steel, and Coal Company, Sydney, C.B.
A. C. Tagge, Gen. Supt. Canada Cement Company, Montreal.
C. D. McPhee, G. and M. Fuse Works, Arnprior, Ont.
A. E. Blood, Bureau Safe Transportation of Explosives, New York, Toronto.
Col. J. M. Taylor, Bureau of Safe Transportation of Explosives, New York.
Daniel Smith, President Ontario Powder Company, Kingston.
C. A. McPherson, Secretary Ontario Powder Company, Kingston.
W. T. Roddin, President Standard Explosives Company, Montreal; Western Export Company, Vancouver.
W. M. Lowery, President Ontario Torpedo Company, Petrolia.
H. R. Drackett, Superintendent Standard Explosives Company, Vaudreuil.
Jas. J. Riley, Vice-president Northern Explosives Company, Montreal.
E. A. LeSueur, Ottawa.
G. M. Howard, A. L. Howard Company, Fulminate of Mercury Works, Sherbrooke, Que.
H. A. Nicholls, Dominion Explosives Company, Ottawa.
Lionel Kent, The Energite Explosives Company, Montreal.
P. E. LeMarch, The Energite Explosives Company, Cobalt.

The CHAIRMAN.—As you are aware, the Honourable Mr. Templeman, Minister of Mines, proposes to introduce at the next session of Parliament a Bill to regulate the manufacture, importation, and testing of explosives in the Dominion of Canada. The Department of Mines last year drafted a Bill for presentation to the House. We deemed it advisable, however, before presenting the Bill on so important a matter, to avail ourselves of the experience of His Majesty's Inspector of Explosives in England who has for many years administered the English law, and who is at the head of the testing station in England. I, therefore, recommended the Minister that application be made to the Home Office in order that we might avail ourselves of his services; and they have been good enough to loan him to us. He has travelled over the country and inspected the various factories where explosives are manufactured, and made himself conversant with the conditions in Canada. He is now prepared to offer certain recommendations, and I have called this conference in order that you might hear the recommendations which Captain Desborough is to make to the Government; so that you might have an opportunity of taking note of his recommendations, and offering your own suggestions, and possibly criticisms in connexion with these recommendations. I shall now call upon Captain Desborough to be good enough to state to you what his recommendations will be.

Captain DESBOROUGH.—Doctor Haanel and gentlemen, the task you have put upon me is rather difficult to carry out in such a short time. I have only been able to get a very general idea of your conditions here, and I felt it was absolutely necessary before I sent in an official report, that the recommendations which I shall sketch out roughly to you—the gist of my recommendations—should be submitted to you for your criticism. The first principle which should be adopted in framing regulations to govern the explosives industry is, what we call in England, the system of authorization of explosives. The meaning of that is this, that before any explosive is allowed to be imported or manufactured for sale, the explosive has to be submitted to the chemical advisers of the explosives department, and they have to satisfy themselves that it is reasonably insensitive to friction and percussion, and that it possesses a reasonable degree of chemical stability. This does not preclude the manufacture of experimental explosives to enable a manufacturer to work out a new type of explosive, but it means that before that explosive is put on the market it must go through the hands of the chemical advisers of the Department. I do not know that it is necessary for me to go into the details of the principles on which our chemical advisers examine explosives. In fact I am sure it would take much too long, but amongst the tests they use are those of the falling weight and the broomstick test, which does not seem to be known over here. The method of the broomstick test is to spread out a thin layer of the explosive on a wooden board and strike it a glancing blow with a wooden broomstick. Ordinary gunpowder can readily be fired in that way. Then, as far as chemical tests of explosives go, the principal test used, is known as the heat test. I imagine that most manufacturers here are more or less familiar with the details of the heat test, so I need not refer to it here. In conjunction with the heat test, they keep the explosives in alternately dry and moist atmospheres, at a temperature of about 90 degrees Fahrenheit, and take the

heat test from time to time, and observe the effect on the heat test. There is also another test, to ascertain if an explosive containing nitro-glycerine is liable to exudation or liquefaction. The next point is the manufacture of the explosive. I think the Dominion Government should alone be responsible for the licensing of factories. As they will be responsible for the type of explosive which is put on the market, they ought to have some control over the manufacture. The principle we use in England regarding the licensing of factories depends on what we call the table of distances. That is, the maximum quantity of explosive allowed to be in any building depends on the distance it can maintain from other buildings connected with the factory, and also from certain prescribed buildings and works outside the factory. These distances are shown in two tables of which I have copies here. One is called the table for outside distances, and the other is what we call the intra-factory distance table. I will just give you one instance here. Take a blasting explosive. We should be prepared to allow 30,000 pounds in a building, provided it was adequately mounded, and was at a distance of 65 yards from other buildings. If the mound were not erected, then we should cut down the quantity to 6,000 pounds. It shows the great trust we put in mounded buildings. Other points which the licenses should embody are the construction of the buildings. We do not lay down any hard and fast construction for any particular buildings; but we work on the principle that buildings in which operations of manufacture are carried out should generally be of light construction, so that in the event of an explosion there should be no heavy debris flying about the factory. As far as storage is concerned, we insist at present on substantial buildings. The reason of this is, that we consider danger of explosion in a magazine comes mostly from without. If a system of authorizing explosives is enforced there should be no danger of spontaneous ignition inside a magazine. Therefore, it is necessary to have the magazine fairly substantial to protect it from dangers from without. That does not mean of necessity that you are to have your buildings constructed of either stone or brick. In certain cases we have corrugated iron magazines; which in our climate have very great advantages. If you have an explosion in a corrugated iron magazine the corrugated iron crumples up and does not fly. I would not propose in any legislation to lay down hard and fast rules as to the construction of buildings, but would have each case considered on its merits. If a manufacturer could provide a light construction and at the same time protect it from outside dangers, I think he should be perfectly at liberty to use such a structure.

Then as regards the number of work-people allowed in a building, we in our licenses limit the number. We have no very strict rule about it, but we think, and I am sure the manufacturers will agree with me, that it is advisable to limit the number as far as possible. As a general rule in buildings where nitro-glycerine is manufactured, the maximum number of persons employed is four. In buildings where the explosive is packed into cartridges, the maximum is four. Where the cartridges are boxed the limit of six is generally assigned. One of the points which struck me over here is that, as a general rule, you crowd your explosives up too much. It means that if you get an explosion in one building you not only lose probably a good deal of life, but you put your factory out of action. Now,

on economic grounds, I believe it would be sounder for you to split up your risks—have smaller quantities and more buildings. With large quantities it is necessary to have your buildings very much apart. What has impressed itself on me very much is the fact, that in one factory—I will not mention names—they killed eleven people last year in packing cartridges. In the whole of England the average death rate is about five or six a year, and the actual use in England is about 15,000 tons, and the output somewhere in the neighbourhood of 40,000 tons, so I think you can do a great deal in preventing the loss of life which has gone on here. There is one other point about the licensing of factories; the system we follow is that the applicant should practically, in consultation with our Department, draft the license. When the terms and details have been arranged, the applicant has to lay the draft of the license before the local authorities. In this country presumably it would be the municipality, but of that, of course, I am not competent to speak. Then the local authority can either give its assent to the establishment; or its assent with conditions; or its dissent. In those circumstances an inspector of explosives is sent down to hold an inquiry, and to make a report to the Home Office. On his report the Home Secretary can either agree with the local authorities decision, or over-ride it, or assent with modified conditions. He has an absolutely free hand. There are several occasions on which the local authorities have dissented, and their dissent has been upheld. In one case the factory had made no arrangements about the discharge of acid affluents, and they were proposing to discharge it into the river where the local authorities thought it would be objectionable. In that case the dissent was upheld. On one occasion the local authorities said they thought the distance of the various buildings from neighbouring dwelling houses was not sufficient. As these distances were based on our table of distances the Home Secretary refused to allow their dissent, and the license was granted. There is one other point on which I have not touched, and that is, the position of existing factories. I think existing factories should not be treated in the same way as new factories for the present and I propose to recommend that a certain time should elapse before they come into conformity with the system which I have outlined, except in the case of any definite building which may be regarded as a menace to the public. I do not mean that the public must come and say they think a building is definitely dangerous, but that the officers appointed under the new Act, when visiting a factory, should take particular note if there is any building which they think is absolutely dangerous, or is thought to occasion any special danger, and that then, the manufacturer should be required to make some alteration, possibly by the erection of a mound screening the building, and possibly by the reduction of the maximum quantity allowed in the building.

The next point is the storage of explosives. I do not think the new Bill should interfere with any magazines which are lawfully existing at the present time in virtue of licenses granted by the provincial authorities. It is perfectly unnecessary, to my mind, to duplicate the work; the new department will have plenty of work without interfering with existing licensed magazines. With regard to magazines which are not licensed, I think a somewhat similar procedure should be adopted to that I have sketched for licensing factories—that is,

the site should depend upon the distance the magazine could maintain from outside works, and the quantity should also be limited in accordance with this distance.

There is another point, the question of lightning conductors. I am not suggesting that the English practice should be followed, that every magazine should be equipped with a lightning conductor. The effect in England is that a bit of copper wire is attached to a building and occasionally it is about as much use as a horse-shoe would be on a door. What I have suggested is, that members of the scientific staffs of universities in Canada, together with representatives of the explosives trade, should form a committee, and that committee should consider the best and most economic form of protection from lightning which they can devise, and then in the interest of safety I think the occupiers of the magazines would be well advised to protect their buildings in such a way.

Then the next point is the transportation of explosives. As far as transportation by rail is concerned, I think matters should be left exactly as they are—that is, that the Railway Commissioners should control the transportation. The only difference the new legislation will have as regards that is that the quality of the explosive will be better looked after, not only when it is first made, but subsequently by a system of sampling which I shall talk about later. As regards transportation by water and by road, I think general regulations should be made, not in detail in the Act, but in virtue of sections in the Act. Generally speaking, what is desired in any Act is not to put in detail, but simply give the Minister of Mines power to make regulations. If detail is put in, the practice becomes hard and fast, and there is no scope for making changes to meet special conditions. There is one point I met in transportation by water in the far west; I heard of a case where 100 tons of explosives were put on a vessel and on top of this 100 tons a cargo of gasoline was placed. I think that is absolutely wrong. If a fire started in that vessel, and it was in the middle of Vancouver harbour, the shipping would be considerably diminished.

There is a point that has nothing to do with legislation, that has struck me—that is, the use of floating magazines where the climatic conditions are suitable. In England a large part of our explosives is stored in floating magazines. These consist of old hulks which are moored in places directed by the harbour authority, and the explosive is stored below the water line. It is a very convenient form of storage. It is out of the way of the public. You will not have people trespassing around your magazine, and it is very convenient where transportation by water is to be effected afterwards. I think such buildings should be licensed in much the same way as an ordinary magazine.

Another question is the importation of explosives. I think the English lines should be followed pretty closely there—that is, that no explosive should be imported into the country for sale until it has been authorized. It will be authorized in exactly the same way as other explosives, and when an explosive has been authorized before the importer takes out a license to import, he should have at his disposal a licensed place of storage; a license not being granted until he can show that he has storage accommodation for the explosives he proposes to import. On importation the explosive will be consigned directly to a specified

place, where the samples will be taken by the Customs Officers; and until those samples have been examined by the chemical department, and reported upon as satisfactory, the explosive should remain under detention at the place of storage. If the samples prove satisfactory on examination, the explosives would be released. If they were doubtful an opportunity might be granted of further sampling, and possibly the explosive released on the condition it was used up within a limited time. If the explosive proved to be of bad quality, but not immediately dangerous, it ought to be exported, and if of a bad quality and dangerous, it should be destroyed. This would apply to explosives coming from the United States, or any other part of the world.

Then the next point is the system of inspection and sampling. It is perfectly useless to have any licensed places unless you have a certain number of people who will pay visits to see that the terms of the license are observed. I do not think you will find inspection—provided that suitable selection is made of the class of persons appointed inspectors—a very formidable thing to encounter. I think I may say that in England we are not regarded as arch enemies by most manufacturers, and very often we are regarded more as a bureau of information and assistance. It is absolutely necessary that the inspector should take samples, not only of current manufacture, but of explosives that have been manufactured for some time, to see that the standard is being maintained.

The next point, which is somewhat of detail, is the establishment of a testing station, which will be primarily for coal mine explosives. I do not know that it is necessary for me to go into the details of the test; but generally speaking the test consists of firing a charge from a cannon into an inflammable atmosphere of air and coal gas, or any other gas which may be settled on; also firing charges of explosives into a gallery in which coal dust has been placed. I have with me here a copy of the last Belgium permitted list, showing the types of explosives which have passed the Belgian test. I cannot guarantee that similar explosives will pass the new test here, but it will give you an indication roughly of the class of explosives it will probably be necessary to manufacture. There is a practical point in the working of the testing station which our manufacturers now admit—that before the testing station was established they used to incorporate their explosives for a certain time, and were absolutely convinced that they were the very best on the market and thoroughly incorporated. Since the establishment of the test station they have become satisfied that incorporation is not at all an easy thing, and it is not merely sufficient to mix things together in a rough and ready way, but a good deal of attention has to be paid to the method of mixing. The test we use for comparing the relative kinetic value consists of a ballistic pendulum. With well made explosives firing charges of four ounce weight, I get a swing of rather over 3″, and if I fire three shots I do not expect to get a greater variation than 0·010 of an inch. Then another point which might be taken up with the testing station is, investigations not only into the kinetic energy by ballistic pendulum, but also the velocity of the explosion. The object of this is to give the user some sort of idea of what a particular explosive will do. At present each new inventor says his explosive will do everything. People who deal with explosives know that is absolute nonsense. Explosives suitable for

one sort of work will not do for another sort. What must be ascertained is the kinetic energy and the velocity of explosion.

Then there is the investigation of accidents in factories. If any accident by fire or explosion occurs in a factory, whether it causes bodily injury or not, it should be reported and investigated, if not by the inspector, at any rate by the staff of the factory. Very often far more is learned from an accident which does not cause injury than from one where everything is wiped out. I should like to make a criticism here generally of the factories I have visited. I think that on general lines you are right enough, but you do not pay sufficient attention to details. You have to remember that the main causes of explosions are apart from fire and spontaneous decomposition, which should not occur in a factory—except, perhaps in case of nitro-glycerine. Where decomposition takes place, there, as a rule, it does not cause an explosion. You can drown the charge in time. The danger is, of striking a thin film of explosive a blow. That will be very much worse if there is grit mixed with the explosive, and what you want particularly to look to is, to avoid any unnecessary blows. In one factory—I cannot remember the name of the machine, but it is an ordinary cartridge packing machine—I found the two big supports of the machine were loose, and every time this machine was operated it came down with a thump on the ground. Now that should not have been allowed. It was running an unnecessary risk and there was no object to be gained. Another point is that steps ought to be taken to prevent grit getting into an explosive. You cannot avoid it altogether, but you can take such steps as are possible, and one is lining the building. I notice here rubberoid is used. It seems to be an excellent material for lining a building. The buildings were as a rule properly lined, but some were not.

Then as regards accidents, in storage, transportation, and use of explosives, I feel quite sure that the Provincial governments will assist the new department by giving information regarding accidents, both in storage and use; but it is useless to make what I might call a book of casualties. You want to have the accidents investigated in a more or less intelligent way, because it is only by ascertaining the causes of accidents and the nature of accidents, that it is possible to suggest any means of preventing them. Of course I do not mean for a moment to suppose that one will ever be able to entirely prevent accidents. That, of course, is impossible. Perhaps it would be convenient if I shortly told you the causes of accidents in the use of explosives in England. Many of them come, of course, from the use of frozen explosives. That is a thing that supervision alone can guard against. Then a certain number of accidents come from the use of weak or inefficient detonators. I am not prepared to offer any suggestion as to how you can get around that except by going for the manufacturer of the detonators, and insisting that the quality shall be good. I know of no really satisfactory test for comparing the strength of detonators; but it is a subject which should receive attention when the new testing station is established here. We have been meaning to take it up in England for a number of years, but the opportunity has never offered. Then there is another kind of accident which is very common in England. It is striking unexploded cartridges in removing debris.

This is either due to frozen explosives, or to a weak detonator, or to a fault in the explosive itself. That refers more to gelatinous explosives.

Mr. BRAINARD, *Hamilton Powder Company.*—There are some things in connexion with Mr. Desborough's remarks which I should like to get information about. In this country there are a number of instances where in putting up supplies for the market you can only use the cold weather, and you have to fill up your stock in the winter weather for the whole year. If you license those magazines on the maximum quantity they contain, I do not know where you would put the factories, because they would be too far away from the source of consumption, as a rule.

Captain DESBOROUGH.—What quantity would you want to put in?

Mr. BRAINARD.—It varies with the extent of the demand. Some of our magazines have 100 tons.

Captain DESBOROUGH.—According to this table, 50 tons could be 3,500 yards from a dwelling house. If you erect mounds it will be 1,750 yards. If it is so placed that the ground interposes a satisfactory screening you would be allowed to have it within 800 yards.

Mr. BRAINARD.—A number of these magazines are erected on land leased from private individuals and are not the property of the people making the explosives.

Captain DESBOROUGH.—I understand the magazines are under the control of the Provincial authorities—is that so?

Mr. BRAINARD.—I do not think private magazines on private property where explosives for their own consumption are stored, are.

Captain DESBOROUGH.—I do not know whether the Government here will accept the system we have—that is, if the occupier of a dwelling house gives his consent to the establishment of a magazine, the distances which have to be maintained are very much less. In that case the distance for 50 tons is 850 yards. That means it would be half—425 yards; if there is a mound, and if there is a substantial natural feature of the ground in between, the distance would be a quarter, or only a little over 200 yards.

Mr. BRAINARD.—Your schedule of distances would be enforced in cases of that kind?

Captain DESBOROUGH.—Yes. Personally I think you would do better to put up, instead of one magazine containing 100 tons, two magazines containing 50 tons each.

Mr. BRAINARD.—Most of these magazines are in a part of the country where concrete and sand cannot be had, and they are made of logs.

Captain DESBOROUGH.—Personally I would not object to that. No hard and fast construction should be laid down. Each case should be treated on its merits. You must not take anything I say as binding the Department at all.

Mr. BRAINARD.—When the English Explosives Act was enforced, were not existing factories licensed as they stood, without changes?

Captain DESBOROUGH.—Yes.

Mr. BRAINARD.—You do not propose to do that here?

Captain DESBOROUGH.—I am told it is not proposed to do it. It has been found very objectionable in England. In certain towns in England you walk along the main street and you hear gunpowder wheels running on either side of you. There is a magazine I am thinking of on the banks of the River Thames which has generally about 200 tons of explosives in it. That magazine is absolutely surrounded by houses and is on the river side and if it should explode it would flood about 200 miles of country. It is an objectionable magazine and we wish we could get rid of it, but we have not the power.

Mr. BRAINARD.—I was not alluding to magazines so much as to manufacturing plants.

Captain DESBOROUGH.—In the discussions I have had with the authorities here I suggested originally that the factories should be left more or less as they are provided exceptional buildings were changed. I have been told, however, that that is not considered a good policy, so I suggested as a compromise that a limited time, so many years, should be allowed to elapse before a change was required.

Mr. BRAINARD.—I should like to know whether the proposed safety regulations for permitted explosives are to be the English?

Captain DESBOROUGH.—I ought to have told you that. The English test is being changed, and I drew up the specifications for a new gallery before leaving England. I heard this morning that they are getting on with the structure, and I suggested that the Canadian government should wait until the English experiments are concluded. In England the gallery will be 5 feet in diameter, 44 feet long, and charges tamped with a plug will be used; and the maximum charge which will not fire the gas or dust mixture will be determined—that is the charge which will be allowed in practice. The Continental people are able to get explosives up to $2\frac{1}{4}$ pounds in weight—in fact they fill their gun completely.

Mr. BRAINARD.—You say the transportation is to be controlled by the Railway Commissioners?

Captain DESBOROUGH.—They control transportation by rail at present.

Mr. BRAINARD.—The rules will be similar to the rules in New York?

Captain DESBOROUGH.—They have adopted the same rules as the New York rules at present.

Mr. BRAINARD.—But the test will be made at Ottawa?

Captain DESBOROUGH.—Yes. There is one point I should mention. I have recommended that the Railway Commissioners should be approached regarding the transportation of small quantities of explosives. Everyone is aware that this transportation goes on now, and is nearly certain to continue, on railway trains where passengers are carried. It should be recognized that it goes on and should be regulated.

Mr. BRAINARD.—The Federal authorities have the official say about licensing; suppose there is a difference between the local authority and the Federal, will the Federal authority prevail? Is not the object of this legislation to give the power of decision to the Federal authorities and take it out of the hands of the municipal authorities?

Captain DESBOROUGH.—It is proposed to do so as far as it is legally possible, but where the Provincial governments have definite powers of licensing, then the

Federal government cannot come in at all. I think there is no doubt that in many cases the Provincial governments will co-operate with the Federal government, and I am quite sure that the Federal government will be prepared to advise on every possible occasion.

Mr. BRAINARD.—About the strength of detonators, are you going to apply the same import rules to detonators as to explosives?

Captain DESBOROUGH.—Explosives include detonators.

Mr. BRAINARD.—There is nothing to prevent a man importing weaker detonators than are made in this country.

Captain DESBOROUGH.—Not only detonators but fireworks and sporting cartridges should all be examined. I would go further than they go in England in dealing with sporting ammunition. I think the explosives with which this ammunition is loaded should be required to come up to the same standard as that manufactured in the country.

Mr. BRAINARD.—Is it the intention of the Government to get after the consumer of these explosives as well as the manufacturer? That is, will a contractor be told that he must use only detonators of a certain strength?

Captain DESBOROUGH.—That cannot be done, I believe, as far as the use of ordinary explosives is concerned, but I think it will be done with the co-operation of the local governments as regards coal mine explosives. It would be an excellent thing if it could be done with all explosives, but I do not know if there is power.

Mr. P. LESUEUR.—In connexion with lightning protection, a principle was discovered a very long time ago which does afford absolute protection to buildings from lightning, and which has not been applied for ordinary dwellings, because of the impracticability of it, but it is quite possible for magazines. It was discovered by Faraday. It amounts to this. Inside a metal cage of any kind, as, for instance, ordinary girders of a closed bridge, no electrical phenomena can take place. This is the result, that if you have a metal roof on your magazine—tin or galvanized iron—and more or less surrounding the sides, leaving plenty of room for one door—there is only one door I believe permitted—and bury this wire netting, which may be in the form known as chicken netting, there can be no manifestation of lighting, even the mildest sort, such as would be detected by the electroscope. If a building should be actually struck by lightning, the lightning does not have a disruptive effect, provided it strikes a sufficient surface. If a wire netting were not sufficiently large it would be burned up by the electric discharge. The netting I speak of surrounding a magazine has at least twenty times sufficient carrying capacity for the heaviest lightning stroke. That appears to have been recognized in Europe; because some four years ago I saw a reference in the Engineering and Mining Journal of some place in Continental Europe where this principle, long recognized, was being applied to magazines, as being the one absolute security.

Captain DESBOROUGH.—There are very elaborate, what we call cage systems, adopted in Germany and in some places in England. My point was I did not think anything of that sort should be prescribed until people over here, particularly manufacturers, had the opportunity of trying to work out the most economical system. I laid a great deal of stress on the economical side of it.

Mr. BRAINARD.—Black powder manufacture has not been mentioned. Are you going to impose the same restrictions as to quantities?

Captain DESBOROUGH.—The factories should be licensed on the same system. For smaller quantities there is a greater reduction of distance for gunpowder.

G. M. HOWARD, of the *A. L. Howard Company, Sherbrooke, Que.*—As regards the number of employees you mentioned only the manufacturing of dynamite and the charging of cartridges. Now, I presume the regulation regarding that would differ for different manufacturing?

Captain DESBOROUGH.—Quite so. My idea is, each case should be treated on its merits. It is impossible to lay down hard and fast rules. For instance, in sporting ammunition there is not the risk there is in loading blasting cartridges, and therefore, each case should be treated absolutely on its merits.

D. W. BRAINARD, *Dominion Cartridge Company, Montreal.*—I was wondering about working magazines. Each loading building will have a small magazine outside, with comparatively little powder in it, say four or five kegs. It means considerable expense if you have to move these a long distance, and have to be continually running backwards and forwards.

Captain DESBOROUGH.—I quite appreciate that.

Mr. BRAINARD.—We should have as large an allowance as possible for small magazines.

Captain DESBOROUGH.—We consider that we have here—for 300 pounds, twenty-five yards is the distance, but if you have a screening wall in between we allow for 200 pounds at twelve and a half yards.

Mr. BRAINARD.—Is the wall of the building counted a screening wall?

Captain DESBOROUGH.—No. I do not think you need be apprehensive of any trouble there. Probably you could by partitioning your little magazine produce the same effect.

Mr. BRAINARD.—About magazines for storing detonators, it is rather complicated on that, because as soon as you can store enough for your day's work, you will need a double handling. You will have to take them to your magazine and load them again, whereas if you could start with say sixty thousand——

Captain DESBOROUGH.—Sixty thousand means a very small quantity of contained explosive. The distance is based entirely on contained explosive as far as detonators are concerned.

Mr. BRAINARD.—The Canadian detonators are made of practically the same strength as the American and English, and the only trouble we have from the manufacturing point of view is, that periodically some dealer will import lightly charged caps and we cannot sell a heavily charged cap cheap enough to compete with them, and we would be forced to manufacture a lower grade.

Captain DESBOROUGH.—Would it be sufficient if the weight of the detonator were strictly defined, so that imported detonators would require to come up to the standard?

Mr. BRAINARD.—That would be satisfactory. The trouble now is that a 5 grain detonator is imported, whereas we manufacture nothing under 8·3 grains.

Captain DESBOROUGH.—The standard detonator with us is the No. 6, which contains one gramme of composition.

Mr. BRAINARD.—How would you have your testing of imported ammunition done? Every dealer will import such quantities that it would be difficult to take a sample out of it.

Captain DESBOROUGH.—It will soon become known that each man who imports ammunition has to take out a license, and that samples will be taken by the Customs for examination by the Explosives Department, and consequently only large importations will be made.

H. R. DRACKETT, *Superintendent Standard Explosives, Vaudreuil.*—I should like to inquire how the table of distances will apply in the way of protection outside the factory. For instance, our plant is located in a heavy bush.

Captain DESBOROUGH.—We quite appreciate the value of timber for preventing the projection of debris, but there is no guarantee that timber will grow for ever, and if that timber is ever destroyed you do not get the protection afforded by it, and it would upset the whole system of distances at once. That is why we do not take the timber into account in measuring distances.

Mr. BRAINARD.—Is there going to be any prescribed form of buttress?

Captain DESBOROUGH.—My opinion is there should not be except in the most general terms. Practically what we find best is sand or earth without heavy rubble in it, about 3 feet thick at the top and supported on either side by timber or by corrugated iron, it stands the weather so much better in England.

Mr. LESUEUR.—About how thick would that be at the bottom?

Captain DESBOROUGH.—If you have corrugated iron or timber revetment, they are almost vertical.

Mr. LESUEUR.—A matter of about 3 feet?

Captain DESBOROUGH.—Yes, but it is objectionable having heavy rubble in these mounds. I may mention that the German Government carried out some experiments two years ago on magazine construction. They used a type of reinforced concrete and exploded fairly heavy charges inside the building. They found the particular concrete was so pulverized that there was no projection of debris for any distance.

Mr. D. H. MCDOUGALL, *Dominion Coal Company.*—You were speaking of a 100-ton storage magazine, and you suggested that it would be better to have two 50-ton magazines—how far apart would you propose to locate them?

Captain DESBOROUGH.—One hundred yards apart, or half that if there is an earth bank in between.

Mr. MCDOUGALL.—In that case the location governing the 50-ton plant, and the distance from residences would apply?

Captain DESBOROUGH.—Yes.

Mr. MCDOUGALL.—I should like to inquire if it is the intention to have explosives which are now on the permitted list in England, admitted for use in Canada without inspection on this side?

Captain DESBOROUGH.—I think it would be advisable to inspect every explosive that comes into the Dominion.

Mr. McDOUGALL.—In that case you would propose, I presume, to be prepared for immediate inspection. Take the case of a shortage in the explosive supply, a company waiting for a consignment to arrive; would you have immediate inspection or would you propose to permit the use of explosives in the meantime?

Captain DESBOROUGH.—All I can tell you is what we do in England. We have been able from the time of importation to release occasionally within two days. Of course, your distances are somewhat greater here, but a certain amount of power ought to be allowed to the inspector, if he knew the factory and origin, to allow the explosive to be taken into use. We frequently do that in England.

Mr. McDOUGALL.—Supposing your testing station were located at Ottawa, and the explosives arrived in Nova Scotia, it would take two days to send samples here.

Captain DESBOROUGH.—My view is this, that if any English manufacturer wished to get his explosive on the Canadian permitted list, he would submit a sample to be tested at Ottawa. Then subsequent importations would only be chemically tested, unless the occupier of the mine, or the mines inspector of the district wished any particular sample to be tested. I do not mean that each importation should go through the firing test, but only through the chemical test.

G. A. McPHERSON, *Ontario Powder Co., Kingston.*—May I ask if there are any drafts of the proposed Bill? It seems to me if we had a draft of the Bill actually before us we could study it and ask more pointed questions than we can in a general discussion.

Captain DESBOROUGH.—I can only give you the system in England. Any draft of a Government Bill is absolutely the property of the Minister, and kept confidential until laid on the table of the House. I imagine the same procedure is adopted here with regard to Government Bills.

Mr. McPHERSON.—There are many details that would be incorporated in the Act which we are scarcely in a position to consider to-day. One point occurs to me—what tests will be necessary for factories to enforce? How many tests? In making nitro-glycerine we run it in batches. Have we to test every batch or take a sample for a number of days and test it?

Captain DESBOROUGH.—The point, and a very necessary point, is that the factory should have a chemical department to see that they are bringing their explosives up to the required standard. There is no obligation on you to do so, but for your own protection you ought to do so. The original sample for authorization will be submitted by you, and will be subjected to certain tests by the chemical department: amongst others a stability test of some sort. If that sample proves itself to have a reasonable degree of chemical stability then it will be authorized, and you will be required to produce explosives which will pass a certain test. I may say that, at the present time, most explosives are examined chemically in England by what is known as the heat test. A committee is sitting at present in England to discuss the whole question of standardizing that heat test, and recommending another test which may be used as a check test. Everyone admits the heat test is not altogether satisfactory; but it happens to be a test that is very easy to carry out. What we want is that the manufac-

turer should not have his explosive condemned on one test, but that there should be other tests which could be used in the event of the explosive failing to pass the heat test. I might say it is very exceptional in England, on sampling explosives, to find one which does not satisfy the heat test. I have taken samples of dynamite twenty years old and they have been perfectly satisfactory.

Mr. MCPHERSON.—I have had the impression that the reason for the movement to have this legislation passed is the number of accidents that have occurred on works. Will there be any move to license blasters where the actual accident occurs?

Captain DESBOROUGH.—I am suggesting that where the use of explosives is not already governed by such legislation as the Mines Regulation Act, the Minister of Mines should have power to make certain rules governing the use of explosives. That I take it would apply principally to construction works. What the scope of those rules is to be I have not definitely thought out, but I thought the Department would probably form a small committee and consult users with a view to framing a code. I quite agree that some regulations to govern firing are absolutely necessary.

Mr. MCPHERSON.—We who are engaged in the manufacturing business feel very strongly the great number of deaths is due really to the reckless handling of explosives after they reach the point of consumption rather than to any defect in the factory.

Captain DESBOROUGH.—I quite agree with you, but you have to recognize this, that if you are going to inspect every place where explosives are used you will have half the population of Canada inspecting the other half.

Mr. MCPHERSON.—Very true, but if we are to get out of the evil we must strike at the root.

Captain DESBOROUGH.—I think rules ought to be adopted to govern the use of explosives, and inspectors should be appointed whose principal duty would be instruction, very much in the same way as the Railway Transportation Bureau send out men to give instructions.

Mr. MCPHERSON.—In regard to the regulations I did not quite catch whether the Federal or Provincial authorities should govern. A point very vital to persons interested in the use of explosives is the possibility that the local authorities might clash with the Dominion.

Captain DESBOROUGH.—That has been the great difficulty in this legislation. I am not a lawyer, but that is a matter which is being considered by the lawyer who is looking after the legal side of the proposed legislation.

Mr. MCPHERSON.—The point I have mostly in mind is this—the question of local taxation. A point comes to my mind now; a few years ago we attempted to open a magazine here in Ottawa. As it happened there were no regulations at the time, but the municipality exacted a license of $500 which drove us completely out of this end of the country. Suppose the Province that is interested exacts a tax, are we likely to be subject to a further tax by the municipality, a tax that appears unjust on the face of it?

Captain DESBOROUGH.—My idea is this; where the Dominion Government has power to license a magazine, that a comparatively small fee should be paid

for that license, and that no other license fee should be exacted, but I cannot tell you whether the Municipal or the Provincial people have power to extract anything from you or not.

Mr. MCPHERSON.—My reason for bringing this up was it occurred to me it might be possible to overcome that in this legislation.

Captain DESBOROUGH.—It is a point that the lawyer who is looking after the legal side of the Bill is going into.

The CHAIRMAN.—All legal questions are in the hands of the Department of Justice who are looking after this matter entirely.

W. M. LOWERY, *Ontario Torpedo Company, Petrolia.*—We manufacture nitro-glycerine and use it for oil and gas wells in its natural state. How would we get samples here?

Captain DESBOROUGH.—How do you transport it?

Mr. LOWERY.—With teams.

Captain DESBOROUGH.—The liquid nitro-glycerine?

Mr. LOWERY.—Yes.

Captain DESBOROUGH.—Well, I cannot say that that is a wise proceeding at all.

Mr. LOWERY.—That is the only way. It is just a point that occurred to me.

Captain DESBOROUGH.—A very important one from your point of view.

Mr. LOWERY.—It does not come under the head of dynamite, so we cannot ship it at all.

Captain DESBOROUGH.—Do you transport it great distances?

Mr. LOWERY.—Sometimes a couple of hundred miles with a team.

Captain DESBOROUGH.—Why do you not adopt the original system of Alfred Nobel, that is absorb your nitro-glycerine with kieselguhr for safe transportation, and afterwards extract the nitro-glycerine from the kieselguhr?

Mr. LOWERY.—That would not do in this case. You have to use it as soon as you get it there.

Captain DESBOROUGH.—I cannot give you an answer right off. It requires a good deal of consideration.

A. C. TAGGE, *Canada Cement Company.*—From the standpoint of the user of small quantities, may I ask what is your recommendation for a small magazine suitable for holding a carload, say ten tons?

Captain DESBOROUGH.—In what respect?

Mr. TAGGE.—Distance from other buildings and public roads?

Captain DESBOROUGH.—That would be governed more or less by this table which would have to be modified more or less to suit Canadian conditions. Some do not apply and others should be inserted. For a dwelling house with the consent of the occupier the distance for ten tons is 250 yards, and without the consent of the occupier 850 yards. Those distances should be halved if the building is mounded, and reduced three-quarters if there are substantial natural features of the ground in between.

Mr. TAGGE.—How would the location of that be with reference to public roads?

Captain DESBOROUGH.—Our distance is 120 yards without mounds.

Mr. HOWARD.—The transportation of samples might possibly be a very serious matter. As regards crude fulminate of mercury, it is not allowed to be transported at all except in a freight car by itself. You cannot carry it on your person in a crude state if it is known, and the transportation of a sample, if a sample is required to be sent, even a small quantity, might be a serious matter. Sometimes quite considerable quantities are imported and manufactured in different places in the country, and as I understand a sample must be furnished at some time or another if you are going to obtain a license.

Captain DESBOROUGH.—Fulminate of mercury is so well known that I think the chemical department would authorize it without examination. I cannot understand why anyone should want to carry fulminate of mercury in its crude state on his person.

Mr. HOWARD.—Except for a sample.

Captain DESBOROUGH.—We have a system in England by which persons are allowed to carry samples to the central office in London.

Mr. HOWARD.—Railways will not carry such persons here.

Captain DESBOROUGH.—I think that could be arranged.

J. J. RILEY, *Northern Explosives Company, Montreal.*—For my own part I am very glad to have an opportunity of coming here, and on behalf of my Company we welcome the fact that the Dominion is going to undertake the legislation which we felt was coming. We do not want provincial legislation with different laws and regulations in every Province. I had hoped we would have heard to-day something more definite than we have had put before us by Captain Desborough for discussion. There are various points he has dealt with very generally, but we have not had a chance to go into many matters. No doubt the details will be left to us later when we see the Bill. If we could have a draft outline, not necessarily the Bill itself, embodying the table of distances and other matters that we could study carefully, perhaps we could have expressed our views more clearly on this question. There are a great many things that will come up. For instance, one of the questions Captain Desborough mentioned, to try and get us lighter rates as they have in the States, the right to transport less than 5,000 pounds without paying for 5,000 pounds—such matters as that. Then there is the question of taxes to be raised, the cost of this testing station and bureau, and other important matters especially for small companies. The question of the cost of running a bureau must be considered. If we could possibly have, before this becomes a finality, some sort of rough draft, not necessarily the Act itself, we might have a better opportunity of studying it. While I say this, I do not wish to convey the impression that we are not favourable to the movement; in fact we are extremely favourable to legislation being prepared, but we have not had an opportunity of going into the details to-day.

Captain DESBOROUGH.—What I have been endeavouring to do in the Act itself is, to put in as little detail as possible, for this reason; if you put in detail you stereotype the practice, and that is bad for the industry and for the country. My view was, the Department would probably follow the English system, and when any change is made by Order-in-Council, the trade would be first consulted.

Mr. RILEY.—That from your point of view is extremely nice. If we had you here permanently carrying out the Act there would possibly be no trouble, but in this Act we are up against a difficulty of getting inspectors to carry it out.

Captain DESBOROUGH.—I quite admit that the administration of any Act depends very largely on the inspection staff, and I can only tell you I have spoken very strongly to Mr. Templeman on the subject, and urged him that he must really try to get the best men he can; and to do that he must be prepared to pay them adequately. The other matter you have touched on, the matter of fees, I cannot suggest definitely what fees should be paid over here; but I am leaving behind me the scale of fees we have, and I am told they are extraordinarily insignificant; but whether the Dominion Government will be satisfied with an insignificant scale of fees or not I do not know. For instance, a factory license in England costs £10—less than $50—and is in perpetuity, so long as the terms of the license are observed. I understand a license in perpetuity is not considered advisable here, and it will be renewable each year.

Mr. RILEY.—Another point that does not seem to have been touched upon by Mr. McPherson is the use of explosives. I agree with him that most of the accidents which have occurred have been in connexion with the use of explosives after they have left the factory. It is a difficult matter to tackle by legislation, and I would suggest the Government should deal with it as the other Departments do—for instance, the Dairy Department—by instructors.

Captain DESBOROUGH.—That is very wise.

Mr. LESUEUR.—Many of the men employed on construction works are foreigners who do not understand the language, and even if they did it would be hard to teach any of them who are over forty years old anything new. The instructors would find it difficult to teach an old dog new tricks.

Captain DESBOROUGH.—The Norwegian Consul has written to Norway suggesting that no more emigrants should come to Canada because they are being destroyed so quickly.

Mr. LOWERY.—In storing nitro-glycerine in the pure state, will a pound of it be considered equal to a pound of dynamite?

Captain DESBOROUGH.—No, I think nitro-glycerine should have a greater distance. It has been our experience that during the manufacture of nitro-glycerine the radius of destruction is greater. Nitro-glycerine is only used as a drug in England. It is a matter which will have to be discussed later on.

Mr. BRAINARD.—Is there any restriction on ordinary smokeless powder? Take ammunition factories—we have eight or nine types of standard smokeless powders. There is no restriction with regard to the storing of these in the one magazine, supposing it contains no higher explosive?

Captain DESBOROUGH.—No, we look upon them all as being equally dangerous, or if you prefer it, equally safe.

Mr. RILEY.—When will the Bill likely go into effect, and what time will you give us to conform to the Bill?

The CHAIRMAN.—That is still under consideration. This Conference is solely preliminary to the draft of the Bill, but as far as the administration is concerned I am quite sure that the Minister will be very glad indeed to obtain

the ablest inspector that can be had. The administration is the important part of the whole thing.

Captain DESBOROUGH.—What limit of time would you think reasonable after which you would be required to conform with the new system?

Mr. BRAINARD.—I agree with Col. Riley that we would have to see the Bill and learn what detail is embodied in it.

Captain DESBOROUGH.—The Bill will have very little detail. It will simply say so far as licensing a factory is concerned that no explosives may be manufactured except in a licensed factory and the Minister of Mines will grant such license.

Mr. BRAINARD.—With regard to the time, all the eastern dynamite plants in Quebec can not do construction work in the factory in winter. You have to keep the plant going and your building operations are restricted to the summer months.

Captain DESBOROUGH.—I do not want to tie you down to a definite time. If you say anything it will not be cast in your teeth afterwards, but would three years be enough?

Mr. BRAINARD.—I would rather have five.

Mr. RILEY.—Five years is better. It means constructing a great many buildings. For existing factories five years is little enough.

Mr. BRAINARD.—I do not know whether it has come to your notice or not, but the Bureau of Safe Transportation of Explosives in the States has been in consultation with the manufacturers for five or six months past, for the revision of the English distance tables. I have a copy of the list here—it is not made public yet—in which the results of the investigations are given as compared with the existing English laws. Before you go I should like to have the privilege of showing you this.

Captain DESBOROUGH.—I should like to have a copy of it. I do not look upon this table I have as perfect. It was drawn up thirty years ago and things have advanced very much since then. When you start a table of this kind it is difficult to alter it; but I do not think it is applicable to Canadian conditions as it stands. Personally I feel, as far as magazines are concerned, if you could evolve the perfect magazine which will not scatter heavy debris, it is quite possible the distances mentioned here could be materially diminished.

The CHAIRMAN.—I would advise you, gentlemen, to obtain all the information you can from Captain Desborough. You see in what a peculiar position we are placed. The Captain will sail on the 6th of October, and after that if any point comes up it will be necessary to correspond with him, and you know that is not a very satisfactory way of getting information. It takes a long time, and sometimes certain parts are misunderstood. The Conference is held for the sole purpose of enabling Captain Desborough to see how you feel with regard to his recommendations, in order that he may finally revise the draft Bill, made up last year. Therefore, I shall be very glad indeed if you will ask any questions that occur to you, and inform yourselves, as far as you can, as to the character of the Bill.

Captain DESBOROUGH.—With regard to the table of distances, I did not propose that any table of distances should be definitely incorporated in the Bill. What I wanted was, that the licensing of factories should be carried out on the general principle that the quantity of explosives allowed to be in a building depended upon the distance of the building from other buildings. I may say the Germans have recently issued new regulations which practically adopt this particular table.

Mr. MCPHERSON.—I should like to say this meeting has been called for the purpose of absorbing what Captain Desborough has explained. The difficulty I find is that while we have his exposition of his position, we have nothing we can study over. If we have something definite before us, we can state our objections or otherwise. Many questions will occur to us after this meeting has adjourned, which at the moment do not come to us, because we have nothing in black and white that we can study as a basis. If we had something to look over we could see the position distinctly, and it seems to me it would advance the matter very quickly if we could have before us something like a synopsis of the Bill. With such a statement before us, we could come back with quite a budget which could be discussed here. I do not know if there is any draft of the Bill of last year, or whether it could be submitted to us.

The CHAIRMAN.—The Bill which has been drafted, only gives general powers, and contains scarcely any detail. All the detail belongs to the administration; that is to say, when new regulations are to be made, authorized by the Bill, it will be done by Order-in-Council. There will be plenty of opportunity given the parties affected by such Order-in-Council, for consultation. I do not think the draft Bill would tell you anything specially. All the main points will be administration affairs and Orders-in-Council, and you will have plenty of opportunity to be consulted in the matter. The Bill is in the hands of the lawyer solely for the purposes of ascertaining how far the Dominion Government can go, without interfering with the Provincial authorities. It will be a very short Bill, indeed. Some matters that Captain Desborough has presented to you are the vital points which he is going to recommend, and I am very anxious that you should ask him every question that affects you; because on this will be based his final report to me. We cannot proceed in any other way; it is utterly impossible for me to take any other course. The Bill does not belong to me, but to the Minister. I am very glad one particular point was mentioned: it is better to have no law than to have a law poorly administered. This subject is of such a technical character, and of such vital importance that it is necessary to have the very ablest and best man available, at the head of the inspection. The question of salary arises. The salaries offered by the government are too low to tempt anyone with special ability to accept the position; but in this case an exception ought to be made.

THOMAS GIBSON, *Deputy Minister of Mines for Ontario.*—The discussion upon this matter has proceeded so far, almost entirely from the point of view of the manufacturers of explosives. I assume that most of the gentlemen present in this meeting are manufacturers of explosives, or represent manufacturers of explosives. I had the honour to receive an invitation to attend this Confer-

ence, and I am very glad indeed to be here. I wish to say at the outset, that so far as I can speak for the Government of the Province of Ontario, they are heartily in sympathy with the decision of the Dominion Government to legislate upon this matter. In fact it has been the view of the Bureau of Mines in Ontario—and I think the view of a good many of the mine owners of Ontario— that in this question of explosives, the supervision of manufacturing has been left too long in abeyance, and that the time has fully come when some step should be taken to put it in a more satisfactory position. At the root of all legislation in Canada, as the Chairman has pointed out, lies the question of what jurisdiction does the proposed legislation come under. We have a Federal system, the Government of the Dominion of Canada; and the governments of the several provinces of Canada; and the constitution of our country divides the jurisdiction between the Parliament of Canada and the various local legislatures. It would be not only inadvisable, but it would be useless to attempt to disregard these fundamental provisions of the constitution of our country in any legislation whatever. In this legislation, as it has been roughly suggested, so far, undoubtedly questions of jurisdiction will arise. I am not here to say what the position of the Government of the Province of Ontario will be with regard to any legislation until that legislation is before us. I have not any doubt, whatever, that the legal adviser of the Dominion Government in connexion with this proposed legislation will take the utmost care to preserve the spirit and letter of the constitution in regard to the powers and functions which belong to the central government, and those which belong to the local government. It would seem to me a reasonable division if it could be on these lines: that the supervision of the manufacture of explosives, and the supervision and inspection of distributing magazines should be in the hands of the Dominion Government, and subject to federal legislation.

That is a matter of trade and commerce, as I understand it, and so long as the explosive remains in the form of a commodity which is open to purchase and sale, then I think it is and ought to be subject to the supervision and jurisdiction of the Dominion Government and Parliament. It is somewhat different when you come to put that explosive into action, when you carry it into the quarries, the mines, or whatever work it is to be used for. The question of the use of explosives, how they should be used in mines for instance—I speak of mines and quarries because they come under the Department to which I belong—these have been regulated in the past by Provincial legislation. There seems to be no doubt that the Provinces have power to enact such legislation. I do not suppose for a moment that the Dominion Government will attempt to trench on that ground of jurisdiction. The use of explosives in mines differs from the use of explosives in public works: for instance, such works as the construction of railways, in which large quantities of explosives are used. The great majority of the railways are under the jurisdiction of the Federal government, but the mining lands of the Provinces belong to the Crown, as represented by the Provinces. They are sold by them, and in the legislature of these several Provinces lies the power to enact such legislation as they may desire to attach to any lands, or mines, or quarries in these various Provinces. I only wish to make the point clear so that there may not be any misapprehension on the subject. This is

not a matter, I assume, which very vitally concerns the manufacturers of explosives, except in this way, that whatever legislation is enacted must be authoritative legislation, and must be enacted by that government to which, under the constitution, such powers and functions are assigned. Otherwise the legislation will be ineffective and at the mercy of those whom it is intended to stop, if they should choose to oppose it and defend it in the courts. Should a matter ever come before the courts they will undoubtedly decide whether the legislation is constitutional or otherwise. There are two matters of public importance which might be achieved by legislation of this kind. I do not say this with any intention or desire to reflect on the manufacturers of explosives in Canada. I think there is a possibliity of improvement in all things, and I have no doubt it is possible to improve the character of explosives which are used and manufactured in our own country. If the legislation will enact that factories for the manufacture of explosives in Canada are to be subject to supervision, and that supervision is the right kind of supervision, it will have a tendency to improve the quality of explosives, and will be a guarantee to the man who uses the explosive that he is getting what he thinks he is getting; that he is not getting 35 or 40 per cent dynamite, when he is paying for 50. That will have a tendency— by improving the quality of explosives— to lessen the number of accidents which occur in our mines. It is undoubtedly true, and distressingly true, that we have too many accidents in our mines. How many accidents are due to the inferiority of explosives or to the negligence, incompetence, or ignorance of those who use the explosives is a matter I am not prepared to decide, and which I fancy will be very difficult to determine, but anything that can be done in the way of improving the situation will be generally welcomed. The point of view I look upon it from, is of necessity different from the point of view you gentlemen look upon it from. What the Government of Ontario has in mind is the improvement of conditions in our mines, and especially the safety and health of those employed in the mines. If this legislation is of such a character as to improve conditions in that respect, it will have the sympathetic and hearty co-operation, so far as I am able to pledge it, of the Department which I have the honour to represent. (Applause.)

Mr. BRAINARD.—I know it is quite impossible to get a draft of the Bill, but could we not adjourn for a few days and in the meantime have copies of the minutes of this meeting sent to us, and we could then hold another general meeting?

The CHAIRMAN.—Copies will be sent to every one who is here to-day. I may explain that Captain Desborough has been travelling all over the country. He was to have sailed on the 16th of this month. We cabled asking permission to have him remain with us a little longer—for I did not know exactly when Captain Desborough would be back and when we could hold a Conference— and he has been allowed to stay until the 6th of October.

On motion, the meeting decided to adjourn, and to hold another Conference a week hence (September 30, 1910).

The meeting then adjourned.

OTTAWA, October 4, 1910.

SIR,—I beg to transmit, herewith, a copy of the proceedings in connexion with the adjourned Conference on the proposed legislation to regulate the manufacture, importation, and testing of explosives in Canada: held in room No. 16, House of Commons, Ottawa, September 30, 1910.

Yours very truly,

(Signed) EUGENE HAANEL,
Director of Mines.

Adjourned Conference on Proposed Legislation to Regulate the Manufacture, Importation, and Testing of Explosives.

ROOM 16, HOUSE OF COMMONS,
OTTAWA, September 30, 1910.

The Conference resumed at 10 a. m., Dr. Eugene Haanel, Director of Mines, in the chair.

There were present:—

Captain Desborough, H.M. Inspector of Explosives, Home Office, London.
Joseph G. S. Hudson, Mines Branch, Department of Mines.
E. T. Corkill, Inspector of Mines for Ontario, Toronto.
William McMaster, President Hamilton Powder Company, Montreal.
J. Murray Wilson, Manager Hamilton Powder Company, Belœil Station, Que.
A. E. Blood, Bureau Safe Transportation of Explosives, New York, Toronto.
Daniel Smith, President Ontario Powder Company, Kingston.
C. A. McPherson, Secretary Ontario Powder Company, Kingston.
H. R. Drackett, Superintendent Standard Explosives Company, Vaudreuil.
Jas. J. Riley, Vice-president Northern Explosives Company, Montreal.
E. A. LeSueur, Ottawa.
Lionel Kent, The Energite Explosives Company, Montreal.
Mr. Gallagher, Standard Explosives Company, Vaudreuil.
Col. William White, Ottawa.

The CHAIRMAN.—At the last meeting, which was held on the 23rd of September, the parties interested in the proposed legislation on explosives heard the recommendations of Captain Desborough, which he is to make to the Government, in connexion with the drafting of the proposed Bill. It was thought desirable that an opportunity should be given to the parties who were then present to digest what he said, and to prepare themselves to ask further questions at an adjourned meeting. We are here this morning for this purpose, and if you have any further questions to ask, or if you desire to discuss with Captain Desborough points which may have come up in your minds with respect to the proposed Bill, I shall be very glad if you will proceed to do so. A desire was expressed at the meeting held on the 23rd inst. that copies of the proceedings should be sent to those present on that occasion. We had less than a week to get that report out, but copies were mailed, and I hope you received them in time to enable you to read the report, and digest it. Captain Desborough desires me to mention, that he has a recommendation to make in connexion with the appointment of a committee to consider the best type of magazine construction, and I should like to hear from him on that point.

Captain DESBOROUGH.—Dr. Haanel and gentlemen: I am recommending to the Mines Department that they should consider the advisability of forming

a small committee, consisting of a member of the Mines Department, possibly an officer from the Militia Department who is interested in the storage of explosives, one member of the Public Works Department—who would be an expert on buildings, and two representatives of the explosive trade. I should suggest that the explosives trade be prepared to supply a limited quantity of explosives for these experiments, and that the experiments should, in general, consist of putting up three or more types of magazines, and then exploding say a ton of explosives in each, and noting the effect of the explosion, more particularly with regard to the projection of debris. The types of buildings I would suggest to be experimented with are: (1) the expanded metal with a cement plaster; (2)—if I can procure the details—the German specially reinforced concrete; (3) a log magazine; and (4) and (5), any particular types which the committee think desirable to test. In carrying out the experiments, I think the explosive should be placed at one end of the magazine, leaving as much air space as possible between the explosive and the far end, the idea being that the explosive which is close to the wall will shatter that wall, but it is not at all certain that the wall at the far end will be equally shattered. When these experiments are being carried out, particularly with regard to expanded metal and reinforced concrete, it might be advisable to see if the expanded metal and iron in the construction of reinforced concrete could not be utilized to protect the buildings from lightning. The other main point that the committee should bear in mind is that the magazine should be reasonably secure against unlawful entry, and also that the cost of construction should be as economical as possible.

Mr. JAMES J. RILEY, Vice-President, Northern Explosives Company, Montreal.—Will Captain Desborough be good enough to outline to us his views of an ideal construction for a powder factory? Probably some of us have to do a little building even this autumn or before the new legislation will be operative and we would like to have Captain Desborough's ideas of what we should strive for.

Capt. DESBOROUGH.—I am afraid that is too big a proposition.

Mr. DANIEL SMITH, President of the Ontario Powder Company, Kingston.—I should like to ask Capt. Desborough if he has had much experience in brick magazines. I have always been of the impression that brick is the best material for such a building, because if an explosion takes place the brick is pulverized into dust. If the magazine is constructed of stone the explosion will scatter it like cannon balls. I have seen magazines where the door of the magazine, made of iron, was used as a target. A brick wall one foot thick will keep any bullet out. I do not know so much about iron and concrete.

Capt. DESBOROUGH.—In England all our magazines, except floating magazines, are made either of stone work or brick work. We have had only two occasions in the last forty years in which explosions have occurred inside a magazine. In one case the magazine was filled with ten tons of sporting powder, and it burned away harmlessly. In the other case the magazine contained a ton of black powder and 150 pounds of gelignite. In this case there was a very violent explosion, and bricks were projected a considerable distance.

Mr. SMITH.—I know of only one case, which occurred in Brockville, a number of years ago, where there was an explosion in a small factory. In that instance the brick chimney was pulverized into dust, while the stones in the building were thrown all over the field.

Capt. DESBOROUGH.—I have the experience of only one magazine. There was another case where the explosive was stored in a concrete building belonging to the British government, near Woolwich, in which an explosion occurred; but the magazine was divided into six compartments by very substantial concrete walls. The explosion occurred in one of the compartments, and pulverized the concrete in its immediate neighbourhood. The farther walls of the other compartments were projected in blocks, some of them weighing half a ton, a distance of 700 or 800 yards, so it seems that the ordinary concrete is a very bad form of construction. I will try and find a report of the experiments I mentioned the other day, which the Germans had been making with specially reinforced concrete. If I can procure it I shall send a copy of it here. I first saw a short abstract of it in the Journal of the Society of Chemical Industry in England. I may say I am a very great believer in putting earth banks around magazines. They prevent a good deal of the debris being projected, and also very considerably arrest the wave arising from an explosion. We heard, I think it was last week, of an experience with a magazine in British Columbia which was built of logs, and surrounded with, I think, about two feet of earth. This was in the middle of a forest fire where everything else was absolutely wiped out, but the magazine remained, and the explosive inside was not damaged in any way, not even by the heat of the fire passing over the roof.

Mr. SMITH.—We have had some experience with several magazines in this new territory to the north. For instance, at Sudbury, twelve or fifteen years ago, a company had a magazine built of logs and covered with earth. A fire came and the man fought it, and it was safe so long as the fire did not touch it. Being covered with earth, it was protected.

Capt. DESBOROUGH.—I do not like to tie you down to any hard and fast structure. A magazine which would be suitable in one place might be unsuitable in another. The object I have tried to attain in assisting to draft this Bill is to include as little hard and fast regulation in the Act as possible, but to have all the regulations administered by Order-in-Council, so as to allow plenty of scope for differences of conditions or materials.

Mr. J. MURRAY WILSON, Manager Hamilton Powder Co., Que.—Last week Mr. Drackett, of the Standard Explosives Company, asked if a plant were located in heavy bush, whether that would count as a natural protection instead of embankments, and you replied that there was no guarantee that the timber protection would be there permanently, that if the timber should be destroyed there would be no protection afforded, and that, that is why timber is not taken into account in connexion with measuring distances. As soon as the underbrush is cleared away, so that there is no danger from fire, I think trees are the very best protection. You agreed that they are, and I do not think any explosive factory would deliberately clear away trees which are so good a protection. The trees grow larger every year, and are even a better protection than embank-

ments. I think trees ought to be taken the same as mounds or hills—should be taken as equivalent to an embankment.

Capt. DESBOROUGH.—I agree that trees do intercept a great amount of debris projected by an explosion. If Mr. Wilson were always managing a factory so protected it might possibly be advisable to take into consideration the fact that trees are there. On the other hand, there are a number of factory managers who dislike trees very much. They say that they prefer to have the buildings quite open, where they can see what is going on. I do not think there is much in that myself, but there are people who do hold those opinions.

Mr. H. R. DRACKETT, Superintendent Standard Explosives Company, Vaudreuil.—Would not a mound shut off the buildings from view very much the same way as timber? In fact, if the mound were on all sides it would perhaps shut it off still more.

Capt. DESBOROUGH.—The mound does shut off the buildings from view, but does not shut off the ground between the buildings, and the idea is that the manager of the factory wants to see when an explosive is being transported from one building to another. There is another point about trees, how are you going to settle what growth of trees will be accepted?

Mr. DRACKETT.—I should think from what you have said that the Act will be administered by the head of the department, and that would be a matter for his judgment in each case, of course. Last week I asked some questions about the use of timber growth as a protection, and I find that our timber growth has been standing within the memory of the oldest inhabitant, and probably will stand for some generations, because we are very careful of our timber growth and nurse it along at all times.

Capt. DESBOROUGH.—Then if the trees were taken into consideration I suppose you would see no objection to inserting a clause in the license that the distance should only be considered adequate so long as the trees were standing.

Mr. DRACKETT.—Certainly that would be accepted, I think. We would not expect to take any advantage of the fact that where we have timber growth we could cut it down and do away with our protection.

Capt. DESBOROUGH.—Timber is getting more and more valuable.

Mr. DRACKETT.—If we had to erect mounds it would be quite an expense for us where we have already a very efficient protection, because our ground is all rock. We would have to bring in enough dirt from some outside point to make mounds there.

Capt. DESBOROUGH.—I was principally referring to magazines when I spoke of mounding, and not to working buildings. What was really in my mind was the outlying magazines, what I should call distributing magazines.

Mr. DRACKETT.—In a case like that the greatest danger is they are considered to be outside the buildings.

Capt. DESBOROUGH.—I agree.

Mr. DRACKETT.—In that case, perhaps, the timber would be a source of danger through fire.

Capt. DESBOROUGH.—I quite agree.

Mr. DRACKETT.—But in construction it is altogether a different matter, it seems to me.

Mr. C. A. MCPHERSON, Ontario Powder Company, Kingston.—It seems to me that trees surrounding a magazine in the outlying districts would serve to keep the public at a distance, and to keep private dwellings away, so it occurs to me that trees would be a very good protection, not only as a barrier against falling debris, but as a means of keeping people from building close to the magazine. It might be well to consider it in that respect.

Capt. DESBOROUGH.—Yes, except I do not think it was ever suggested that the existence of trees would be a bar to the establishment of a magazine. I think we are at cross purposes.

Mr. MCPHERSON.—It occurs to me that while trees are considered a good natural barrier, they should be regarded also as a barrier to the building of houses nearer the magazines.

Capt. DESBOROUGH.—As far as dwelling houses are concerned a magazine should only be allowed to exist, containing a specified quantity, so long as the distance required between the magazine and dwelling houses is maintained. If a property owner had a right to build a house alongside a magazine and proceeded to build it, then the magazine license would become extinct.

Mr. DRACKETT.—That raises a very important point. For instance, a distributing magazine might be built in some district in conformity with the table of distances; that being the case would the owner of the magazine have any guarantee that your bureau would protect him from the encroachment of dwellings?

Capt. DESBOROUGH.—No.

Mr. DRACKETT.—Suppose we put up a magazine for explosives and some one undertakes to build near it, I suppose the only way we could protect ourselves would be by purchasing the land near the magazine to prevent any one coming in.

Capt. DESBOROUGH.—As a rule, the effect of building a magazine is to prevent the erection of other buildings near the place.

Mr. DRACKETT.—It has not always been the case. I think Mr. Smith could give you some light on that point. We were just discussing it last night. If you have fifty tons in a magazine, you must have a distance of 850 yards. Is that correct?

Capt. DESBOROUGH —If you get the consent of the occupier the full distance is 850 yards, but if you have an earth bank between the magazine and the dwelling house the distance may be reduced to 425 yards, or if there is a substantial natural feature between, then the distance would be about 216 yards.

Mr. DRACKETT.—Say we do not receive permission, we must therefore put our buildings 850 yards from other buildings. That means a square mile of property.

Capt. DESBOROUGH.—It would be necessary then to put up an earth bank, which would reduce the distance.

Mr. DRACKETT.—That would still be half a mile.

Capt. DESBOROUGH.—I do not quite see how to get around that. The way our people get around it is, they use a fairly large number of small magazines—

twenty-ton magazines. You must remember in England we are very crowded, and it is difficult to get a site for a magazine at all, but still we manage to use 30,000,000 pounds of explosives every year, and all that is kept at specified distances. I do not think in practice you will find the difficulty you anticipate.

Mr. SMITH.—A few years ago we built a magazine in Cobalt, when the mines were first discovered there, and we cut a road about half a mile into the woods and built a log magazine covered with sheet iron, banked it, and fixed it up as we thought was right. That autumn the discovery of silver was made known generally. Miners went there in flocks, and went in by our road and built a town near the magazine. A bush fire came. They did not pay much attention to it until it got near the magazine, and then they made tracks down the railway. The country being new, and there being veins in the rock, leaves accumulated in them and the fire followed them up, and ran under the magazine and set it off. You have heard of the explosion, I presume?

Capt. DESBOROUGH.—Yes.

Mr. SMITH.—In a mining district like Sudbury, you cannot buy a large block of land—the Ontario Government would not sell a mile square—and the consequence is we could not build a magazine there where it is quite essential. The quantities stored vary. Sometimes we have to carry a larger stock than at other times in those isolated places, and if we should have a large quantity it would be necessary to move the magazine farther away than when a small quantity is stored. In that event it would be necessary to have the magazine on wheels or runners.

Capt. DESBOROUGH.—Cobalt cannot be described as a flat plain, and I am quite sure there are many hollows in the ground that would enable you to maintain a quarter of these distances. I think, possibly, Cobalt may be an exception. Perhaps it would be better for Canada if it were not, but you cannot expect to have tremendous developments in such a rich country in very many places.

Mr. SMITH.—You were speaking of trees as a protection. We find that the trees are a great protection, not only against flying debris, but also against carrying the sound. If an explosion occurs in such a place the trees around it throw the sound up. For instance, if you see a train approaching, and stand behind a clump of bushes until it passes, you do not hear much sound.

Capt. DESBOROUGH.—I quite recognize the very great value of having the protection of trees.

Mr. SMITH.—Our factory stands in a very nice clump of trees. We have had a couple of explosions there, and I consider the trees afforded very good protection. It is the wave that does the damage, the movement of air, and the trees carry the waves upward.

Mr. LIONEL KENT, the Energite Explosives Company, Montreal.—Mr. Smith's remarks on the subject of the advisability of having trees surrounding magazines and factory buildings recall to my mind the differences in point of view taken by some of the municipalities on that subject. Our factory is situated in the township of Bucke, near Haileybury. Under the municipal regulations there we are not allowed to have trees or brush within some twenty rods of any of our buildings or magazines, and for that very reason we have been com-

pelled to clear them away, the danger arising from bush fires in that district not being considered by any means insignificant. Before getting away from the subject of the construction of magazines, I notice, Captain Desborough, that you make no mention of sheet-iron magazines as having been adopted in England or in use there.

Capt. DESBOROUGH.—We do use them in England, but every one I have mentioned them to here, says that, owing to climatic conditions, they are unsuitable. I do not see the slightest objection to using corrugated iron buildings in a certain way for magazine construction.

Mr. KENT.—The only objection you have heard is that climatic conditions render them objectionable at certain seasons of the year?

Capt. DESBOROUGH.—Unwise.

Mr. E. A. LESUEUR.—You mentioned 850 yards as the distance required for a magazine containing not more than 50 tons.

Capt. DESBOROUGH.—With the consent of the occupier.

Mr. LESUEUR.—Without the consent of the occupier what would the distance be?

Capt. DESBOROUGH.—Three thousand five hundred yards, that is unmounded, but it is almost inconceivable that you would find 3,500 yards of flat country in the Sudbury district.

Mr. MCPHERSON.—Some mention was made at our last meeting of a revised table of distance. I do not happen to have one of those tables. Is there any probability that the revised tables will be adopted?

Capt. DESBOROUGH.—I cannot tell you what the Dominion government will do in the matter, but I think that I may say this, that the new table is produced by the manufacturers of explosives; I do not doubt their integrity in the least, but one must remember they are very interested parties, and, therefore, before one accepts such a table one would have to be very well satisfied that the distances were adequate. I may say, in the new revised table sent to me it was expressly stated that the new distances did not protect any building against projection by debris. It is very nice from the manufacturers' point of view, but if the Government sanctioned such conditions as might occur similar to what did occur in Hull, I think the Government would have a very unpleasant time, and rightly. The existing table of distances has been adopted by the bulk of the European countries, by South Africa, by Australia, and by India, and if the new one were adopted, reducing these distances about 75 per cent straightway, I think it would be a very bold step to take.

Mr. MCPHERSON.—In your opening remarks you suggested that a committee should be formed of three Government officials and three representatives of the explosives trade, for the purpose, apparently, of experimenting on this question. The present table, therefore, would probably be adopted temporarily until such time as a new table might be arranged.

Capt. DESBOROUGH.—My view was not so much to deal with the table of distances as to afford information about preventing the projection of debris. Remember in this country your dwelling houses, outside of the cities, are almost entirely frame houses. These are much more susceptible to damage than build-

ings of stone or brick which you find in other countries. Therefore it is absolutely essential to take such steps as you can to minimize the damage which would occur from debris in case of an explosion. I would not like to base the distances on experiments with one ton of explosives—I would not like to say that it would indicate what might happen if 50 or 100 tons of explosives were exploded. I do not think the manufacturers would care to furnish 100 tons to be exploded at one time; it would be an expensive experiment to carry out.

Mr. McPHERSON.—The Government might co-operate and furnish the explosives. It occurred to me that up to the quantity exploded it might be well to have a revised table in mind, to govern such quantities as might be experimented with.

Capt. DESBOROUGH.—You may be very wealthy people out here, but if you are going to use enough explosives to make tests on a large scale, I think you will find it very expensive.

Mr. McPHERSON.—Up to one ton was suggested.

Capt. DESBOROUGH.—That is a very small amount.

Mr. McPHERSON.—It would be interesting to manufacturers to have experiments on a large scale. Apart from our magazine, and perhaps one other building on the works, we would not expect to have 100 tons in any one of the buildings. Then it would be interesting to us to know just what distances might be considered safe.

Capt. DESBOROUGH.—I have been endeavouring to get the English government to carry out such experiments for the last eight years, and have failed to persuade them. I mentioned it this morning in the hope that you people would be ready to co-operate with the Dominion government. I think the experiments would be most valuable, particularly if carried out in a reasonable way, keeping economy in view.

Mr. McPHERSON.—Economy would be, of course, one determining factor. For instance, if we have regulations put into force here which will mean that we will have to transport our material back and forth, let us say a quarter of a mile between the different buildings on the work, it means that our finished product is going to cost a great deal more than the same explosive manufactured in the United States, where the regulations may be entirely different. I do not know if they are. Supposing our cost is increased by even a fraction of a cent in the pound, where we have certain markets where we come into competition very keenly with the United States dynamite, I imagine in those conditions we might be entirely shut out.

Capt. DESBOROUGH.—If my recommendation is adopted no United States explosive will come into Canada, except by virtue of an importation license. The United States manufacturer will be required to have his explosive authorized in the ordinary way. Any explosive coming into Canada will be held in bond until samples have been examined by the chemical officers of the new department, and it will not be released for distribution until the chemical advisers have reported favourably on the samples taken by the customs officers.

Mr. McPHERSON.—I have reference more especially to another of our colonies where there is no protection or duty of any kind, and where we have to compete

with United States dynamite. They probably will not have any regulations of this kind, but the explosives used there will be either Canadian or American. If we are handicapped to the extent of even a small fraction of a cent we will be cut out of that market, which we consider peculiarly our own; so that if you can in any way reduce the distance between buildings on the works, it is a very important point to the manufacturers where others may have an advantage in the trade. I merely mention it in order that these questions may be taken into consideration.

Capt. DESBOROUGH.—I have here the intra-table of distances which we use. The distances are very much smaller inside the factory than in relation to buildings outside. For ordinary blasting explosives, if a building is mounded you can have 50,000 pounds at 75 yards. I do not think there are many working buildings where you will want anything near 50,000 pounds. The distance for 2,000 pounds, if mounded, is 50 yards.

Mr. RILEY.—What is the distance for 5,000 pounds?

Capt. DESBOROUGH.—The curve is very steep between 2,000 and 10,000, but you can have 10,000 pounds mounded at 55 yards.

Mr. RILEY.—And half of that?

Capt. DESBOROUGH.—Five thousand would come between 55 and 50 yards.

Mr. MCPHERSON.—There is one question which came up in connexion with our last discussion, that is, the sampling of new importations. We are not interested in that, so I do not need to discuss it. I do not think we quite understand each other on the question of this licensing. As I understand it, you stated that any powder imported from the United States would be subject to a license. It is a question of cost rather than license that would determine where the trade would eventually lie.

Capt. DESBOROUGH.—I do not think you will find a government in the world that will grant a license without extracting a fee, and probably the fee will be made proportionate to the quantity of explosives imported.

Mr. MCPHERSON.—The Ontario Powder Company did not receive the documents which were to have been sent to them. I believe they were mailed, but we were obliged to leave Kingston probably before they arrived, so we have had very little time to study the points touched on last week. In regard to the number of employes in the different buildings, I notice you mention here the rule in England at the present time, or is it merely the conditions you have found in Canada?

Capt. DESBOROUGH.—As regards the limitations?

Mr. MCPHERSON.—The number of employes in a building.

Capt. DESBOROUGH.—That is in England. The number is generally limited to four, but that is exclusive of what we call runners; those are men who are not producers and whose business it is to convey explosives from one building to another, and, of course, exclusive of foremen.

Mr. MCPHERSON.—At our last meeting you made some remarks with reference to the applicant drafting a license. I do not just understand what that means.

Capt. DESBOROUGH.—It means the occupier of the factory. He has theoretically to produce a draft of the license and bring it to the authorities and ask them to confirm the license. The explosives department in England have so much greater experience in the way of drafting licenses that they practically draft the license with the occupier of the factory. It is merely a friendly arrangement; it saves trouble to the occupier of the factory.

Mr. MCPHERSON.—That seems the natural course and it must necessarily resolve itself into that.

Capt. DESBOROUGH.—The essential part of a license is the plan, which shows the distribution of the buildings on the site. I may say I have here a dummy license which we use in England, and which you might like to have a look at. I am not proposing that it should be exactly the same for Canada.

Mr. MCPHERSON.—On page 8 of the report of last week's meeting mention is made of regulations to be made by the Railway Commission for transportation by rail, and regulations for the transportation by road, and by water.

Capt. DESBOROUGH.—What I said was that it was not proposed to interfere with the transportation by railway, as that was already governed by the Railway Commissioners' regulations, but I did think the Federal government should make general regulations regarding transportation by water, and by wagon road. There was a very bad accident in one of the cities of the United States through bad stowage on a cart. Two cases of dynamite were dropped off a cart and an electric street car ran into them. You want to protect the public from bad stowage, and what we propose is that general regulations should be made providing that stowage should be satisfactory.

Mr. MCPHERSON.—Subject to a chance inspection at any time, that is, to one you never know. In some cities, I understand the regulations are such that if you want to remove powder from a magazine you have to apply to the Chief of Police, who sends an officer to accompany the load. That means not only expense, but inconvenience.

Capt. DESBOROUGH.—And a certain amount of friction too.

Mr. MCPHERSON.—A regulation of that kind in this country would be tremendously resented, and in the end might not be workable.

Capt. DESBOROUGH.—You think a general regulation would be a mistake?

Mr. MCPHERSON.—A general regulation might be satisfactory, but to stipulate that an officer in uniform must accompany the carter, as is required in some cities, would never do.

Mr. SMITH.—Quebec for instance.

Capt. DESBOROUGH.—We have nothing of that sort in England. All our regulations are really to require proper stowage; that is the gist of the regulations, and also to prevent gasoline and similar things being conveyed with explosives. The difficulty here is that many of the municipal authorities have power to regulate matters. In one instance it has come to my knowledge that they have insisted upon every vehicle conveying explosives being provided with rubber tires. That is not a thing which I should have thought necessary, but at present apparently they have the power to do so. My feeling is this, if you can get general regulations it will be much more satisfactory to you and to the public.

Mr. McPHERSON.—Major Riley at our last meeting in connexion with the supervision of the use of explosives suggested that a course might be followed something like the one followed by the Agricultural Department, that is, sending out instructors. That reminds me of the system pursued with respect to the inspection of milk. As a matter of fact, the inspection of milk does not occur every day, or periodically, but the produce of every dairy is subject to inspection at any time. In the same way a rule might be adopted that the whole system of stowage is subject to inspection around the corner at any place, and in that way people would be more careful, and such inspection would be more effective than any other.

Capt. DESBOROUGH.—To get that inspection you must have inspectors appointed, and it seems to me to be largely a question of money.

Mr. McPHERSON.—The local police might co-operate.

Capt. DESBOROUGH.—If their co-operation could be obtained. That is what is done in England. The entire supervision of conveyance is absolutely in the hands of the police in England.

Mr. McPHERSON.—On page 10 of the report of our last meeting I find a reference to accidents from frozen explosives. That comes back to what I mentioned the other day, the question of accidents at the place of use. I do not think we have accidents from frozen explosives at the factory.

Capt. DESBOROUGH.—No, that refers only to the use.

Mr. McPHERSON.—If an explosive is used in the frozen condition at the point of use, that is where the inspection should be; you cannot blame the manufacturer. Then again, the statement is made that accidents happen from the use of weak or poor caps. That no doubt is true, but on investigating at the point of consumption our experience has been that most of the accidents we have been able to trace have been due to improper loading, or probably carelessness in preparing their charges. They may have one cartridge in the bottom of the hole, and a large space between that cartridge and the next one, the consequence being that the top cartridge would go off without exploding the lower one. Then when they come along with their picks and shovels they find the lower cartridge unexploded. That is not due to inferior dynamite, but to improper loading.

Capt. DESBOROUGH.—I have studied the use of explosives for some years, and I would not be wrong in saying that 80 per cent of the accidents which occur in use are due to sheer foolishness on the part of the operator.

Mr. A. E. BLOOD, Bureau Safe Transportation of Explosives, New York and Toronto.—I should like to touch on a point brought up with regard to the transportation of explosives by team through cities. I do not think there are any regulations at the present time that fully cover the matter, and that is, the transportation of blasting caps and high explosives on the same wagon. Without giving any offense I should like to say that that practice is pretty general among the representatives of the manufacturers in Canada. It seems to be a point that has been overlooked entirely. They have perhaps certain days of the week in which they want to deliver their shipments to the railways, and also deliver to the local works throughout the district, and it is almost entirely the

practice to load the whole business in one wagon, and make the deliveries just as a groceryman would deliver his groceries in the morning.

Capt. DESBOROUGH.—I think the new regulations, if they were enforced, would stipulate that caps should not be conveyed with explosives.

Mr. BLOOD.—What I am asking is that the manufacturers discontinue the practice before the legislation is passed. I leave it in their hands.

Mr. CORKILL.—Would that have reference to the transportation of explosives from the magazines to the mine itself, or is it chiefly transportation in cities?

Capt. DESBOROUGH.—My idea is, it should be where the explosive can constitute a danger to the general public, but when the explosive goes on to the mine premises, then the mine owner is responsible for it. As a matter of fact, these general regulations should be only what one might call common sense, and the mine owner would be well advised to carry out the same regulations when the explosive is on his own property.

Mr. CORKILL.—I quite agree with you as to the reckless manner in which explosives are transported. I know of a great many cases that were really dangerous. One happened in Cobalt. The teamster had taken his load of dynamite, and at noon time he happened to be opposite a public school. He allowed his load to remain there with children playing around it for over an hour. Such a thing should be stopped.

Capt. DESBOROUGH.—One of the regulations we have is that the man in charge of the team should not smoke when passing through a town or village. That could not hurt any one, and still it is a most important precaution to take.

Mr. LESUEUR.—The minimum carload of dynamite is ten tons—that means about eight tons of actual dynamite. Magazines are built for containing one of these shipments, and it occurred to me that it might not be too much, if the Government thought it would alter their views about the table of distances, if the manufacturers would supply not merely ten tons, but two or three lots of ten tons each to experiment with the different types of magazines, with a view to finding out whether there was any possible danger from debris from a well constructed magazine without rubble in its walls, at distances such as the British table of distances gives. Do you not think that the data obtained from such experiments should have great weight in determining the distance that a magazine containing not more than ten tons might be located from the nearest dwelling?

Capt. DESBOROUGH.—A practical experiment is just what I was suggesting; only I was too modest. I stipulated for one ton, and you are stipulating for 10 to 100 tons.

Mr. LESUEUR.—The matter is of such vital importance and involves such an investment in land that the expense would be warranted, but no one concerned might wish to incur the expense from which others who did not share it would derive as much benefit as himself. I should think there would be no trouble getting several times ten tons from the manufacturers if they would club together.

Capt. DESBOROUGH.—It is an excellent idea. What I suggest is to carry out the experiment with two kinds of explosives. Take ordinary black powder

for one, having a low velocity, and for the other an explosive which has the greatest speed of detonation, something like 60 per cent dynamite, and then if you have the two extremes of velocity of explosion, you can be sure what will happen with intermediate explosives.

Mr. J. MURRAY WILSON, Hamilton Powder Company, Quebec.—I would be on the economical side. The mine manager can always tell how much a ton of explosive will do in the way of work. He can tell if the explosive is weak or strong. We can tell in the laboratory whether the explosive is weak or strong. Why not make small magazines as you suggest, say only about 6 feet square, and instead of exploding ten tons, explode a decimal quantity of that, or say ten pounds, and you could have a number of experiments to show where the debris goes.

Capt. DESBOROUGH.—In actual practice we have made these tests and have registered results. We have found the curve for small quantities does not give a very good idea of how the curve will go as the quantities increase. It changes very rapidly, and I would not like to base a new table of distances on experiments carried out with small quantities.

Mr. WILSON.—I am speaking more of the quality of walls so as to get the best type of wall for a magazine in the event of an explosion. It would only be a comparative test.

Capt. DESBOROUGH.—Only a comparative test at best, but I think if done without undue expenditure to the country half a ton or a ton should be used, and it would be better still if you made tests with larger quantities. It would be more satisfactory to every one. One does not really know what pressures would obtain with large quantities. The only time in which I have attempted to measure pressures was firing a charge of 75 per cent dynamite in a cannon. We used copper crusher gauges, and the result of these tests gave us say 100 tons to the square inch. I do not give those figures as at all accurate. We do not know what happens to copper after that pressure. The other system of measuring pressures was in vacuo. I do not think those experiments were worth anything.

Mr. CORKILL.—I have not had an opportunity of reading the recommendations of Captain Desborough very carefully, but in glancing over them hurriedly, I do not see anything in reference to the inspection of fuses. Is it your idea not to have these inspected?

Capt. DESBOROUGH.—I had thought of that, but I may say in this paper I have only touched on very general principles. I thought whether it was advisable to have a test for fuse was a matter which could be considered when the Act has passed through Parliament. The South African government has a very elaborate system of testing safety fuse, and they tell me it has been of very great benefit to them. In England we have no test of fuses, and I do not know whether the fact of not having a test has led to any increase of accidents. If there is a demand for a test, it would be a very good thing to have it.

Mr. CORKILL.—My experience inspecting mines the last five years leads me to believe that there should be an inspection of fuse, and that fuses should be regulated so that the burning speed should be within certain limits. There are at the present time many makes of fuse sold in Ontario, and they are not of the

same burning speed. Of course there is not a great deal of difference, but sometimes there is a difference which might lead to accidents. Another case is where we have a so-called quick fuse. Of course I do not think that is responsible for a great many of the accidents that occur. In fact, in a number of accidents I have investigated from the so-called quick fuse I have always found something else, but the miners all call it quick fuse if they happen to be caught. Still I have affidavits from fairly reliable miners that their fuse did in some cases burn faster than was safe. I have never yet in my own experience seen it, but still there is a possibility of it.

Capt. DESBOROUGH.—You can reproduce it experimentally very simply with a pair of pliers.

Mr. CORKILL.—I think in drafting the Bill there should be some regulations for the inspection of fuse. I have read with much interest the South African Act with regard to that, and I was very much impressed with it.

Capt. DESBOROUGH.—The real difficulty, even in South Africa, is that fuse changes so much after storage. If you have a hard and fast rate of burning you may condemn fuse because it has got a little bit slower and just outside y our limits.

Mr. CORKILL.—It is a very hard thing to regulate the storage of fuse. Most people when they get a box of fuse in a store put it near a stove, and soon it will be unfit for use.

Capt. DESBOROUGH.—Personally I should prefer electric firing if I wanted to be very accurate about the time of burning.

Mr. CORKILL.—That brings up another thing. During the last six months we have had some electric time fuse that should be tested thoroughly by the new department before it is allowed to be sold, the same as any new explosive, and regulations framed accordingly; because no one knew anything about this new fuse. The miners had to experiment, themselves, with it. I do not know if we have had any fatal accident from it, but there is the possibility.

Capt. DESBOROUGH.—My view of the new department is this, really, that explosives will be examined by the chemist solely with two objects in view, one to eliminate explosives which are unduly sensitive to friction and percussion, and the other to ensure that the explosives possess a reasonable degree of chemical stability. As regards the regularity, it would be a very difficult thing indeed to frame regulations to ensure it, and I think all one can do, anyway for the present, is to have a testing department of the new bureau opened to carry out experiments for the users of explosives. If a user wants to try a new explosive, I think it ought to be open to him to send it to the testing station, and let the authorities there give him such information as they can about its explosive qualities, such as speed of explosion possible, of kinetic energy, and other kindred matters, but I am rather averse to regulating what I may call the physical qualities of explosives.

Mr. CORKILL.—What about the gas? Is that not a point you are very strict about?

Capt. DESBOROUGH.—It is a very difficult question to take up. We have discussed it a great deal in England, but except so far as coal mine explosives

are concerned, we do not attempt to regulate it. Practically all explosives give off deleterious gases. Some are very much worse than others, depending on the completeness of their detonation. If the detonation is not complete, you get worse gases. Other explosives will give other gases if you light them. It is a question of degree. It is very difficult to regulate explosives so far as their fumes go. If you say they shall not give more than a certain percentage of carbon monoxide, a manufacturer will say, and reinforce it with experiments; under the conditions he carries on the experiment, the explosives are right. Then you have to blame the detonator. The maker of the detonator will say the detonator is all right, and the explosive all wrong.

Mr. CORKILL.—Should you not say that the amount of carbon monoxide should not exceed a certain quantity. We have had considerable trouble with gases, and a number of men have been asphyxiated.

Capt. DESBOROUGH.—We have fired explosives from cannon, one case tamped, another case not tamped. You get absolutely different substances from the combustion. It leaves a loop hole open in this way, that the manufacturer of the explosives will quite rightly say this hole was not properly tamped, therefore you did not get the necessary confinement and did not get the final products of the explosion. It is impossible to prove it one way or the other, and you simply set people at loggerheads without any advantage.

Mr. CORKILL.—In the case of new explosives, there should be some regulation with regard to deleterious gases, carbon monoxide in particular.

Capt. DESBOROUGH.—All you can do is to try to ensure that the quality of the explosives will be good. The whole question of detonation is such a very involved one that it is very difficult to frame any regulations which would meet your point.

Mr. CORKILL.—I see also here, with reference to detonators, you state it is very difficult to have a system of inspection.

Capt. DESBOROUGH.—Not so much a system of inspection as formulating a test by which you compare different patent detonators.

Mr. CORKILL.—I think the regulations should be that weak detonators should be prohibited from sale altogether.

Capt. DESBOROUGH.—I think the manufacturers here have agreed that there is no objection to specifying the minimum amount of explosives which must be present in a detonator of a particular number; that is, that a number 6 detonator means that it contains one gramme of fulminate composition.

Mr. CORKILL.—I think the only way you can keep most of the miners from using inferior detonators is not to let them be manufactured.

Capt. DESBOROUGH.—The other difficulty is this, it is very hard to persuade the user of explosives that it is false economy to use a cheap detonator.

Mr. CORKILL.—I have been trying to do that for five years and have not succeeded.

Mr. LESUEUR.—The number 3 is the standard detonator in Canada, and in a country as cold as Canada I think it is not right.

Mr. CORKILL.—I must disagree with you. In mines they generally use a No. 6.

Mr. LESUEUR.—For construction work the No. 3 seems to be almost exclusively used, except for electric exploders, where they sometimes get double strength, which means No. 6.

Mr. MCMASTER.—I regret exceedingly that I am not, on account of want of knowledge, able to speak of the practical working of powder factories, or the technical parts. While I am sure we all are in sympathy with the desire to protect life and property, there is, of course, the commercial side of the question which has to be considered. Mr. McPherson raised an important point. He suggested that in any neutral market which the Canadian manufacturer might reach, it would be naturally a disadvantage to subject the producer in this country to onerous conditions in competition with manufacturers to the south of us. That is something we must ask the Government to take into consideration, because there is no question the climatic conditions here are somewhat different to those in Captain Desborough's country, and I have no doubt that has been taken into consideration by the Captain. In regard to the Orders-in-Council, if I understand the Captain correctly, he does not want to make hard and fast rules. I have had experience of Orders-in-Council in the past where interests have been affected. If the parties interested could have knowledge of what was intended to be enforced before the Orders-in-Council go into effect, it would be better.

Capt. DESBOROUGH.—I go further than that; I say I think it should be absolutely necessary, but you must not take what I say as binding the Government.

Mr. MCMASTER.—I understand that. I should like very much if I were in a business which would be affected by Orders-in-Council, to be treated in that way. When you were speaking about the size of magazines on the other side of the Atlantic, there came to my mind the question of climatic conditions which do not exist here—that is, where large quantities have to be put into magazines at certain seasons of the year, and storage quantities must necessarily be larger.

Capt. DESBOROUGH.—There is another reason for establishing small magazines; otherwise you could not maintain the distance from dwelling houses. We have a few magazines, of 200 tons capacity, but they are invariably old hulks moored in the Thames, or the Mersey, or other similar places, and it is because they cannot comply with the table of distances that they use these old hulks. They find them a great advantage now that they have adopted them.

Mr. MCMASTER.—I may say we shall be very glad to co-operate in making the tests suggested.

Mr. RILEY.—I notice in the title of the Act there is no reference to regulating the use of explosives in any way. I presume it is intended to adopt Mr. Gibson's suggestion the other day, that this Act will only govern explosives in the hands of manufacturers, and once they become a usable commodity the provincial or municipal regulations will govern. There must be places where there are no such regulations, and I think with Mr. Corkill that the users—that is Mike and Tony at the end of the dump—must be protected from themselves to a certain extent regarding the quality of explosives and the caps and the detonators.

If you could put in this Act certain general regulations applying to the transportation of explosives by wagon, and the use of explosives, these regulations to be framed by Capt. Desborough, and other trained people, it would be a very great guide for local aldermen and others who know nothing at all of the conditions, and yet have to frame municipal regulations that they feel called upon to make. If you had some such general regulations for transport and use in the Act, or in the Order-in-Council in some way it would be a good model for the local people to adopt, and would tend to make the legislation on this matter uniform from one end of the country to the other.

Capt. DESBOROUGH.—So far as transportation is concerned, I propose, if it is legal, that power should be taken to regulate the general transportation throughout the country. As far as the use is concerned, I have recommended, again if it is legal, that the use of explosives in places which are not already governed by the Provincial Mines and Quarries Act should be governed by general regulations framed by the new department, but, of course, the question of legality is one which is difficult to settle, and has not been threshed out yet.

Mr. RILEY.—I should like to emphasize that point, and also that I do not believe in trying to accomplish everything by legislation—that a certain amount of education should be undertaken by the Mines Department, such as other departments of the Government undertake. Another point I should like to have borne in mind—I notice the proposition is to adopt the American Bureau's regulations—to try and get from the railways better terms for the transportation of explosives than we can at present, because we have to pay for 5,000 pounds whether we ship that amount or less. I know as a matter of fact that this causes the smuggling of explosives on passenger trains to a certain extent. People carry them on the trains when they should not. If we could ship, as they do in the United States, a box of explosives at a time it would be a good thing. It is a question which I should like you to bear in mind. I should like Captain Desborough to tell us also, from his experience in England, what protection the manufacturers have from the encroachment of dwellings around their factories. Does the proposed legislation mean that we have to bank up the whole of our factory with a mound to keep people from coming in on us, or that we must go a certain distance away from the border of our property before we put up any buildings?

Capt. DESBOROUGH.—In practice in England the bulk of the factories have no fence around them, but they put up a notice to trespassers, and that notice is statutory. If a man is found trespassing on the property he can be apprehended and prosecuted.

Mr. RILEY.—I did not mean that so much. Suppose we have a building located in accordance with the table of distances, and some one comes and puts up a building close to us, have we to go so much farther back?

Capt. DESBOROUGH.—Yes, you would, but in England it is always arranged by mutual agreement between the occupier of the land and the occupier of the factory.

Mr. RILEY.—The intra-table of distances is a very important matter with us, even in small works like ours. The winter before last we had a man with a

horse and snow plough, and two shovelers at work all winter. This contributes to our cost above the cost of production in more southern climates, and if we have the additional distance to shovel the snow, the cost will be increased proportionately.

Capt. DESBOROUGH.—I do not think you will find practically that it will make any difference. In your factory I believe there are greater distances than we require.

Mr. RILEY.—That is the cause of a good deal of the trouble. I should like to ask the Captain what is the ideal factory construction that we should work towards.

Capt. DESBOROUGH.—I do not wish to accede to your request because I do not know your Canadian winter, and what is suitable to us is not necessarily suitable to you. Throughout, my feeling has been not to lay down things hard and fast—to try and have as much elasticity as you possibly can. Of course there is the general principle that the working buildings should be of light construction, and that in a magazine the greater danger comes from without, and therefore, you must make the magazine more or less solid.

Mr. KENT.—According to Major Riley's intra-factory distance reference, it was said last week, by some one, that perhaps you will allow us five years, or recommend to the Government that the period allowed to factories existing, to-day, under certain conditions, to conform to the new regulations covering distance, should be five years.

Capt. DESBOROUGH.—I have noted that, but you must understand I cannot possibly bind the Government to any course. All I can tell them is what the feeling of the explosives trade is.

Mr. KENT.—You would not care to commit yourself to saying what your probable recommendation would be touching that point?

Capt. DESBOROUGH.—I have had a conversation with Mr. Templeman on the subject, but I really am not at liberty to tell you what he said to me. I told him that in England we treated the existing factories too leniently.

Mr. KENT.—Yes, and you cited an instance.

Capt. DESBOROUGH.—And as a compromise you should be given a certain time limit. What his views are on the matter I really cannot tell you.

Mr. KENT.—Is it anticipated that the legislation which will result from your recommendations will influence in any way, or modify, or affect the existing railway transportation regulations?

Capt. DESBOROUGH.—What I have suggested is that the control of transportation by rail should be solely in the hands of the railway commissioners—in fact no one has power to take it out of their hands. I have no doubt they will co-operate with the new department, and in that, of course, the main difference between what exists at the present time and what will exist in the future will be that the control of the type of explosive which is conveyed will rest in the hands of the Dominion government, instead of the private bureau in New York.

Mr. KENT.—That may or may not add to the transportation restrictions as they are at present.

Capt. DESBOROUGH.—I can only repeat that I think, for the present, the regulations will remain absolutely as they are.

Mr. KENT.—I should like to ask Mr. Blood if it has been actually demonstrated, frequently or unfrequently, where shipping detonators by wagon, by rail, by boat, or otherwise, with dynamite or other explosives, is practised, when those detonators have been properly, carefully and intelligently packed—if it has been demonstrated that the danger is increased to any extent?

Capt. DESBOROUGH.—I should think it is a matter of common sense that if you put detonators close to your dynamite you must have greater danger of explosion.

Mr. BLOOD.—I should like to put it in this way: a short time ago in the province of Quebec, there were two teams unloading a carload of 600 cases of dynamite. The teams were on their way to the magazine. The first team in turning a corner very nearly collided with a sleigh in which a party was out riding. The second driver was negligent and did not notice that the first team had stopped until the pole of his wagon struck the front wagon, perforated it, and passed through four or five boxes of cartridges and scattered some of them on the street. It might just as well have been a box of detonators and caused an explosion. I understand not long ago a horse ran away in the city of Ottawa and scattered dynamite along five or six blocks, and shortly afterwards a child picked up a detonator and pricked it with a pin, and it exploded in his hands. I have heard that, I do not know if it is true.

Mr. KENT.—I admit that it is a matter of common sense that if there are detonators with other explosives the danger is increased to a certain extent, but it is equally a matter of common sense that if there are two cases of dynamite, or three cases, the danger is increased by the difference in the quantity of explosive in any given place or at any given point. What I asked you to tell me was if it had been demonstrated, to your knowledge; or can you cite any instance from your own experience of accidents, or serious explosions, resulting from the detonation of caps carefully packed and transported with dynamite?

Capt. DESBOROUGH.—I cannot tell you, because in England it is absolutely prohibited.

Mr. KENT.—Infractions of that regulation are not heard of?

Capt. DESBOROUGH.—No, it is absolutely prohibited, and I do not think any manufacturer would want to do it.

Mr. BLOOD.—It is prohibited in the United States, and Canada. I have known violations through ignorance, but I do not know of accidents which could be directly traced to the violation.

Mr. MCPHERSON.—I have here before me the form of license submitted to us to-day. I understand from the various paragraphs here that you must first obtain permission to apply for a license.

Capt. DESBOROUGH.—I did not really mean the first two or three pages to refer to you. I was just showing you the terms of the license. Of course, to an actual license a plan would be attached.

Mr. MCPHERSON.—I see provision made in the license for the testing of clothing of workmen employed. That such clothing shall be of non-inflammable

material. That would mean only clothing of that character should be used—there is no uniform clothing required?

Capt. DESBOROUGH.—We have a small apparatus for testing clothing. What we want to eliminate is thin cotton, particularly in black powder factories. Our experience has been in explosive factories where the main danger is from fire as opposed to explosion, it is very important that the workmen should wear relatively non-inflammable clothing.

Mr. DRACKETT.—I have seen an abstract of a report from German experiments on fireproof clothing. The abstract shows that the experiments developed that fireproof clothing is of no use.

Capt. DESBOROUGH.—I do not know what the German fireproof clothing is, but I know we have had a considerable number of lives saved by its use in England. It is absolutely beyond question.

Mr. DRACKETT.—That is in connexion with black powder?

Capt. DESBOROUGH.—I do not refer to any particular cloth. Most of our people wear closely woven woollen clothing. What you want is when the actual source of fire is removed the material will not go on burning. Our system of testing is to place the cloth on a frame about a foot square and standing about six inches above the table. Then underneath the centre, in a pan, we use cordite and ignite a definite quantity of it, which burns for a definite time, and makes a big flame. If the flame does not pass through the clothing, and the clothing does not carry fire after the explosive is burned out, we consider the clothing sufficiently satisfactory.

Mr. DRACKETT.—How long a flame is that as to time—very short?

Capt. DESBOROUGH.—I should think somewhere about a minute.

Mr. DRACKETT.—I have tried clothing for black powder. It does not seem to stand up that way.

Capt. DESBOROUGH.—If you come to England I can show you plenty of samples which stood the test very well.

Mr. DRACKETT.—You spoke of floating magazines; are the distances different for floating magazines?

Capt. DESBOROUGH.—We consider, as far as floating magazines are concerned, so long as the explosive is kept below the water line, that counts as very adequate mounding, and you get favourable distances. As a rule, from the configuration of the bank of the river, or whatever it may be, you may consider you have natural features of the ground intervening, and, therefore, the distances are probably reduced by three-quarters.

Mr. DRACKETT.—I suppose it depends on the judgment of the inspector?

Capt. DESBOROUGH.—Yes, it is left to the judgment of the inspector. What struck me was they might be of great use here on the west coast of Canada. I was not thinking of the east coast at all.

The CHAIRMAN.—Before adjournment I want to make the remark that the proceedings of this meeting will be published, and copies sent as early as possible, as was done in connexion with the first meeting.

Mr. MCMASTER.—I wish to express the thanks of the meeting to Capt. Desborough for his kindness in allowing the gentlemen here to express their

iews on the subject of the proposed legislation. I am sure all of us agree that we re very much obliged to him for the opportunity. (Applause).

The CHAIRMAN.—I am inclined to think that all the difficulties in carrying ut the Bill will be matters of administration. The Bill itself will be an exceedngly short one. Therefore, it will require at the head of the division of the Mines Branch a man of great ability, judgment, and practical knowledge. Since he new regulations will be made by Order-in-Council I think that in the matter f these regulations plenty of opportunity should be given to manufacturers, nd all concerned, to express their views. I myself would be strongly in favour f having nothing done without advice and consultation with the parties who are oncerned.

Mr. MCMASTER moved that a vote of thanks be extended to Dr. Eugene Haanel, Director of Mines, and to Captain A. P. H. Desborough, Inspector of Explosives, from the Home Office, London, England, for their consideration in alling this Conference, and for the explanation of their recommendation, which Captain Desborough proposes to make in his report to the Minister of Mines. The motion was carried with acclamation, and the proceedings terminated.