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Comm.on Atomic Energy Control
Board, 1949, 2d Sess.

1949
SECOND SESSION

HOUSE OF COMMONS

SPECIAL COMMITTEE

ON THE

OPERATIONS

OF THE

ATOMIC ENERGY CONTROL BOARD

MINUTES OF PROCEEDINGS AND EVIDENCE
No. 1

FRIDAY, NOVEMBER 4, 1949
TUESDAY, NOVEMBER 8, 1949

WITNESS

Dr. C. J. Mackenzie, President, Atomic Energy Control Board

OTTAWA
EDMOND CLOUTIER, C.M.G., B.A., L.Ph.,
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
CONTROLLER OF STATIONERY
1949

ORDER OF REFERENCE

HOUSE OF COMMONS,
MONDAY, 31st October, 1949.

Resolved,—That a special committee be appointed to examine into the operations of the Atomic Energy Control Board: that the said committee be empowered to sit during the sittings of the house and to print such papers and evidence from day to day as may be ordered by the committee; and to report from time to time; that the said committee consist of Messrs. Breithaupt, Brooks, Coldwell, Bourget, Gibson (*Comox-Alberni*), Green, Kirk (*Digby-Yarmouth*), Low, McCusker, McIlraith, Murphy, Pinard, Stuart (*Charlotte*), Winkler.

ATTEST.

LEON J. RAYMOND,
Clerk of the House.

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MINUTES OF PROCEEDINGS

FRIDAY, November 4, 1949.

The Special Committee appointed to examine into the operations of the Atomic Energy Control Board met at 10.30 a.m.

Members present: Messrs. Bourget, Breithaupt, Brooks, Coldwell, Gibson (*Comox-Alberni*), Green, Kirk (*Digby-Yarmouth*), Low, McCusker, McIlraith, Murphy, Stuart (*Charlotte*), Winkler.

In attendance: C. J. Mackenzie, C.M.G., M.C.E., D.Sc., F.R.S., President, and G. M. Jarvis, M.B.E., Secretary, Atomic Energy Control Board.

On motion of Mr. Bourget, seconded by Mr. Breithaupt, Mr. McIlraith was elected Chairman of the Committee.

Mr. McIlraith took the Chair and thanked the members for the honour of being chosen as Chairman. He invited an expression of opinion regarding the Committee's agenda, and it was agreed that sittings be held on Tuesday and Thursday of next week, and that the Committee proceed to visit Chalk River the following week, on a date to be determined later.

Mr. Mackenzie addressed the Committee, more particularly in regard to its proposed visit to Chalk River. He also referred to the secret nature of certain information that would be made available to members of the Committee.

The Committee adjourned until Tuesday, 8th November, at 10.30 a.m.

TUESDAY, November 8, 1949.

The Special Committee appointed to examine into the operations of the Atomic Energy Control Board met at 10.30 a.m., the Chairman, Mr. McIlraith, presiding.

Members present: Messrs. Bourget, Breithaupt, Brooks, Coldwell, Gibson (*Comox-Alberni*), Green, Kirk (*Digby-Yarmouth*), Low, McCusker, McIlraith, Murphy, Pinard, Winkler.

In attendance: Dr. C. J. Mackenzie, President, and Mr. G. M. Jarvis, Secretary, Atomic Energy Control Board.

Dr. Mackenzie was called. He gave evidence on the history and certain activities of the Board, and answered questions thereon.

Witness retired.

On motion of Mr. Coldwell, seconded by Mr. Green,

Ordered,—That 500 copies in English and 200 copies in French of the Minutes of Proceedings of November 4 and of this day be printed.

Further consideration was given to the Committee's proposed visit to Chalk River and it was agreed that arrangements be made to this effect for Tuesday and Wednesday, November 15 and 16.

The Committee adjourned until Thursday, November 10, at 10.30 a.m.

R. ARSENAULT,
Clerk of the Committee.

MINUTES OF EVIDENCE

HOUSE OF COMMONS,
November 4, 1949.

The Special Committee appointed to examine into the operations of the Atomic Energy Control Board met this day at 10.30 a.m. The Chairman, Mr. G. J. McIlraith, presided.

The CHAIRMAN: Gentlemen, I wish to thank you for the honour of choosing me as Chairman of this committee. I can only claim one particular attribute that might be desirable for a chairman and that is an attribute shared by all other members of the House—interest in the committee.

I have taken the liberty of asking Dr. Mackenzie, the President of the Atomic Energy Control Board, and the secretary, Mr. Jarvis, to be present with us this morning. It was my thought we might get forward a little further and more quickly in arranging the form and details of the next few meetings. I thought it would be desirable to have the benefit of Dr. Mackenzie's knowledge and I trust my action meets with the approval of the committee. I went ahead on the assumption that the committee would wish to save time.

I should also say that I undertook to have Dr. Mackenzie free at 11.15 this morning. I considered it desirable to have him here notwithstanding the limitation of time.

Perhaps it would be useful to draw the attention of the committee to two factors. One is that we have the control of the printing of the evidence within the committee so that problem can be settled from day to day and we do not have to report back to the House as is usual in committee. The second matter is that we have authority to sit while the House is sitting so we need not report back to the House on that point.

Perhaps it would be best if we now had an expression of opinion from the members of the committee regarding our first meetings.

Mr. MURPHY: What did you have in mind?

The CHAIRMAN: I have some ideas on the subject but I would prefer to hear what others might say.

Mr. LOW: What have you in mind as an agenda?

The CHAIRMAN: My own idea is to have two meetings next week on suitable dates, possibly Tuesday and Thursday, with Dr. Mackenzie giving evidence. Then, the week after that we could have a trip to Chalk River after the necessary details for the trip have been completed. The meetings here would be on Tuesday, November 8, and Thursday, November 10. The trip to Chalk River can be made the following week on whatever days are agreeable.

I wonder how that plan suits the members of the committee? I would be glad to hear discussion on the point.

Mr. GREEN: I think it is all right.

Mr. COLDWELL: It seems to be satisfactory.

The CHAIRMAN: With respect to the meetings next week what is your wish?

Mr. BOURGET: Leave them to the call of the chair.

Mr. GREEN: Is there any objection to sitting on Mondays and Fridays?

The CHAIRMAN: The only objection at the moment is that I am engaged in other committees this coming Monday.

Mr. GREEN: Generally speaking is there any objection?

The CHAIRMAN: Generally speaking there is no objection. Next Friday, however, is November 11 and I had thought of a meeting in the morning but I realized that some of the members would wish to take part in the memorial services here . I see no objection to sitting on other Fridays.

Mr. GREEN: Other committees will be sitting on Tuesdays and Thursdays and I wondered whether there was any serious objection to this committee sitting on Mondays and Fridays.

Mr. BREITHAUPT: Let us cross that bridge when we come to it. Next week we cannot sit on Friday but further consideration to the problem can be given after that time.

Mr. GREEN: I wonder how many weekenders there are in the committee?

The CHAIRMAN: I think we are extraordinarily free of them but perhaps Mr. Breithaupt could enlighten us upon that? Can we agree that our next meeting shall be on Tuesday November 8?

(Agreed).

And our tentative plan will be to sit also on Thursday the 10th?

Mr. Low: Yes.

The CHAIRMAN: What about the Chalk River trip?

I think the committee will be ready and will desire to take such a trip after having two meetings here. Is that agreeable?

(Agreed).

Now would you like to hear just a word or two from Dr. Mackenzie about Chalk River. There will be certain things which require attention—organizational work at Chalk River to arrange for accommodation of the committee.

C. J. Mackenzie, C.M.G., M.C., M.C.E., D. Eng., D. Sc., LL.D., F.R.S.C., M.E.I.C., called:

Dr. MACKENZIE: Mr. Chairman, and members of the committee, we would like you to spend as much time as you can at Chalk River. You may not feel as I do but I think that is a very important part of your study. You will see everything there and your understanding of the other issues will be much easier after you have seen Chalk River, where there is a very great deal to see. It takes time to get up there and back and my feeling is that you should take two days for the trip. You could drive up one morning and have the afternoon and the evening of that day, together with the next morning, for your inspection, and you could drive back on the afternoon of your second day. If you try to make the trip in one day you will not get anything out of it at all. It takes three hours to drive to Chalk River. If you leave Ottawa at 9 o'clock you arrive in Chalk River at 12 o'clock and if you have to leave at 5 o'clock you will not see sufficient to understand our problems. We are really anxious that you should see those problems; there are a lot of difficulties with which we are faced. We have overcome many of our difficulties and I would like you to have, not just an overall picture, but an understanding of what we have done and of what the future is. You cannot achieve that understanding in five minutes. We would be very happy to have you there as many times as you can come. Our people are extremely pleased that this committee has been appointed. We feel that our work is a very big issue and the consequences are very great, and that we must have a very wide constituency knowledge of what is being done. The matters under research are going to be very very important. There are broad problems in which we are interested and we would like you to be with us for as many hours as you can. As I say, I feel that you should not make less than a two day trip.

We have got just about enough space to quarter this committee.

Mr. GIBSON: I guess it is pretty tight?

Dr. MACKENZIE: We have had to build all our own accommodation and we are a long way behind in housing. We are not alone in that regard. Everything is full but we can accommodate the committee if we are given a little notice. We have a staff hotel but we shall have to put two of you in a room. We must do that because we have just not got fifteen spare rooms. We have reasonable accommodation though, and the cafeteria and transport facilities are good.

We are interested in your seeing the village, apart from the atomic energy development. It is an experiment but it is a very fine village and something of which we are proud. We would like you to get some idea of the problems involved in handling the village.

Mr. COLDWELL: Is it under rent controls?

Dr. MACKENZIE: Unfortunately, as far as we are concerned it is—at least it is rent fixation. We cannot make that village pay.

Mr. GIBSON: Nobody else can either.

Dr. MACKENZIE: No. The reason is that there are no industrial features to it and you just cannot run a domestic unit without subsidy. In a city like Ottawa the retail business and the industrial people pay taxes which support the domestic part of the city. It is our desire that there should be more knowledge of our problems in that direction. We are satisfied that we have an extraordinarily good show and we wish you to see everything that we have.

Perhaps I should mention the matter of secrecy. Secrecy is something about which we feel keenly. We would like to be free of the necessity for secrecy but we are bound by an international agreement which, if broken without authority, will very seriously prejudice our future.

I am bound by the Government's decision and I am assuming that I can tell this committee everything. Parliament has appointed this committee and I am entitled to make full disclosure to the committee, but a great deal of the information we will give you cannot be published. You will understand that attitude as we go along. Our feeling regarding secrecy is that disclosure of certain things would result in the drying up of our sources of information. We know what has happened in other places.

Unfortunately we cannot take the press. I have been hoping every day that we could take the press and I feel that within a short time it will be possible. At the moment, I cannot agree to it because I am not authorized to do so. The instructions to the staff will be that they can answer any of your questions and show you everything that there is to show and they will only be too happy to have you there. Your presence will please us indeed.

The CHAIRMAN: Are there any questions of Dr. Mackenzie?

Mr. GIBSON: I suppose arrangements can be made to go by private car.

The CHAIRMAN: I think that there are sufficient cars among the members of the committee to provide the necessary transportation.

Mr. STUART: Have we decided upon the date that we will go?

Mr. COLDWELL: What about Tuesday and Wednesday or Wednesday and Thursday? I am thinking that the House sits only a half day on Wednesday?

The CHAIRMAN: Would Tuesday and Wednesday suit the committee?

(Agreed.)

Mr. MCCUSKER: That is of next week?

The CHAIRMAN: November 15th and 16th.

The question of other members of the House of Commons going to Chalk River will arise. I know that a great many members have asked me for the

opportunity of going but I am afraid that we will have some difficulty there. I understand that it is just not possible at this point to take them.

Mr. COLDWELL: Dr. Mackenzie has pretty well settled that when he says there is just accommodation for the committee.

Dr. MACKENZIE: We must clear everybody who goes there. I consider that parliament has cleared the members of this committee but I cannot accept anyone else.

The CHAIRMAN: The problem is linked with the corresponding sort of thing in the United States. I have explored the question and I do not see any way around it.

Mr. STUART: If you have members outside of this committee how can you draw a line at all?

The CHAIRMAN: I understand that there are international commitments and I do not see how we can get around the fact that we must limit the trip to the members of the committee. However, I think it is well that the difficulty should be known.

What about taking the committee secretary and committee reporters?

Dr. MACKENZIE: I take it that the discussions at Chalk River will really be off the record and that it will be an inspection visit. We would like to take you around to the laboratories and have our people talk to you and show you experiments. Our feeling is that we need to have an informed group in public life which knows as much about atomic energy as the comparable group in the United States does. It is not true today, but we would like to bring that about by your visit. We would like to show you our experiments and give you elementary lessons in atomic energy. After you have been through the plants, the various other business matters may be dealt with in Ottawa. It would seem useless when spending only two days up there to talk about things that can be talked of here. After you have seen the plant you will be in a position to ask more pertinent questions.

We would have no difficulty in arranging for Mr. Jarvis, the secretary of the Board, to take the necessary minutes.

Mr. BREITHAUPT: Having seen and heard what we are going to see at Chalk River, what are the obligations of the members of the committee as to secrecy? I think that is a very important feature.

Dr. MACKENZIE: We operate under a system of classifications. An international committee with members from the United Kingdom, the United States, and Canada, is responsible for declassifying material and authorizing publication of information on the declassified material. We shall tell you what is classified and what is not classified and, I suppose, you will be honour bound not to publish or pass on information on the classified subjects. Although there is a very large field of matters declassified, like most situations, the portion classified is insignificantly small. Your understanding must go a long way before you recognize what the differences are. But that is what we have proposed to do when we talk about classified matter. We would say, for instance, in reply to such a question as: "How much plutonium is there in a bomb?", we do not know. That is classified information. There are certain things like that, but I assure you that the classified part is a very small part.

Mr. BREITHAUPT: If that be the case, what is the objection to the press going along?

Dr. MACKENZIE: The objection to the press going along is that we have an agreement that that should not take place. Moreover, if you beat the gun on us and write this across the press, then our information dries up.

Mr. BREITHAUPT: But they won't grasp the secret part of it any more than we will.

Dr. MACKENZIE: No. But others will say that the press has visited us, and they are publishing these things, and it is against the agreement.

The CHAIRMAN: If you break your secrecy provisions, or agreement, then the consequences to us are very great, because we will lose the sources of information, which are rather satisfactory now.

Mr. MCCUSKER: Would our time be spent to better advantage if we planned the visit to Chalk River next week? Would not our discussions, after that, be more advantageous? Are we wasting time having two sessions before we go? Can we be briefed at those two sessions, or taught something, so that we can appreciate what we are going to see there?

The CHAIRMAN: My feeling about that is—and I discussed it a bit—that we would get some briefing, some gathering up, starting with more or less elementary information, at the first meeting or two, on material which has never been gathered up and put in one place at all. I would hesitate about going to Chalk River before we hold any meetings. I do not think it would be good practice.

Mr. MCCUSKER: I was just asking for information.

The CHAIRMAN: I suppose it would be possible to visit the plant next week; but I think it would be crowding it a bit, from the point of view of arrangement.

Dr. MACKENZIE: We are entirely in your hands; but it seems to me that a picture of how we got into this thing, of the negotiations, how we started, how it was done, what our obligations were, how they changed, and the organizations that did it, might be a pretty good prelude.

Mr. BREITHAUPT: Yes, and a lot of the answers to questions asked now should come out at various meetings, and I think it would be desirable.

Dr. MACKENZIE: We could even get a map of the site, the lay-out, so you would know what you are going to see when you get there. But we are completely in your hands, and any arrangement which is satisfactory to you is quite satisfactory to us.

The CHAIRMAN: Now, is there anything further at this point before we leave the agenda for the next two meetings and Chalk River?

Mr. COLDWELL: I move we adjourn.

The CHAIRMAN: Just before you move that we adjourn, there is one thing I would point out, and that is that I did not raise the question of a steering committee this morning. There are two ways of handling that problem: either by appointing a steering committee, which is common practice, or, on the other hand, in view of the fact that we have a very small committee here, and in view of the fact that the nature of any questions which arise might be of a type that we would probably want to have Dr. Mackenzie here in order to pass on them, I thought we might leave the question of a steering committee in abeyance.

And I would also suggest that, if necessary, at the closing part of any meeting, we might clear the meeting, and have a whole meeting of the committee together in camera, just to fix an agenda for the next day. That would give an opportunity for any member to raise a question about the type of thing he wanted information upon for the next meeting, and he could be told at once whether it was available, or was secret information, and so on. All those problems could be settled.

Mr. GREEN: That seems very reasonable. I think we should try that, anyway.

The CHAIRMAN: Well, if any member should feel, during the course of a meeting, that there is a subject which he would hesitate to bring up in open

meeting, he could send me a note, and at the end of the meeting we could clear the room and have it brought up and settled, right there.

I think that would speed up our procedure. And, moreover, having a steering committee in connection with a committee of fourteen members seems to me rather like surplus organization.

Is there anything more this morning?

Dr. MACKENZIE: In our submissions, would it be quite all right if we did not prepare a script and just prepared headings, and spoke informally; and then, if you wished to have the thing written out afterwards, it could be done? I might say that it is quite a job to sit down and prepare these things. It would relieve me, if I could speak completely off the record and impromptu, so that the committee could direct the discussion anyway it desired?

Mr. BREITHAUPT: Do you think we should have the committee reporters at every meeting?

Mr. COLDWELL: Dr. Mackenzie could tell us when anything should be off the record.

Dr. MACKENZIE: I feel that at the meetings down here I should stay away from classified information, but there would be enough background, and we would do anything of a secret nature, at Chalk River.

Mr. COLDWELL: So, anything you would say here would be on the record, unless you told us otherwise?

Dr. MACKENZIE: Yes. There might be a question arise, but I would not, normally, present anything which I would not be willing to answer.

The CHAIRMAN: Does that cover your question satisfactorily?

Mr. BREITHAUPT: I think so. I move we adjourn.

The CHAIRMAN: The committee is now adjourned.

The committee adjourned until Tuesday, November 8, 1949, at 10.30 a.m.

MINUTES OF EVIDENCE

HOUSE OF COMMONS,
November 8, 1949.

The Special Committee appointed to examine into the operations of the Atomic Energy Control Board met this day at 10.30 a.m. The Chairman, Mr. G. J. McIlraith, presided.

The CHAIRMAN: Gentlemen, we shall begin our proceedings.

In accordance with the understanding at the last meeting we have with us this morning Dr. Mackenzie, the President of the Atomic Energy Control Board. He will give evidence. He is prepared to deal with the subject generally and I think the committee members can feel perfectly free to interrupt him as he goes along.

There is one rather narrow point which I might raise now. The reference of the committee is to examine into the operation of the Atomic Energy Control Board. Actually, the Board was not set up until 1946. I think it is only possible to get a proper understanding of the activities of the Board by having an explanation of the events leading to the commencement of its operation. If it meets with your wishes I would ask Dr. Mackenzie to describe something of the history as well as the activities of the Board.

Dr. C. J. Mackenzie, called:

The WITNESS: Mr. Chairman, and gentlemen. I am very pleased that you have decided to hear a few words on the early history because, as far as I am concerned, the early history includes more policy than was the case after the Atomic Energy Control Board took over.

I thought you might be interested in getting some idea of how we got into the picture and how it developed. As you will recall in 1939 in January, there was a discovery in Germany of what was subsequently called "fission". That roughly meant that obtaining some of this very large amount of energy that scientists had told us was tied up in the atom and which many people thought we would never get, seemed to be a practical possibility. That excited scientists very much but there seemed to be a great distance to go, and the war was coming on. Only a few of the specialized scientists thought much about nuclear energy in 1939. It is very interesting to know that in the many popular articles published at that time there was no mention made of a bomb. Most scientists did not think of a bomb at that time. They thought of nuclear energy as being one of the great sources of energy which could be used for the benefit of mankind. Of course, when the war broke out, people did begin to think of the possibility of a bomb. We at the Research Council started a very small experiment in 1940. Dr. Lawrence, one of our nuclear physicists thought he would like to study some of the scientific aspects of the release of energy. He carried on in a small way. It was not a large experiment and it was the normal type of thing which we would do.

During 1939 and 1940 a number of scientists in England and in the United States began turning this matter over in their minds. In both countries certain scientists came to the conclusion that a bomb was a possibility and they were, I think, very much worried about the Germans. I think it is a fair thing to say that the early work was done in a defensive way. The Germans had discovered fission and, as soon as they captured Norway, they had the only heavy water

plant in existence; and they had the scientists and everything else in their favour. The scientists starting in the early days were certainly activated by a sense of apprenhension. Most of us were not concerned very much with atomic energy in those early days although we kept hearing rumours about it and we had done certain work.

In 1942 most of the nuclear physicists on both sides of the water had come to the conclusion that the chances of success were better than even, and from that time the activity increased. The atomic energy activity graph went up in a gradual climb—there was not any point where you could say it started. It started gradually; there were no great milestones; there were decisions made which brought about intensified activity; but generally speaking the activity was gradual.

In 1942 a group came from England called the Akers Mission. They came over to discuss with the people on this continent the relative position and what would seem to be the thing to do. They suggested to me at that time informally—in the light of conditions in England, and the fact that England was under bombardment and the industrial facilities were being used to the limit—that we might set up a joint laboratory in Canada. This was long before reactors had reached the design stage. After a few months of discussion we approached the government through Mr. Howe, the Minister of Munitions and Supply. Mr. Malcolm MacDonald, on behalf of the United Kingdom Government and Mr. Howe, discussed the matter and decided they would recommend that we start a co-operative laboratory. We could not afford not to be in this picture, and an agreement was made on September 26, the essence of which was that it would be a co-operative laboratory coming under the administration of the National Research Council. I entered the picture at that point, as President of the Research Council and in charge of that laboratory. The team or personnel was to be contributed from England and from Canada. England agreed to move a team they had at Cambridge and they did so. Those people were a little more experienced at that time than our Canadians but we eventually added a much larger number of Canadians to the laboratory.

That laboratory was opened somewhere around the end of 1942 or the start of 1943. There were negotiations from September with respect to accommodation which was difficult to obtain. Eventually we made arrangements with the University of Montreal to use a laboratory in their buildings. You will recall they had large buildings which were not completely occupied. We thought it was a good business deal because eventually we knew we would have to move out and it seemed a waste of money to equip a laboratory for perhaps a year and then dismantle it. By using the building at the University of Montreal we were able to put in facilities which were eventually of value. We agreed on the rent and it was offset by this capital cost. It was a good deal for both sides. The University of Montreal was generous and we did not lose any of the money that we put into that temporary laboratory. The thing went on very well.

All during this time they were doing work in the United States and they were doing work in England. You will recall that the first chain reaction in the world was brought about in Chicago in December 1942. That was a landmark. Up until that time nobody knew that a chain reaction could be obtained.

Mr. COLDWELL: Who made that reactor?

The WITNESS: Fermi was in charge. There was a group at Columbia University and another group under Arthur Compton at the metallurgical laboratories at the University of Chicago. Obtaining the first chain reaction in the world was a historic event. There was of course an increased interest in the project and we began to think in terms of the next step. We discussed reactors and the possibilities of building reactors. Two types were considered: one using a graphite moderator and the other using heavy water as a moderator.

At the Quebec conference, Roosevelt and Churchill and Mackenzie King agreed that there should be a measure of co-operation, and they set up machinery to determine the general policy. That body was called the Combined Policy Committee.

The Right Hon. Mr. Howe was the Canadian member; and the American Secretary of War, Mr. Stimson, was the Chairman. It was a very small committee. It did not have administrative responsibility, but it did write broad policy.

During that summer there had been a very great deal of discussion going on as to our Canadian programme and whether we should build a pile or not; and it was not until April, 1944, that plans were finalized and the decision taken to construct a heavy water pile in Canada.

By the Chairman:

Q. Just at that point, I take it that work was going ahead in the Montreal laboratory?—A. Oh, yes. The Montreal laboratory did not close down until 1945 or 1946. There were two broad activities: the operation of a reseach laboratory and the design and construction of the pile.

By Mr. Breithaupt:

Q. Could you tell us a little more about the expression "heavy water"? That is used a lot; and as laymen, we are in the dark on that. Is that part of the secret?—A. Oh, no, it is no secret, but it is difficult to explain briefly. I will have to describe what an atom is. Is that agreeable?

The CHAIRMAN: Yes. Do you want that now?

Mr. BREITHAUPT: No. Let us have it as you come to it. It is very interesting, because it is used too often.

The CHAIRMAN: Perhaps you could follow the developments from 1944, the firm decision, and we could come to it in due course.

Mr. BREITHAUPT: Fine.

The WITNESS: When we decided, and the government accepted the obligation to construct a pile, we moved into a phase involving large scale design and construction in addition to research.

Mr. MURPHY: Would you include "pile" in that category?

The CHAIRMAN: Yes, we will come to it.

The WITNESS: Yes. I am very glad to do that.

We had to contemplate the building of a structure, costing around $20 million. That was large scale engineering design and construction and obviously when we came to this, we had to get an engineering firm. I discussed with General Groves, in the United States, as to how they had proceeded.

Their strength, of course, was their industrial facilities; and they brought in all the major companies with very large scientific and development staffs and engineers. D.I.L. appeared to be the only company in Canada that was in a position to do similar work.

(Discussion off the record.)

The scientists had to write the fundamental specifications; but the engineers had to turn them into practical plans. And that is the way we worked. The D.I.L. company had a contract with Munitions and Supply to construct the plant; and they subsequently had a second contract to operate it, which they did for a few months. The N.R.C. continued to operate the research laboratory.

One of the first tasks was to select a site. We examined maps from Nova Scotia to British Columbia and then visited, perhaps, a dozen sites, and selected Chalk River as the site which had the greatest advantages and which

was reasonably safe. You will recall that we did not know much about safety in those days. We did not know how dangerous it was, and we were playing pretty safe. We put the village five or six miles away from the plant, as you will see, when you get up there. I think that today we would not worry so much about that danger. As we have gone along, our experience has made us very confident. Many things we feared did not materialize and precautionary procedures have developed very rapidly, and today we feel there is not as much danger as we anticipated.

The remoteness of the site, of course, brought the costs up very much. It was a virgin site. Artisans, masons, carpenters and labourers did not care to leave the big cities. We could not present it to them as a patriotic effort because we could not tell them what it was. We had to meet the Toronto rates which brought the costs up above normal costs, although I do not think, in retrospect, the costs would look very high today. In any event, it was quite a frantic effort from then on. We selected the site in August 1944. The actual construction started immediately, and we had one pile operating within a year. That was a small pile, but it was the first pile operated outside of the United States. It was put into operation in September, 1945.

Shortly after the end of the war, the Atomic Energy Control Board was set up. So everything I have mentioned, up to the present time, is pre-atomic energy control board.

Do you think there might be some questions at this point?

By Mr. Coldwell:

Q. You have spoken of the years 1942, 1943, and 1944. What was going on in the United States at that time? Were they ahead of us?—A. Oh yes. It is rather difficult properly to appraise that period. The most significant things, from 1940 or 1942, were the judgements that were forming in the minds of the first class scientists, such as Fermi and Chadwick. These people were considering all aspects of nuclear theory and making calculations to answer the questions as to the feasibility of reactors and bombs. The group in England certainly was a very important group.

As time went on more work was done in the United States than in U.K. That is just as one would expect, considering their facilities. The Columbia group was a very active one and so was the Chicago group, and the group at the Bureau of Standards. Until that first pile reacted in Chicago, the order of magnitude of expenditures in the United States was not great. Probably it ran from $50 million to $100 million.

Q. And there then followed close co-operation between the three countries? —A. There followed close co-operation between the three countries. As a matter of fact, there were scores of papers published in 1940 and 1941; so when it is said that all countries have always had the scientific theory, it is substantially true. Some of you may have read popular articles. In an article in Colliers, July 4th 1940 there is an interesting story.

By Mr. Green:

Q. The Germans did not make the progress that had been expected?—A. No. That was a most extraordinary thing. Scientists would say that it was because of the way the dictatorship countries handled science. If the German scientists had been operating under the pre-1914 regime they would probably have made more progress. Apparently Hitler took many of his first class scientists away from the laboratories. The Germans certainly had the basic knowledge but they never made a successful reactor.

Q. They must have known the results from Chicago?—A. No, the curtain was down by then. They knew of the early Columbia work and they knew of the work done by Bohr in Denmark. There must have been fifty or sixty

scientific papers put out after the war started but before the possibility of a bomb was taken seriously. As soon as the possibility was taken seriously the curtain was clamped down, first by general agreement, and then, in the United States, by the army.

Mr. COLDWELL: There was fear that the Germans might get this knowledge. I remember being in London in 1944 when the first V-2 fell. I was speaking to Mr. Morrison and Mrs. Summerskill that morning and they were saying "Thank God it is not as bad as we thought it might be".

The WITNESS: The raid on the Norwegian heavy water plant was planned to make the German programme ineffective.

Mr. MCCUSKER: Was that successful?

The WITNESS: Yes.

Mr. MCCUSKER: Also a number of scientists were put out of the picture somewhere on the Black Sea.

Mr. COLDWELL: That was on the Baltic Sea.

Mr. MCCUSKER: At that time we were told the raid was supposed to have resulted in casualties to a number of their top scientists.

The WITNESS: That would not be in connection with heavy water; it was in connection with their V weapons.

The CHAIRMAN: Is there anything more that anyone wishes to ask at this point?

Mr. COLDWELL: What about the definitions?

The CHAIRMAN: We are coming to the appointment of the Atomic Energy Control Board and for the purpose of the record, do you wish to have the officers listed?

The WITNESS: If you are agreeable I think it would be a good idea to cover some of the scientific background. This need not be on the record.

The CHAIRMAN: While you were talking off the record you mentioned that some assessment of our setup was made by a very prominent American scientist.

The WITNESS: Yes, Dr. L. R. Hafstad, director of reactor development of the United States Atomic Energy Commission speaking at Los Angeles July 22, 1949 said "The reactor of most advanced design and performance is in Canada".

That does not mean that we have got the largest reactor, but our reactor, using heavy water, permits us to get what we call a very high flux density in the pile, and we can do things that can not be done anywhere else in the world today. Also, the pile is extraordinarily well designed. It is a remarkably good design and a first class engineering job. We are all rather surprised at the unusually good job we got.

Mr. LOW: Why do you call it a pile?

The WITNESS: Well the first device was like a pile. The material was laid in crisscross fashion. Now, you will find that the word "pile" is gradually going out of use in favour of the word "reactor".

Mr. COLDWELL: You quoted this scientist as saying that we had the most efficient pile. Is anything known of what is going on in Russia with respect to this matter?

The WITNESS: The only thing we know is that there has been a nuclear explosion.

Mr. GIBSON: Where does cadmium come in?

The WITNESS: If you put something in a pile that will absorb large numbers of neutrons you will stop the operation. We have such rods of cadmium that slip down into the pile and they immediately stop the reaction.

Mr. GIBSON: There is no way of getting the neutrons out of the cadmium?

The WITNESS: No, but we do not care very much about that. The whole process stops which is what is wanted.

Mr. COLDWELL: Have any of the scientists had any ill effects from contact with these materials at Chalk River?

The WITNESS: Not a bit. I suppose it is the safest place in Canada from the health standpoint because of the extreme precautions we take. Every man, as Dr. McCusker and other medical men well know is carefully monitored. When you go up you will be monitored. You will have to carry one of those little badges with films and, in the really dangerous places, the personnel carry little wrist watches—geiger counters, and everything is under complete control. It is rather expensive but we do not feel that we can take any chances.

By Mr. Gibson:

Q. Should I leave my wrist watch at home?—A. No. These little watches I am speaking of are not watches at all; they are really like little geiger counters.

Q. I just wanted to know.

Mr. GREEN: Where do the universities fit into the picture?

The CHAIRMAN: Perhaps we could leave the technical part of it now.

Mr. COLDWELL: We have had about as much as we can take.

The CHAIRMAN: We have brought the discussion to the setting up of the Atomic Energy Control Board.

The WITNESS: When the Atomic Energy Control Board took over in August, 1946, the operating features were divided between N.R.C. and D.I.L. The National Research Council were still running the laboratory, but D.I.L. had a construction and an operating contract for the industrial features. Well, it was obvious that was not a workable scheme. D.I.L. did not want to continue, so they urged General McNaughton, Chairman of the Atomic Energy Control Board at that time, to have the Research Council take over complete operating responsibilities, which was done. It is a very difficult job to run an industrial facility with a research facility and we have an industrial facility with six hundred prevailing rate people and that is quite a good size industrial operation. But we worked that out and will tell you about the organization later. The National Research Council assumed responsibility for the operation of Chalk River in February, 1947, and that is the way it is today.

When General McNaughton went to New York I assumed the position of head of the Atomic Energy Control Board as well as head of the National Research Council, so at the present time I function in those two capacities.

I do not suppose you want me to talk much about or describe the pile—we will see that when the Committee visits Chalk River.

I am glad you raised the question of co-operation with the universities. Authorities in the United States and England, early decided that all of the facilities should not be in the government laboratories. In England eight universities were given capital grants of £521,500, a little over two million dollars to set up what are called accelerators. The accelerator is a device for speeding up protons and electrons and other charged particles for research work. There are a number of types of accelerators, and we in Canada felt the wise thing to do would be to work with the universities and assist them in building the type of accelerator that they wished to build. We put up roughly speaking fifty per cent of the capital costs. We did not say to the universities, "You do this". We supported the first university that came to us and suggested that they were going to build a certain type of accelerator. For instance, the first one, the University of British Columbia, decided they wanted to build a Van de Graaff

generator. They have a very excellent group out there. They built the buildings, so we went 50-50 with the University of British Columbia on that project. The Atomic Energy Control Board considered it their responsibility to see that we have in Canada all the facilities required but we do not duplicate any facilities. The University of Saskatchewan undertook to install a betatron which they are using for both physical and biological research. They work in co-operation with the Cancer Institute. We paid fifty per cent of the cost. McGill, which has a longer history in atomic energy than any other university, was building a cyclotron. We went along with McGill on the cyclotron. Queen's installed a synchrotron and Dr. Gray, who is one of the leading nuclear physicists in Canada, is in charge. They decided to go into this particular field. We supported them. We are supporting Dr. Thode in McMaster. Dr. Thode is a leading chemist in the radiological field in Canada. We are supporting some work in the University of Montreal. That is our policy. If you are interested in the detailed figures you can get them later on. McGill has been granted directly $87,500, but other assistance had been given by N.R.C. The University of Montreal is just starting. Queen's University has received $100,000. McMaster is to have $20,000. These accelerators cost different amounts. Saskatchewan has received $60,000 and the University of British Columbia has received $90,000. Now, the Board's proposal is that once we get these accelerators built we will assist in operating those accelerators, so that we will have various research units across Canada which if we did not have them in the universities, would have to be built at Chalk River.

By Mr. Coldwell:

Q. I notice you use the phrase earlier that "we were supporting a scientist at McMaster". Is that in addition to the monies given in connection with the installation? You do not mean that you support the scientists by contributing to his salary? That is the point I was enquiring about.—A. No—we do not contribute to the salary of any of the University directors. For instance, the University of British Columbia comes to us, and say: "We are going to build a Van de Graaff generator and would like your support". We said "Who is going to direct this work? What arrangements have you made for building, staff, etc.? What is the total cost?" After being satisfied as to competence and intention a grant was made. That is the common procedure.

By Mr. Bourget:

Q. You support them fifty per cent?—A. Fifty per cent on capital, that is all.

Q. Does the university devote all its time or just part of its time to this work?—A. The university professor in charge would not put all his time on the one project. He will have a staff. The next step will be that we will support annually the projects to be carried on with these accelerators.

By Mr. Murphy:

Q. Is the same course being followed on the other side?—A. Yes. In England, I know the facts. Our support is far less than theirs. We have granted $362,700 to six universities. England has spent about two million dollars on eight universities.

In the United States, it is almost impossible to find how much they have given, but I am quite sure they have given more than one hundred million dollars to the universities.

The CHAIRMAN: What you have described is the expenditure of the Atomic Energy Control Board at the universities?

The WITNESS: Yes, but there is co-operation in other activities between the Research Council and the universities.

We consider it is not a good idea to have two government bodies making grants for the same thing. So during the construction stage, the Atomic Energy Control Board made capital grants only. Now after the facilities are built up we propose that the Board support the operations but that its funds be administered by the Research Council, so there will be no overlapping. The Research Council is a very experienced body in making such grants in aid of research. In the past the Research Council has been making grants for operation, while the control board was building up the facilities. As soon as the facilities are built up we feel it would be wiser to have all the money for nuclear research in accelerators come through the A.E.C.B.

By Mr. Murphy:

Q. I wonder if at this stage we could ask the president, Dr. Mackenzie, if he thought that maybe the grants in aid of research were too limited?—A. Our expenditures in Canada on research are less per capita or on a basis of percentage of national income than in either the United Kingdom or the United States, but I do not think it would be fair to say that our grants are too small. I feel it is better to develop gradually, so that we are sure the money is wisely spent.

By Mr. Coldwell:

Q. Have you any loss of scientists leaving your employ either to move to industry or, as you say, across the line, or elsewhere?—A. Well, of course, ours is an organization that must look forward to losing men as we are in part a training ground. We have to look forward to a seasonal turnover. We have not lost very many men in atomic energy recently. We do not consider it a serious problem at the moment.

By Mr. Green:

Q. Is there any exchange between your Atomic Energy Control Board and university scientists?—A. Yes. Every summer we bring in members of university staffs who work with us at Chalk River as well as scores of students. There is a constant flow, back and forth. We have not got many men from our staff working in the universities; but nearly everyone who is working on nuclear physics in Canada has been at Chalk River at some time.

Q. Did I understand you to say that once you had the capital investments made at the universities then the operating would be under the direction of the Research Council rather than the Atomic Energy Control Board?—A. We think the Research Council has the machinery to administer grants better than the A.E.C.B.

(Discussion off the record.)

By Mr. Coldwell:

Q. Is there as close co-operation between the United States and Canada as there is between Britain and Canada?—A. No, because of the act which they have in the United States.

Mr. COLDWELL: This has been quite an ordeal for the witness, just as it has been for most of us. I do not think we should overtax Dr. Mackenzie.

By Mr. McCusker:

Q. I just have one brief question which should be an easy one to answer. Does the exchange of personnel between the universities and Chalk River in any way endanger secrecy?—A. No. They are all cleared. We have to vet everybody who goes to Chalk River.

The universities are not doing any secret work.

The CHAIRMAN: Now, perhaps, if it meets with the wishes of the committee, we can discontinue the evidence at this point. I would like to have a moment to discuss the line of evidence which the committee would like for its next sitting on Thursday.

Mr. COLDWELL: Are we not very much in the hands of Dr. Mackenzie and his staff in that respect? We know so little about this subject that we cannot suggest a line.

Mr. MURPHY: Before you go into that, could we get any data that we could study relative to what was not taken down this morning concerning, let us say, heavy water, and isotopes, and so on? I found it very interesting, but I could not absorb all that was said this morning.

Mr. WINKLER: And could you add a few charts?

The WITNESS: There is a great deal of published literature on this matter, and published explanations. The difficulty is to find it in one place where you want it. Scientists have to be careful, so they put all sorts of qualifications on things; and it is rather difficult to get it into elementary form.

The CHAIRMAN: If it is agreeable, we will have Dr. Mackenzie and his staff look up the published literature and see if they can find something which would fill that need.

Are there any other suggestions or matters to be raised with respect to the next meeting? If not, there is just one other matter, and that is the question of the printing of evidence, I mean the evidence which was taken at the last meeting and has been taken at this meeting. The committee has authority to control the printing of evidence without reference to the House. So a motion would be in order for the printing of any set number of copies.

Mr. GREEN: Could we have Dr. Mackenzie's opinion as to whether there would be any objection to the printing of the evidence? It would be very helpful to the members of the House if we could have it printed.

The WITNESS: I would be perfectly happy if we might have the opportunity to revise the report.

The CHAIRMAN: A motion would be in order on the question of printing the evidence and the number of copies.

Mr. COLDWELL: Is it not usual to print five hundred in English and two hundred in French?

The CLERK: That is the usual practice.

The CHAIRMAN: I understand that is the usual number.

Mr. COLDWELL: Then we should carry out the usual plan.

Mr. KIRK: You mean, to take the notes as given this morning and to put them in the form of an essay?

The CHAIRMAN: In printed form, yes.

Mr. GREEN: I would so move.

Mr. COLDWELL: I would move that we print the transcript of evidence, five hundred copies in English and two hundred in French.

Mr. GREEN: What about the numbers?

The CHAIRMAN: The clerk suggests that the usual number is five hundred in English and two hundred in French.

The CLERK: Yes. In certain cases, however, it might be more.

The CHAIRMAN: That would seem to be about right. It would be helpful. Perhaps I can take that motion as put by Mr. Coldwell, and I take it that it is unanimously carried.

Now, it would be helpful to Dr. Mackenzie if you would give him some indication of what sort of topic you want him to take up at the next meeting. Perhaps a word might be said about the industrial field.

Mr. GREEN: Could Dr. Mackenzie give us an indication of the ways in which atomic energy could be used industrially?

The WITNESS: With your permission, I think we might do that at Chalk River, where we have a great many experts. I would like somebody to talk about the chemistry of the isotope; and somebody to talk about the engineering side of it; and somebody to talk about the problems which we face. I felt what we should do here would be to give you the general type of thing. I fancy you have got about as much back history as you want. So, what sort of thing do you want answered?

The CHAIRMAN: Do you want an idea or a summary of the money spent on atomic energy, and the different aspects of it?

The WITNESS: Do you think we should discuss the organization, before we go up there?

The CHAIRMAN: That should be put on record.

The WITNESS: We can give you a little plan or chart, an organization chart.

By Mr. Coldwell:

Q. Yes. That would be a good idea.—A. I think you have got enough of the type of thing that I gave you today.

By Mr. Green:

Q. Could you not give us a general idea of the fields in which atomic energy might be used?—A. I could give you my views, yes, during the time I am there.

By Mr. Green:

Q. But what is said at Chalk River will never get out to the public?—A. Oh yes, we will prepare a report, provided the matter is not classified. We will make sure of that.

By Mr. Gibson:

Q. What about the subject of the production of raw material?—A. We might talk about the raw material field next day and give you our reflections. Our responsibility, as a Board, is to control the movement of things. You cannot sell material without orders from the Board. But we are not responsible for the actual operation and initiation.

Q. Who looks after that?—A. That has been put in the hands of private enterprise. People can prospect and do these things. The only thing the board does is to write the overall control.

Q. The laboratory is owned by the government?—A. That is a crown company, and its relationships would be exactly like any other commercial company. I do not know anything, personally, nor does the Board know anything about their financial affairs.

Q. You do not know what their ore reserves are?—A. No.

By Mr. Lowe:

Q. That could be a point for discussion at the next meeting.—A. Yes.

By Mr. Green:

Q. You are vitally interested in knowing whether or not we have enough uranium in Canada?—A. We could indicate those things. We might put it down as a point, to explain our position under the act.

Mr. MURPHY: I wonder if Doctor Mackenzie overestimates our ability to absorb so much at Chalk River? The point I am raising is that of time. My own personal opinion is that we might spend an extra day there, instead of just an afternoon; possibly we might spend the afternoon of the next day.

The CHAIRMAN: We worked out, very carefully, the possible length of time there. I think the position of the Board and the Research Council operating the plant is that they welcome us there very much. But we came to the conclusion that the most workable arrangement was to occupy the whole of two days with the Chalk River phase of work, and that by utilizing a full afternoon, and the evening of that day and again the next morning until we come back, it would be about all the committee could absorb at the Chalk River project, and it would also fit in with their facilities.

There is a little problem about facilities and personnel there, too. We spent some time discussing the matter with Dr. Mackenzie, and we came to the conclusion that two days would be about the most agreeable and the most suitable pattern.

If it should be sought to extend that time, I suppose it could be done. It can be done, if the committee wants it, but I would raise the question of the wisdom of extending it at this time.

Mr. COLDWELL: You have talked it over with Dr. Mackenzie pretty well and pretty carefully.

The CHAIRMAN: Yes and while the Research Council are agreeable to our visit, I think that about two days should suffice.

Mr. GIBSON: We could go back.

The CHAIRMAN: Yes.

Mr. KIRK: Which group of two days will it be?

The CHAIRMAN: It will be Tuesday and Wednesday, November 15 and 16. That is what the Council has been working on. I think we have taken that as a firm date.

Mr. MCCUSKER: Leaving on Tuesday morning?

The CHAIRMAN: Yes, leaving on Tuesday morning, the first thing.

The WITNESS: You have to leave by nine o'clock. There are the eating arrangements; and it will take you at least three hours to drive up; and if we go to the cafeteria of the plant, it is open only at certain times.

Mr. MCCUSKER: Where will the convoy assemble?

The CHAIRMAN: Right here.

Mr. COLDWELL: At the main door.

The CHAIRMAN: At the main door, yes.

Mr. COLDWELL: I move that we adjourn.

The WITNESS: Thank you!

The committee adjourned to meet again on Thursday, November 10, 1949, at 10:30 a.m.

1949

SECOND SESSION

HOUSE OF COMMONS

SPECIAL COMMITTEE

ON THE

OPERATIONS

OF THE

ATOMIC ENERGY CONTROL BOARD

MINUTES OF PROCEEDINGS AND EVIDENCE

No. 2

THURSDAY, NOVEMBER 10, 1949

WITNESS

Dr. C. J. Mackenzie, President, Atomic Energy Control Board

OTTAWA
EDMOND CLOUTIER, C.M.G., B.A., L.Ph.,
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
CONTROLLER OF STATIONERY
1949

MINUTES OF PROCEEDINGS

THURSDAY, November 10, 1949.

The Special Committee appointed to examine into the operations of the Atomic Energy Control Board, met at 10.30 a.m. The Chairman, Mr. McIlraith, presided.

Members present: Messrs. Bourget, Breithaupt, Brooks, Coldwell, Gibson (*Comox-Alberni*), Green, Low, McCusker, McIlraith, Murphy, Pinard, Winkler.

In attendance: Dr. C. J. Mackenzie, President, and Mr. G. M. Jarvis, Secretary, Atomic Energy Control Board.

Copies of the following documents were tabled for distribution to members of the Committee:

1. An Act relating to the Development and Control of Atomic Energy, Chap. 37, George VI, 1946, together with Statutory Orders and Regulations under the Act.
2. A group of papers presented before the sixty-first Annual General and Professional Meeting of The Engineering Institute of Canada, May 8, 1947, in Toronto, Ontario, and reprinted from The Engineering Journal under the title "Atomic Energy—A Canadian Symposium".
3. Chart showing the Chalk River Site.
4. Chart of the organization at Chalk River.

Dr. Mackenzie was recalled and further examined.

On motion of Mr. Low, seconded by Mr. Bourget,

Ordered,—That 500 copies in English and 200 copies in French of this day's Proceedings and Evidence be printed.

At 11.45 a.m. witness retired and the Committee went into private session.

The Committee adjourned to meet again, following the visit to Chalk River, at the call of the Chair.

R. ARSENAULT,
Clerk of the Committee.

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MINUTES OF EVIDENCE

HOUSE OF COMMONS

November 10, 1949.

The Special Committee appointed to examine into the operations of the Atomic Energy Control Board met this day at 10.30 a.m. The Chairman, Mr. G. J. McIlraith, presided.

The CHAIRMAN: Gentlemen, we have a quorum. There are several preliminary matters to discuss. If it is agreeable to the committee, we would like to discontinue the taking of evidence a bit earlier today than we did the last day. Perhaps we could fix an hour now for discontinuing the main evidence. Would 11.30 be too early?

Mr. GREEN: What was that Mr. Chairman?

The CHAIRMAN: We would like to make the meeting a little shorter today than it was on Tuesday, and perhaps we could agree now as to the time we could stop.

Mr. BREITHAUPT: Can we cover all that we want to cover by 11.30?

The CHAIRMAN: I think most of it.

Mr. COLDWELL: I think by 11.30 we will have all that we can take.

The CHAIRMAN: The second point is that at the end of that period, we have a few details about the Chalk River trip to consider. Perhaps we could clear the meeting at that point and finish off the details of the Chalk River trip. Is that agreeable?

Carried.

The CHAIRMAN: Before starting the evidence this morning, I have a copy in pamphlet form of the Act relating to the development and control of atomic energy, as well as a printed copy of the regulations. If it meets with your pleasure I shall be glad to file one for each member. In addition, I have here reprints from the Engineering Journal. It is "Atomic Energy—A Canadian Symposium". It is a copy of papers presented before the Sixty-First Annual General and Professional Meeting of the Engineering Institute of Canada held on May 8, 1947, in Toronto, Ontario. On page 7, there is an article by Mr. Tupper dealing with nuclear and pile theory, and at page 11 there is another article by Mr. Jackson dealing with the Chalk River project generally. I have a copy available for each member of the committee, and I think it will be found useful.

In addition to the material given to you, there is a chart for each member of the committee showing the Chalk River site. Perhaps I could distribute them now and they will be referred to later by Dr. Mackenzie. In addition, we have a chart of the organization, and it will be referred to in evidence in a few moments. Perhaps I could have them distributed now.

Perhaps we are ready now to hear Dr. Mackenzie continue the evidence that he was giving on Tuesday last.

Dr. C. J. Mackenzie, President of the Atomic Energy Control Board, recalled:

The WITNESS: Mr. Chairman and gentlemen, it might be helpful to refer for a few moments to the work of the Atomic Energy Control Board in its general aspects. The Act, on pages 3 and 4, outlines what the Board maw do. Item 8(*a*) is the significant reference: to "undertake or cause to be undertaken researches and investigations with respect to atomic energy" and 8(*b*) "with the approval of the Governor in Council utilize, cause to be utilized and prepare for the utilization of atomic energy."

Section 9, "the Board may with the approval of the Governor in Council make regulations."

Now the Board itself is composed of five people at the present moment: The President of the Reseach Council is an ex-officio member and is the President of the Board; Mr. G. C. Bateman, mining consultant; Dr. Paul Gagnon, Director of the Department of Chemistry of Laval University; Mr. V. W. T. Scully, Deputy Minister of Taxation; Mr. W. J. Bennett, President and Managing Director of the Eldorado Mining and Refining Company.

There is a very small headquarters staff of eight people. The attempt has been made to keep the headquarters staff at a minimum and to utilize the facilities of the Research Council and other government departments. With regard to duties I might just say a word under five headings, and if you wish I have some notes here which we could have mimeographed and given to you later on to refresh your memory. Under Section 9, the furtherance of research was the major topic, and as I have told you the decision was taken to delegate to the National Research Council, as agents, the operation of the Chalk River plant, so that the Board as such has delegated, in detail, its responsibility for administration. I will not say any more about that because we will be discussing the Chalk River project when we go there. The second thing that we have to do is assist the universities which is authorized under one of these clauses, 8(i). I explained Tuesday, and I do not think it is necessary to repeat, the general plan of assisting research in the universities. The third thing which we do is distribute isotopes for research and for industrial purposes. The principles underlying the distribution are drafted by the Board, but the Chalk River organization carries out the details. Perhaps we could talk about isotopes at Chalk River where you could see them and talk directly with the gentlemen who really prepare and distribute them.

Next is the development of natural resources. I think you have a clear idea of this particularly as far as our responsibilities are concerned. Our Board has a limited responsibility in connection with the development of Canada's radioactive ore deposits and the reason for the present demand is, of course, obvious. We feel that the project is in its infancy from the industrial standpoint and that the demand in the future for industrial purposes will certainly grow. It is not very large at the moment. The chief use at the present moment is, unfortunately, for the bomb. Acting on the expressed opinion of the government that with proper security provisions the development of Canada's radioactive ores could best be carried out under the normal mining exploration conditions, the Board framed, as was its duty to do, the necessary regulations which would permit exploration and development under normal conditions. That is as far as the Board went. They have to issue these orders because under the Act they have the responsibility of controlling the movement of what are called "prescribed substances" which would be raw materials such as ore, fissile material and all materials which might be dangerous to the health of people handling them or to the security of the nation, so that our responsibility as a Board is limited to that extent. We have no responsibility for seeing to it that an enlarged program of development is undertaken. The reason, of course, is that

at the present moment the supply of material in Canada is more than adequate for our own needs. As you are probably aware, the major part of the uranium that is produced in Canada is exported to the United States under an agreement which our Board has nothing to do with.

On the other hand, as we have control and as there is only one purchaser we have exercised our authority in the matter of movement of the supplies; we had to make some arrangements so that the mining companies could dispose of their product once they got it. To that end an advisory committee of mining people was appointed to advise the Minister as to what steps should be taken, and the price that could be offered. I think you are familiar with these details. The government has offered to purchase through its crown company, the Eldorado Mining and Refining Company, uranium ores and concentrates of specified grade, normally 10 per cent by weight of uranium oxide, at a guaranteed minimum price of $2.75 per pound of contained uranium oxide. As a result of the steps we have taken, there has been, as you know, a very great deal of activity in this field.

The Department of Mines and Resources has been very helpful to the industry, arranging for analyses, putting out a prospecting guide for prospectors and giving the type of advice that their geological service and metallurgical and ore dressing laboratories give to the industry.

In 1948, in nine months, there were 3,349 analyses made. That is, 3,349 samples were submitted by prospectors. And in the next year, 1949, that number has risen to 5,208.

It is, of course, fortunate that we have such a wide area for exploration; and, while our board has nothing to do with that, nevertheless, as individuals, in common with you, I think we feel some satisfaction in the belief that there will be extensive uranium deposits found in Canada.

By Mr. Gibson:

Q. And what percentage of those samples showed some radioactivity? —A. They would all show some; but it is like any other mining proposition, it is a matter of economy. This is confidential to the board, between the mining company and the analytical laboratory, which, I think, is the proper procedure. But I believe we have the right to know these things.

Mr. JARVIS: Yes, we have the right to know these things.

The WITNESS: We have tried to let it go in the ordinary way; we feel there should not be more restrictions put on than are absolutely necessary. That is the general philosophy of the board.

That is the picture, Gentlemen. Now, if there are any questions, I shall be glad to deal with them.

By Mr. Green:

Q. I do not understand just whom a person deals with, if he finds radioactive ore. What governmental body has the responsibility?—A. Eldorado. Eldorado is the purchasing agent.

Let us suppose that a prospector finds some ore. He would send it in for analysis to the Geological Survey. Then, the people who are supporting the effort look at the proposition, and if it appears to be favourable, they apply for a permit to set up diamond drilling and extension.

Mr. JARVIS: And they would report to the Geological Survey.

The WITNESS: Then, if they get to the point where they decide they will go on, having in mind the price they know they will get, they would go on in the normal way, with their mines. And when they got to the point where they had material for sale, they could sell it to the Eldorado Company, which acts as an agent.

By Mr. Green:

Q. They cannot sell it to any other purchaser?—A. No.

Q. And they cannot go on with their mining development unless they get a clearance from Eldorado?—A. No, from our Board. And let me say that the clearance would be given. There is no reason for it being held back. But we do have to know where this material is. The responsibility of our board is to know where everything is, to see that it gets into the proper channels.

Q. Is the prospecting done largely by individual prospectors working on their own, or is it done by employees of the large companies?—A. I could not answer that question. I would presume that it is being done in the normal way. I really do not know the answer.

By Mr. Gibson:

Q. You mean it is being done just like gold exploration?—A. I do not know; but as far as we can see it looks like the ordinary picture of mining gold.

By Mr. Green:

Q. I understand that a good deal of prospecting is done by the employees, let us say, of Consolidated?—A. Yes.

Q. I wondered if that was the picture with regard to radioactive ores, or whether prospecting was being done by individuals working on their own.—A. I could not give you any exact data on that.

By Mr. Coldwell:

Q. I think it is being done that way, because I know that in northern Saskatchewan there are a number of individual prospectors working. Would they get some help from the government?

By Mr. Low:

Q. A good many prospectors are working in various places in the Northwest Territory.—A. Ithink they would be following the same pattern as in the ordinary mining game.

By Mr. Murphy:

Q. Does the price warrant the same effort as you would find with the ordinary prospector?—A. I do not know what the miners get. Our Board has no responsibility for it at all. It is, unfortunately, a difficult position because there is only one buyer at the moment. We do hope, however, as the industrial side develops that situation won't remain very long. But it is a fact.

By Mr. Green:

Q. You would hope that uranium could be put on the market?

A. We would hope that industries would go up which would want uranium. At the present time nobody wants much. At least, there is not any great industrial demand for uranium.

By Mr. Coldwell:

Q. Isn't that one of the matters in which the Atomic Commission of the United Nations is very interested? Was it not the original plan to own all reserves?—A. At one time I think they wanted to own. Then they modified it slightly, to control.

Q. So it would be very difficult, at the moment, for industry to obtain any?—A. It might not if commercial power developed and it were found possible, under international control, to let a central power plant have it. Then

they would become buyers. But I could only speculate as to how the thing would be channelled. As I have said, at the moment, unfortunately, there is only one large use for it.

By Mr. Low:

Q. Does it not appear that the present price and conditions tend to discourage developing finds in areas which are fairly remote from transportation? —A. Well, I think that is the same picture with respect to gold or anything else.

Q. Well, I believe it is even more so in the case of uranium, from the fact that the price is $2.75 a pound, and that is not terribly encouraging.—A. That is a general question of policy, which we do not decide.

By Mr. Coldwell:

Q. So far as the purchase is concerned, you are pretty well tied up by national expenditures.—A. We are.

By Mr. Low:

Q. Could you tell us if there would be any deterioration take place with respect to uranium once it is refined and put into storage?—A. I would say there is very little. I speak only from general knowledge, but I do not think it is significant. It has all been there for millions of years.

By Mr. Green:

Q. From the press we would be led to believe that uranium was in short supply all over the world, and that there was a great demand for it. But, apparently, that is not the picture.—A. I would not say that. I said the demand is for bombs.

Q. I beg your pardon?—A. The demand is for bombs.

Q. Would not Canada be wiser, then, to develop uranium to a greater extent?—A. That is a matter of government policy with which we have no responsibility.

By Mr. Coldwell:

Q. It is international policy.—A. All our responsibility is to see that the movement is known and controlled and that the material does not get into unauthorized hands, or create any health hazard. Those other matters are very interesting problems, undoubtedly, but I would suggest they are in the general political field, with which our board has no particular responsibility.

By Mr. Gibson:

Q. In what form do we export our uranium?—A. Oxide.

By Mr. Murphy:

Q. I think you mentioned isotope distribution for industrial purposes. Would you mind enlarging on that?—A. I have that matter put down as one of the headings. I would prefer to get through this in an orderly way, if I might. I would like to get through this mining business.

By Mr. Breithaupt:

Q. When you face a market with only one price and only one interest which is taking the product, do you think there is sufficient incentive to the prospector for him to go ahead and ply his trade as energetically as he would, perhaps, in

the case of some other mineral?—A. Of course, the only thing we can go on is the fact that we have had over five thousand samples sent in in 1949. I think that is quite good.

Q. That is good evidence?—A. Yes.

By Mr. Low:

Q. Would you mind enlarging on that. After the submission of those samples, how many claims, then, were actually developed? Could you give us any information on that?—A. We have no detailed knowledge of that at the moment.

Q. Relative to that, have you had any difficulty in securing all the uranium that you need for your work?—A. We have no problem, actually. The situation is that we are using only a moderate percentage of what Canada is producing. It is public knowledge that Canada is supplying material to the U.S. but as a board, we do not know the detailed quantities and price; we do not know anything about the internal working of Eldorado—but it has been published and stated that we are exporting uranium annually.

Q. Are there any other commercial producers, apart from Eldorado?—A. No, not in any quantity.

By Mr. McCusker:

Q. Are there any in the United States?—A. That is a matter on which our Board is not specially informed.

By Mr. Low:

Q. Is this a top secret: Is it the policy—whoever orders these things in Canada—to keep good reserves of uranium in store?—A. That, of course, is government policy. As I have mentioned, one person will say: why do we not export more? And another person will say: why do we not keep it? But that is not for us to decide at all.

Q. I know that; that is true. But what I wanted to know was: Is it your policy to keep a reserve?—A. We have a reserve. We have an annual production which is much greater than we are using, and that is a reserve, in one way.

Q. Yes, but one would have to subtract from that the amount we export to the United States; and I wonder if we are keeping in our own hands a sufficient reserve to meet any future needs?—A. We are sure that we can operate the Chalk River pile, which is our responsibility. Let me put it that way.

Q. Thank you.

A. I take it that what you are really asking me is: are we confident that we can keep on operating at Chalk River? And I think I could say to that, yes! But another thing, which is top secret, is the matter of the quantities of all this material, where it is, and how much. The Board has made it a point not to inquire beyond our own responsibility. The fewer secrets one has the better off one is.

By Mr. Green:

Q. I have always understood that the Atomic Energy Control Board kept a very close check on all mining for radioactive ores. But now you tell us that once the miner goes ahead, or the mining company goes ahead to develop the mine, then you people have no further interest in it.

A. No. We give an order which permits him to do the next phase of it, the diamond drilling. And we do that more for the purpose of keeping in touch with what is happening. Then, if he wishes to go on to the production stage, we would give the necessary permission; and before he started to sell it, he would have to have permission from the Board to do that.

My Mr. Low:

Q. What sort of reserves are maintained for the actual production phase?
A. We have not got any.

By Mr. McCusker:

Q. Would there be any possibility of supplying these concentrates to some other source without our knowledge?

A. The purpose of our control is to prevent that.

THE CHAIRMAN: Referring to Mr. Low's question, I take it that your answer was: We have not got any; and I take it that what you meant was, main producers.

THE WITNESS: Outside of Eldorado.

By Mr. Green:

Q. You mean, any other company which is producing uranium?
A. At the moment.

By Mr. McCusker:

Q. The concentrates are flown from the north?
A. Out of Eldorado.
Q. Suppose some other company was producing concentrates?

A. All that the board would be responsible for would be an audit, more or less as we have in our own plant. Some of this material can be very dangerous. So, with all these supplies, we have a very careful audit of everything that passes through our plant. It is very difficult, but we would do the same thing in mining operations.

By Mr. Green:

Q. Do you have any check on Eldorado?

A. No, that is a matter for the government, and we assume that the government is responsible for seeing that they would not divert material to an operation where it should not be diverted.

Mr. MURPHY: Is it possible, doctor, for any new company to produce for export without your knowledge?

The WITNESS: No.

Mr. GREEN: Where do the provincial Departments of Mines come into the picture? For example, in British Columbia the provincial Department of Mines is much closer to the mining picture than the federal department. I was just wondering what co-operation you have with the provincial departments?

Mr. JARVIS: The basis is one of co-operation. Any information that we think would be of interest in its field to other departments is interchanged, and we have made an arrangement by which as far as possible ordinary mining procedure is followed; that is in the physical field of safety, and that sort of thing, where we make provincial regulations applicable subject to the security regulations of the Board.

Mr. GREEN: You mean that a man could go in and stake a mine, a mine containing radioactive ores in the same way that he could stake say a silver, a zinc or a lead property?

Mr. JARVIS: Yes, exactly.

Mr. GREEN: Under the provincial laws?

Mr. JARVIS: Under provincial laws; but he has to report what he finds to the Board. Then he has to come to the Board when he wants to carry his operations beyond the prospecting stage; and under that order there are provisions

about keeping the Board informed, and where he may send his samples of ore for analysis, and provisions under which he may not move more than sample quantities except under a special permit of the Board.

Mr. GREEN: Then if he produces radioactive ore he would turn over to Eldorado?

The WITNESS: The only place that Eldorado would come into it would be as the marketing agency. He does not have to turn it over, but if he wants to get any money for it that is the only place where he can sell it. We do not say to him that he has got to do something.

Mr. GREEN: Can he concentrate it himself, smelt it himself?

The WITNESS: As long as he is authorized by the board to do it he can do that.

By Mr. Murphy:

Q. What worries me is this: what is there to prevent a developer, a miner or a prospector from doing some concentrating, making his own concentrates and shipping them to a foreign country?—A. He has to report any prospects.

Q. I know, but supposing he does not do that?—A. Then he is prosecuted just like any other offender.

Q. The point I am making is: is it not possible even in this country for a man, a prospector, to develop his own prospect, concentrate the product and ship it outside the country, let us say to Russia?—A. Well, it is almost impossible to do that. For instance, it is very difficult to erect and construct a large mining property without anybody in the country knowing anything about it. Then too, on top of that, how is he going to ship it; the railway would know about it and aircraft have regulations covering transport. I do not say it is theoretically impossible; but of all the crimes on earth one could attempt I think such a crime would be the most difficult to get by with without it being detected. That would be the responsibility of the Board. There is no question about that; it is the Board's responsibility.

Mr. GREEN: Is the ore of a type that a large quantity would require to be shipped?

The WITNESS: Yes.

Mr. GREEN: It is not like gold?

The WITNESS: The final product is very small but the start is very very large.

Mr. BREITHAUPT: If we are going to adjourn at 11:30 this morning would it not be wise to let the witness go on?

The CHAIRMAN: Just a moment, I think Mr. Green has another question.

Mr. GREEN: Yes. Mr. Chairman, there is one other question I would like to ask: is any of this ore being shipped to the United Kingdom?

The WITNESS: As I say, we do not know anything about the military end of it.

Mr. COLDWELL: The movement of this product is closely controlled.

The WITNESS: And it is also internationally controlled; but I would prefer not to answer that question.

Under the third item, that of responsibility—I think we have covered that.

Then, four, control of material and information—I think we have talked about that.

Liaison: Liaison with other organizations is very good. We maintain close liaison with the departments of government; we maintain liaison with the atomic energy projects in the United Kingdom and the United States—with the United States in a more limited way, as I mentioned the other day. Liaison with the public is a very difficult responsibility because it is hampered by our secrecy obligations, but we are trying to break that down.

The fifth item: is co-operation on international control, on that our machinery is set up. As you know, we haven't any responsibility for the negotiations

which are going on in the international field because that is the responsibility of government and departments. But we do provide experts for delegations, and officials; and, presumably, if some international control were set up the Atomic Energy Control Board would probably be the main agency of government handling it; but we carry no responsibility on that.

That is our picture, Mr. Chairman.

By Mr. Green:

Q. You mentioned liaison. I see in one of these documents you have given us you have a U.S.A. liaison officer at the same level with the vice president.—A. I just noticed that myself. I had not seen these drawings before this morning. I think that is just a matter of trying to show him somewhere.

An Hon. MEMBER: A matter of diplomacy.

The WITNESS: I agree with you.

By Mr. Green:

Q. How do you know what I was going to ask?—A. We wanted to show him to you. We wanted you to know that he is there.

Q. What I wanted to know is, is there any Canadian in a similar position in the States?—A. No, and the reason for the man being here was that when we started this project—it was cooperative, certainly—the degrees of cooperation of the various parties may have been different. Great Britain put in a staff, a sizeable staff; the Canadian government looked after financing, and put up a major part of the money; the United States put in certain things. They put in certain equipment and certain knowledge, a limited amount. The reason they put their man there was to facilitate matters. This liaison man is really up there to facilitate our getting what we are permitted to get from the United States.

I am not going to stress the remainder of the organization. As you can see the fundamental portion is in the middle of the chart here. We have a director, Dr. Lewis—a very distinguished scientist; we have the industrial facilities headed by Mr. Hatfield; we have three assistant directors who are in charge of large groups. You will meet all these people, talk to them, and probably the chart will mean a great deal more to you after your visit.

Mr. MCCUSKER: Would it be possible for us to have a chart giving the names of the individuals occupying the various positions?

The WITNESS: We can do that. We have a chart but I did not bring it today because I thought perhaps it was a little too much.

When you come to Chalk River we propose to give you a short background of each of those persons so you will know where they come from and what they are doing, and that should assist you when you are going around. I think it would be easier to distribute that information before we leave here.

The CHAIRMAN: Yes, perhaps on Tuesday morning.

The WITNESS: The plant site is composed of 10,000 acres of which only about one hundred acres are used. There are a hundred odd buildings. You have the chart in front of you showing those buildings. I will not stress them except to indicate to you that there are very interesting things there, particularly along this first horizontal road here at the top of the chart. You can see there the physics group, the chemistry group, and the pile group. There are a lot of other administrative buildings—about a hundred units on the site. Some of them are small.

By Mr. Gibson:

Q. Is that "water treatment" the heavy water plant?

A. No, that is ordinary water. The quality of the water was an important factor in selecting the site. Water is used for cooling so that the selection of

the water and the possibility of treating that water became one of the most important matters, much more important than the problem of obtaining ordinary drinking water.

Q. Do you get the heat for your buildings up there?

A. No. There, however, you have hit on a real industrial problem—how to get the heat out. It is low grade heat now and that is really the heart of the problem, from the industrial standpoint. With present materials we cannot raise the temperature in the pile to a degree that will make it an economical supply. We have got to do that however, before power becomes a practical thing.

Q. It would be too dangerous to get too great a heat at the present time.

A. The materials would not stand it. We have got to get up to very high temperatures.

Q. Superheated steam?

A. Yes, but now you see we do not dare go up to the boiling point of water because of the materials used. That whole field of research, of finding and developing materials which will have the proper physical properties and the proper nuclear properties, is one of the big things we are up against.

The village is a very interesting one. I want to say just a little about it. We propose that you should spend perhaps half an hour on Wednesday driving around the village looking at the hospital, the school facilities and so on. We would like you to have a bird's eye picture. We feel that it is one of the finest villages in the country. It is a very interesting place and an experiment in itself. There are 2,000 people there and we think we run it reasonably economically. We have a very nice school and a very fine group of children; there are a lot of them. There is a community hall and I think we have something like fifty clubs on the site. They, of course, are not all intellectual.

Q. We won't be out of our element there I hope?

A. We can satisfy any taste you have. There is the little theatre, boating, skiing, and the regattas up there are splendid. The people have built boats cooperatively during the winter time and they are all enthusiasts.

By Mr. McCusker:

Q. Has the school been running long enough to indicate how the pupils are and how the results compare with results in other schools? Are they superior?

A. I would guess that we would have a high I.Q. to start with. We have a very select group and the teachers and inspectors say that it is one of the very finest schools in Ontario.

Now that is a rough picture and I do not fancy, Mr. Chairman, that there is very much more I can say on this.

Mr. BREITHAUPT: What municipal government is there? Is there a mayor and a council? How are you running that phase?

The WITNESS: That is one of the matters which I would be very glad to have you look at. We have no municipal government.

Mr. GREEN: It is a company town?

The WITNESS: Yes, it is a company town. There are advantages and disadvantages and the thing we want is a sense of civic responsibility. To get that responsibility without the accompanying responsibility for the spending of money is a difficult thing. The school seems to run very well. We appointed a school board and the members take an interest, I suppose because they have children; they do very well. We have something that might be called a village council but when you take away the responsibility for the raising and spending of money you have a problem.

Mr. BREITHAUPT: Yes, it is a problem.

The WITNESS: I would be very glad to have you take an interest in it.

Mr. LOW: Are there any policemen up there?

The WITNESS: Yes, but we do not use them very much. We have them at the plant.

Mr. COLDWELL: Do you have the Mounted Police?

The WITNESS: Not in a policing way. We use them for security. There is one officer on duty at the plant for security purposes. It is a very orderly place.

Mr. MCCUSKER: No one owns their own property?

The WITNESS: No, and there is no unemployment. There are a lot of interesting things at the village. The commercial centres are limited and we have agreements with the concessionaires where we get a percentage of the "take." We have to run our own hospital services and it is a very fine hospital. We run the school, the recreation and commercial centres, and all the utilities.

I think I have given you an outline now. I have just tried to bring out the high points so that you will not be completely out of the picture when you make your visit.

By Mr. Green:

Q. Can you give us the connection between the Atomic Energy Control Board and the plant at Port Hope?—A. None at all. The plant at Port Hope is part of the Eldorado Company. The company consists of the mine plus the factory at Port Hope.

Q. You have no connection with it?—A. No.

Mr. MCCUSKER: Among the employees at Chalk River you have many very young people. Are they allowed to bring in their dependent relatives or is that a problem?

The WITNESS: We have never faced that problem—whether a man brings in his mother-in-law—and I don't know whether we would object. What we do is to allot houses. We only have 440 houses, and we have a staff hotel, where this group will stay, with 400 rooms including those in the dormitories. We have to make the allocation of houses very carefully. A person is granted a house under certain conditions. If he wished to bring in some relatives naturally that raises a point but he could not get a house to do it. If it were a single family it would get a certain type of house; if it is a family with one child it would get another type of house; if it were a family with two children it would get another type of house and so on. If a man wants to accommodate his relatives and if the allocation has already been made on the basis of a man and his wife alone, they would live under very difficult conditions.

The CHAIRMAN: We have now come to our deadline but we have not gone as far as I had anticipated. The next two matters we proposed to deal with included a financial summary. It will be fairly short but I think we could leave it to another meeting.

The WITNESS: We might file it.

The CHAIRMAN: I would prefer to have it read.

Mr. COLDWELL: If it were filed we could read it and ask questions afterwards.

The CHAIRMAN: Perhaps we could go on for a few minutes more now and have the summary of the financial aspect?

The WITNESS: To give you some idea of the financial matters I will present them to you in periods. For the period of 1942 to 1946, everything was done through Munitions and Supply; we merely got F.E.'s under the War Measures Act or whatever authority it was, to run the laboratory. The National Research Council operated their laboratory in Montreal, and they operated the laboratories in Chalk River while the D.I.L. was building, so that our appropriations for

five years, from 1942 to 1946 inclusive, totalled $2,907,558.36. The money spent on construction amounted to $342,547.88, machinery $29,095.19, and the salaries, plus what we call the necessary equipment that is not capitallized, $2,536,005.29, so that when the Atomic Eenergy Control Board took over there had been that amount of money spent by the Research Council in Montreal and at the site. Now the only thing I know about the expenditures by D.I.L. is on this statement that I have. That was financed in the same way as all the other war projects. There were some banking arrangements I do not know much about. Of course these expenditures were audited in the usual manner. The total amount in 1944-1945: D.I.L. spent on construction at Chalk River, $3,008,906.22, and in 1945-1946, $14,843,132.41, in 1946-1947, the cost was $7,808,277.72, of which $2,532,580.99 was for operating. Then the Board took it over. In 1947-1948, there was spent $5,389,130.03; in 1948-1949, $6,476,714.40, and in 1949-1950, to September 30, 1949, $2,825,265.51.

By Mr. Pinard:

Q. Is that all spent on construction?—A. No. Up to date, the total according to this sheet is $40,351,426.29, of which $27,268,100.11 was for construction, and $13,083,326.18 was for operating.

By Mr. Green:

Q. That includes what the D.I.L. spent?—A. That includes everything. The breakdown is almost impossible to give you because there was a transition. The National Research Council ran the laboratories on one account until the time the Atomic Energy Control Board took over. The D.I.L. had a construction and an operating contract. When the Research Council took over the project on February 1, 1947, it did not take it completely over because D.I.L. had some construction to finish, so there was a period of nine to ten months during which we were looking after the new construction and current construction and D.I.L. was finishing up the old contracts. I think the most significant figures are really the over-all figures. You can say that at Chalk River there has been an expenditure of $40,351,426.29 of which $27,268,100.11 was on capital account. That is the significant thing.

By Mr. Green:

Q. That includes the work at Montreal University and at Chalk River?—A. That is Chalk River only—if the Montreal laboratory is included the total is $43,258,984.65.

Q. That would not include the cost of producing uranium?—A. It does not have anything to do with Eldorado.

The CHAIRMAN: Perhaps I might clear a point here in the statement. I take it that $43,000,000 figure deals with the expenditures on atomic energy development solely. There have been expenditures in addition for the Atomic Energy Control Board operations.

The WITNESS: But they are very small. I think the total is there but one would have to check it up. I may be wrong on that. Anyway the Atomic Energy Control Board figures run $170,000 or something like that. Take 1948 to 1949, headquarters of atomic energy cost only $31,000 a year out of $6,000,000. That is a figure which must not be taken too seriously because the National Research Council does the essential part, but you can see that that figure does not really change the total figure at all. The big grants are to the universities. Those are the biggest expenditures, the ones I mentioned on Tuesday: $150,000 a year is the grant made to the universities; $30,000 roughly for the administration, which of course, is almost insignificant in comparison with the $6,000,000 or $7,000,000 we spent.

By Mr. McCusker:

Q. Is there any revenue or do you anticipate any?—A. Internally?

Q. I mean from the sale of isotopes?—A. There is a small revenue but it is insignificant. We feel that the isotope aspect is now one of research and we would not like to see research stopped anywhere through lack of isotopes; so that while we do charge for them, we try to make it possible to have the people get on with their research work.

I do not think you will ever get any great revenue out of isotopes supplied for research. But there is always the possibility, if we get to the point where commerce or industry uses these radio active things in mass quantities, in industrial processes that we might find a credit. But, at the present time, one of the difficulties is that you cannot permit these active particles to get into clothing, food, or anything which might react on the individual.

By Mr. McCusker:

Q. Are there not possibilities for use in agriculture?—A. For research. But I do not think you will make any money in agriculture in this way; although it might help out in the matter of knowledge, efficiency and effectiveness of agriculture. That is one of the fertile fields, but I do not think there is any money in it. I do not think we would ever make money out of this, anymore than we would make money out of universities, and hospitals.

By Mr. Green:

Q. In effect, it is just one large research plant.—A. That is perfectly true.

By Mr. Murphy:

Q. In your capitalization structure, have you separated the equipment and machinery from the buildings?—A. Yes, we have all that information, but I have not got the totals with me. I may say that the construction of the buildings would be much larger than the machinery. I think it is very difficult to say whether a pile is a machine or a building.

Q. Could you tell us if, in the course, of your research, some of the equipment which you originally obtained would be now out of date?—A. Nobody can say it is out of date but ourselves, because we are the only ones in that field. We certainly know how to build a better pile, and the next one we build will be modified. Undoubtedly, as we went along, we found certain things which we would have to correct. It has just been one long series of difficulties.

Sometimes you will find that the precautionary measures you have taken were not necessary and that you could get away with less precaution; while in other cases, you will find that the thing was a failure and you have got to do something better. But that is typical of research and development, and that is the field we are in. What might very well come out of this, as a secondary matter, is that some of the things which are developed in this atomic energy plant might find very great use in industry.

The CHAIRMAN: I think, perhaps, if the committee will agree, we will terminate our evidence for this morning at this point.

—The committee went into private session.

1949

SECOND SESSION

HOUSE OF COMMONS

SPECIAL COMMITTEE

ON THE

OPERATIONS

OF THE

ATOMIC ENERGY CONTROL BOARD

MINUTES OF PROCEEDINGS AND EVIDENCE

No. 3

TUESDAY, NOVEMBER 22, 1949

WITNESS

Dr. C. J. Mackenzie, President, Atomic Energy Control Board

OTTAWA
EDMOND CLOUTIER, C.M.G., B.A., L.Ph.,
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
CONTROLLER OF STATIONERY
1949

MINUTES OF PROCEEDINGS

TUESDAY, November 22, 1949.

The Special Committee appointed to examine into the operations of the Atomic Energy Control Board met at 11.30 a.m. The Chairman, Mr. McIlraith, presided.

Members present: Messrs. Breithaupt, Brooks, Coldwell, Gibson (*Comox-Alberni*), Green, Kirk (*Digby-Yarmouth*), Low, McCusker, McIlraith, Murphy, Pinard, Stuart (*Charlotte*), Winkler.

In attendance: Dr. C. J. Mackenzie, President, and Mr. G. M. Jarvis, Secretary, Atomic Energy Control Board.

The following documents were filed with the Clerk of the Committee:

1. General outline of organization and duties of the Atomic Energy Control Board, prepared for the information of Members of the Committee.
2. Chart showing the staff organization of the Chalk River project.
3. Health Radiation and Contamination Control, by G. H. Guest, Health Radiation Branch, dated January 1, 1948.
4. Proceedings of the Conference on Industrial uses of radioactive isotopes, held in Ottawa, December 7, 1948.
5. Industrial uses of radioisotopes, published by G. H. Guest, dated December, 1948.
6. The Melchett lecture of the Institute of Fuel, delivered October 8, 1947, by Sir James Chadwick (reprinted from "Nature", March 29, 1947).
7. Unclassified researches in Nuclear Physics at Chalk River—1948, by W. B. Lewis, dated 24 November, 1948.
8. Atomic Energy as the servant of humanity by David A. Keys. (Off-print from Queen's Quarterly, Vol. LV, No. 2, 1948).
9. Applications of recent advances in Nuclear Physics to medicine, by J. S. Mitchell (reprinted from The British Journal of Radiology).
10. Short Bibliography on Nuclear Physics, dated November 14, 1949.

On motion of Mr. Breithaupt,

Resolved,—That the Chairman write to Dr. D. A. Keys, Vice-President, National Research Council and Director of the Atomic Energy Project, thanking him for the many courtesies extended to the Committee on the occasion of its visit to the Chalk River plant and to the village of Deep River on Tuesday and Wednesday, November 15 and 16.

The Chairman read a letter from the Honourable Colin Gibson, Minister of Mines and Resources, inviting the Committee to visit the operations conducted by the Mines, Forests and Scientific Services Branch of his Department relative to research work for the Chalk River project.

On motion of Mr. Brooks,

Resolved,—That the Committee accept Hon. Mr. Gibson's invitation for a later date when it is found possible to take advantage of the opportunity to enter into this field of inquiry.

Dr. Mackenzie was recalled and further examined.

49859—1½

On motion of Mr. Gibson,

Ordered,—That 500 copies in English and 200 copies in French of this day's Minutes of Proceedings and Evidence be printed.

The Committee then went into private session and later adjourned to meet again in public session on Thursday, November 24, at 11.30 a.m.

R. ARSENAULT,
Clerk of the Committee.

MINUTES OF EVIDENCE

HOUSE OF COMMONS, NOVEMBER 22, 1949.

The Special Committee appointed to examine into the operations of the Atomic Energy Control Board met this day at 11:30 a.m. The Chairman, Mr. G. F. McIlraith, presided.

The CHAIRMAN: Perhaps the first step this morning is that we should indicate for the purposes of the record that we have tabled the documents given to us when we visited the Chalk River plant. I think it would be helpful if these documents were listed as being tabled today so that we will have a record of them. This would include also documents distributed to the members just before leaving for Chalk River.

Mr. GREEN: Do you mean they are being distributed to members of the house?

The CHAIRMAN: No, I mean tabled in the committee and a reference in our committee minutes to the fact that we have them available to members of the committee. There will of course be no other reference to them.

There is one other matter. I, as chairman, would like to express to Dr. Keys by letter our appreciation of the splendid organizational work he and his staff did.

Mr. BREITHAUPT: I would be glad to move a motion of thanks to Dr. Keys. I think the whole trip and everything connected with it was arranged wonderfully and I do not think we could have been looked after better. I would like to move: that the chairman write to Dr. D. A. Keys, Vice President, National Research Council and Director of the Atomic Energy Project, thanking him for the many courtesies extended to the committee on the occasion of its visit to the Chalk River plant and to the village of Deep River on Tuesday and Wednesday, November 15 and 16.

Mr. COLDWELL: I second that motion.

The CHAIRMAN: I take it then that the motion is unanimously agreed to. Carried.

The CHAIRMAN: Before we resume the taking of evidence, I have a letter from the Hon. Colin Gibson, Minister of the Department of Mines and Resources, which reads as follows:

G. J. McIlraith, Esq., M.P.,
Chairman,
Committee on Operations of Atomic Energy Control Board,
Room 416,
House of Commons,
Ottawa, Ontario.

My dear McIlraith,—

I wish to congratulate you on your appointment as Chairman of the Committee recently set up to examine into the operations of the Atomic Energy Control Board. The investigation should be a most interesting one.

The Mines, Forests and Scientific Services Branch of this Department carries on certain activities which should be of interest to your committee. The Geological Survey of that Branch examines samples of ores sent in by prospectors and others to determine the uranium content. The Bureau

of Mines conducts research on the treatment of ores and undertakes metallurgical investigations for Chalk River. If your Committee cares to visit these operations, arrangements may be made by telephoning Dr. W. A. Bell, Acting Chief, Geological Survey of Canada, local 4610, and Mr. C. S. Parsons, Chief, Bureau of Mines, local 4422.

Yours sincerely,

COLIN GIBSON,

What is the wish of the committee with regard to the invitation in that letter.

Mr. GIBSON: Have we got time, do you think, to go into that stage of it? When are we going to be through? Can you tell us that?

The CHAIRMAN: That brings up the question of the whole situation with respect to prorogation of the house.

Mr. COLDWELL: I think if we could see some of these officials who are dealing with this matter it would be helpful to the committee, but perhaps we may not have time this session. I am hoping that this committee will be reconstituted next session and if so, we should try to enlarge the scope of the committee so that we can have a fuller knowledge of what the National Research Council is doing, not only in this but in other fields as well. We have never had an opportunity of finding out what the National Research Council is actually doing. They are doing a wonderful work. Before the war it was a small organization, and during the war it expanded greatly; but during that time we could not enquire about their activities. I think if we can get to see what the Research Council is doing we will have a good background of atomic energy. I can heartily agree to that.

Mr. GREEN: I think we have a very big job going into this question of atomic energy and, after all, while the evidence which could be given by the officers of Mr. Gibson's department is directly connected with the development of atomic energy I would suggest we finish our atomic energy enquiry before trying to start investigating the National Research Council. That is a very wide field; and if we get into that I think we would very soon lose sight of the atomic energy work which is our job.

Mr. COLDWELL: I am suggesting that for next session, Mr. Green.

Mr. BREITHAUPT: That will be up to the house, of course.

The CHAIRMAN: I suppose we will have an opportunity of recommending that in the report if the Committee so decides. I am just dealing now with this particular invitation and asking your opinion as to what we should do about it.

Mr. GREEN: If Dr. Mackenzie completes his evidence and we get finished with any other evidence in connection with our business then perhaps we shall have time to hear Dr. Bell.

Mr. BREITHAUPT: Mr. Chairman, as much as we appreciate the invitation extended by the Minister of Mines and Resources, I think the scope of the work we are handling is so large that I do not see how we can go off on a side road at the present time. I think that might be something for later consideration. That in itself is an interesting project, but I think the committee members are so absorbed in this very interesting work that Dr. Mackenzie is putting before us, that this second matter might be postponed for later consideration.

Mr. BROOKS: Could we not accept the invitation in the meantime and if time permits then we can go on to the subject under the guidance of Dr. Mackenzie here who could tell us whether it is necessary to accept this invitation to gain a proper knowledge of the subject on which we are reporting.

Dr. C. J. Mackenzie, President of the Atomic Energy Control Board recalled:

The WITNESS: Mr. Chairman, I think it is a matter of time. I am not responsible for the work of the Survey and the Bureau of Mines but I think they have activities there that would fall into three general categories: first the geological survey which, I understand, keeps in touch with the findings of prospectors and their normal routine work which we of the Atomic Energy Control Board have nothing to do at all. They also assay the samples which are sent in by the prospectors and others, which work, I think, is quite extensive, but it is analytical work. The next activity is a co-operative one between the metallurgical scientists and our own scientists on specific research problems of the character you saw in Chalk River.

The CHAIRMAN: It strikes me that it is a problem of time and that we are going to be confronted with the necessity of bringing our evidence to a close before we have dealt with many matters in which we are interested. I would think the situation is rather neatly summed up by Colonel Brooks when he asks whether we could not accept the invitation and take advantage of it when we are in a position to do so. If Mr. Brooks will move that we shall see if the committee agrees.

Mr. BROOKS: I so move.

Mr. MCCUSKER: I will second that.

Carried.

The CHAIRMAN: This morning we have Dr. Mackenzie with us again this being our first meeting since our trip to Chalk River. If it meets with your wishes, Dr. Mackenzie is prepared to try to answer any questions arising out of the two day trip to Chalk River. Are there any questions or matters for discussion arising out of that?

Mr. BREITHAUPT: Perhaps he could review the extent to which the experiments of the project have been made available to industry. In the first place, a good deal of our time was taken up in discussions and talks on its application but I believe some misunderstanding exists in the country as to the limitations of the information which might be available to industry by the Canadian project. Could Dr. Mackenzie enlarge on that subject, Mr. Chairman?

Mr. COLDWELL: Confusion in the house as well as in the country.

The WITNESS: I think the confusion is probably quite natural. The over-all picture is simply this. We are following exactly the procedures that are being followed in the United States and Great Britain. When I referred to the situation as being tragic I referred to the tragedy of the over-all scheme. I said the "tragedy in this game", meaning the over-all development of atomic energy was made very difficult due to the nature of the bomb and the fact that it was difficult to bring in industry in the normal way. That apparently got misunderstood. We are very familiar with the general situation and those in control in the three countries have repeatedly made remarks similar to those I made. Mr. Lilienthal has indicated in several addresses these inherent difficulties to American industry. He also pointed out the three main fields in which it was possible in the United States to have the ordinary practice of free enterprise operative. I will refer to his three fields and indicate that we are doing exactly the same thing as they are doing. The first field that he mentioned as being open to industry is in the field of mining, milling and processing. As I said before, that field in Canada is operating in exactly the same way. The second field is the preparation of radioactive tracer compounds and their use in private industrial operation and in process control. Our Canadian arrangements in this field are identical with those in the United States. We have laid the data before Canadian industry and

there is the same activity in that field. As far as our regulations are concerned the industries are as free in that field as they are in the United States. The third area is in the manufacture and maintenance of radiation detecting equipment and again we have followed exactly the same procedure as they have in the United States. In Canada today there are several firms who are actually building and selling equipment in this particular field. So that in those three areas we are following identically the same procedures as are being followed in the United States, Canadian industry is on the same basis as industries in the United States. Mr. Lilienthal in this paper refers to two other general fields. He refers to the fact that the Hanford plant and Oak Ridge plant are being operated by private companies. Now that is true but these are large production plants of which we have none in Canada. We started out to operate our Chalk River plant in exactly the same way. The first contracts were with D.I.L. who constructed this plant and who later had an operation contract, but they demanded to be relieved from the operating contract because our plant was not a production plant. Ours was essentially a research plant, and there was no benefit to industry and no advantage to anyone in that arrangement. Now exactly the same thing has happened in the United States.

The CHAIRMAN: That is in the arrangements to have D.I.L. operate the Chalk River plant.

The WITNESS: That is right. Their production plants in the United States are very large industrial facilities. The Hanford plant is operated by General Electric and the Oak Ridge plant by the American Chemical and Carbide Company; they have also five research establishments very similar to ours. Of the five only one establishment is operated by a commercial company and that is operated by a company for the simple reason that it is in the Oak Ridge territory. The others are operated by scientific organizations even more remote from industry than our establishment because they are university development establishments.

The next field in which the United States is co-operating with industry is in connection with the very large power development programs. They have, as you know, a laboratory at the General Electric site, called the Knolls site, and General Electric is there developing commercial power plants. That is a very large operation involving many many millions of dollars. There is a proposal now that the Westinghouse Company try to develop a power plant for naval vessels. Again that is a very large proposal. We, in Canada have not undertaken any development of that character. Ours is a research establishment as has been indicated, and we operate our research establishment precisely the same as the United States is doing and precisely the same as the United Kingdom is doing. There are two large stations in the United States where research is directed towards possible military application. Up until quite recently even those stations have been run by the University of California scientific department. Recently they have separated the establishment, and there is one laboratory, called the Sandia laboratory, operated by the Bell Telephone Company—a very large scientfic laboratory.

Mr. BROOKS: Do General Electric and Westinghouse receive any assistance from the American government?

The WITNESS: It is entirely government money. There is no industry in the United States that has undertaken any expenditure of their own money on these projects. In the United States the Atomic Energy Commission itself is not an operating organization and they let contracts to some other body to operate the facilities. Our Atomic Energy Control Board operates in exactly the same way. The Atomic Energy Control Board has, I think, only eight members on its establishment. It makes a contract with Research Council to

operate Chalk River in the same way as the Atomic Energy Commission in the United States makes a contract with the University of Chicago to operate those very extensive Argonne laboratories and with the associated universities to operate Brookhaven which is another establishment about the size and scope of ours. The radiation laboratory, another laboratory of similar size, is operated under contract with the University of Southern California and Ames is operated under contract with Iowa State College. As you look at the overall picture one can state quite definitely that there is not any difference in the way industry is being handled in the two countries—or in the three countries. The overall difficulty, of course, is that the research for the bomb cannot be separated from the research for fuel. That problem goes to the heart of industrial application.

Mr. GREEN: Is there any governmental body in the United States operating a plant?

The WITNESS: I do not think so.

Mr. GREEN: Then the position is really quite different in Canada because here the Research Council, which is another branch of government, is doing the operating and that situation does not exist in the United States. In the United States all the operation is done by private companies and by the universities.

The WITNESS: That was a fundamental difference in the whole of their war work. Their war work was done that way. In Canada, operations are conducted under the Bureau of Mines and the Defence Research Board, the Research Council and so on, but the United States has adopted the principle of letting contracts, but to all intents and purposes those laboratories are government laboratories. Every nickel that goes into them is government money.

Mr. COLDWELL: The primary work is undertaken by the universities and not by the companies?

The WITNESS: In the laboratories comparable to ours the university merely accepts the contract and organizes a staff to operate those laboratories. The ordinary professor in the university normally does not have anything to do with it at all.

Mr. GIBSON: Are they on a cost plus basis or just cost?

The WITNESS: I will have to check that up, but I am quite sure that the universities do not put one penny into it.

Mr. MURPHY: The same applies to industry?

The WITNESS: Yes. I think the contracts would probably be identical.

By Mr. Green:

Q. Is the result not apt to be that if and when the secrecy restrictions are lifted industry in the United States will be in a much better position to go ahead and use what has been discovered?—A. Not by virtue of what they are doing in plants comparable to ours.

Q. They have plants of a type which we do not have in Canada at all?—A. They have very large production plants.

Q. Could Canada usefully operate such developments?—A. That of course is definitely one of the broad policies—how far should Canada go in this field?

Mr. LOW: Just what are they producing in those plants?

The WITNESS: Fissile material.

Mr. LOW: Both for fuels and for the bomb?

Mr. COLDWELL: Doctor, to what extent has Canadian industry shown an interest in the use of material now available to it? That would give some idea of the interest?

The WITNESS: There are three areas in which they can operate, and I would quote again from Mr. Lilienthal. The first area is mining, and there has been a lot of enterprise shown. If my memory serves me correctly there were about 5,000 samples sent in for analyses last year. The second area concerns the industrial use of isotopes and on that I think it is fair to say there has not been much done up to the present time.

Mr. COLDWELL: Industry has not shown very much interest in getting them?

The WITNESS: They have shown a great deal of interest. We had 150 people at the conference which I mentioned.

The CHAIRMAN: That is the conference of December, 1948?

The WITNESS: Yes. Industry is very interested and it is studying the possibilities of use, but the actual use to date has been very limited.

Mr. BREITHAUPT: That is because of such factors as you told us about at Chalk River—

The WITNESS: We are talking about the industrial use of isotopes at the minute. Industry, I think, will use them, but at the present moment there is not as much use being made of isotopes industrially in Canada as in the United States.

By Mr. Green:

Q. The use of isotopes is quite apart from the industrial development to which you referred as being undertaken in the United States?—A. Large companies working for the government are working on research development projects.

Q. There are other industries using isotopes?—A. Yes. There is one large area of industrial activity where it is quite open to anyone to get isotopes and use them.

Q. Can anybody get those free?—A. Not only can they get them but Mr. Howe, at a luncheon on December 7, according to presumably accurate reports by the press, said that he would recommend that tracer atoms be provided free for a year for industrial use, and that a school be established at Chalk River to have industries get started in such use. So, Canadian industry has been given or offered a year's free supply of isotopes, and that is more than what has been done in the United States.

Mr. COLDWELL: To what extent has that offer been used within the year?

The WITNESS: To a very limited extent.

By Mr. Murphy:

Q. Is there any indication that say branch companies in Canada are accepting the facilities that are available on a comparable basis, shall I say, to their parent company on the other side of the line?—A. Do you mean General Electric and Westinghouse?

Q. Yes; and Dow Chemical?—A. General Electric is operating Hanford.

Q. The reason I ask, and you can perhaps couple your answer with what I have in mind, is that I am thinking of patents?—A. Let me deal with one thing at a time. General Electric in the United States is operating the Hanford plant. We have not any production plant in Canada and therefore the subsidiary in Canada cannot be given the benefits of a production which we have not got. The second point is that there is no development of a commercial power plant, that matter being secret—we know nothing about it. We are not engaged in that activity in Canada and so Canada cannot offer as much as is available to the parent companies in the United States.

By Mr. Gibson:

Q. We do not have anything like the per capita investment of the United States?—A. We operate a research establishment.

Q. Have you ever figured out the per capita expenditure?—A. It is very large in the United States.

Q. Our per capita investment would be low, but would theirs be five times as great?—A. The figures they mention are somewhere between two and three billion dollars as at the end of the war. I have not the precise figures but that is the order of magnitude and the corresponding figures in Canada ought to be about $25 million.

Q. Their expenditure is about a hundred times greater while their population is only ten times greater than ours?

By Mr. Murphy:

Q. Is not their appropriation this year to be one billion dollars? I have a figure for 1950 of one billion dollars—A. The figure I have seen for this year runs around $600 million—that is for 1949. I do not know exactly what the figure will be for 1950, but it must be very large. I would think if we are to make comparisons on some ratio we should apply the figure of one to fifteen. I understand that figure has been used when combining both ratios of population and national wealth. To equal the United States expenditures we would then have to be spending somewhere around $40 million a year on atomic energy development whereas we are actually spending only $5 million to $6 million.

Q. Would you answer the question relative to patents? I would assume that your organization is protecting patents where necessary.—A. We control all the patents that our own organizations take out.

Q. They are not shared with any other country without your permission?—A. We own them. What we do with them is another step—the patent situation is, of course, a very difficult one in a secret field.

Mr. GREEN: The Atomic Energy Control Board controls all patents whether the discovery is made by an employee of the government or a private individual. Is that not so?

The WITNESS: That situation has never arisen and the situation perhaps could be explained by Mr. Jarvis, who is a lawyer.

Mr. JARVIS: The situation is that patent applications in this field are referred to the Board and the Board has the right, if security is involved, to request the commissioner of patents not to proceed with the application and also apply the proper provisions about security of information.

Mr. GREEN: The Board has the power also to takee over all such inventions, has it not?

Mr. JARVIS: It has the power either to prevent them from ripening into patents or to expropriate them.

Mr. LOW: I had something in mind along those lines, more particularly the equipment in the electronic field.

The WITNESS: I am sorry I did not understand your question.

Mr. LOW: I had in mind the subject of equipment, more particularly in the electronic field. Now as I understood it a number of those items were developed in your own laboratories?

The WITNESS: Correct.

Mr. LOW: But certain companies have been requested to manufacture to the specifications of your scientists there. Now, what steps are taken to protect your patents or your secrets or whatever they may be, when those contracts are let to companies undertaking to manufacture these machines?

The WITNESS: We are following the general practice followed in the Research Council. Let me take one item, A, for illustration. We develop the prototype and in order to get it on the market it must be developed from the standpoint of industrial production; it must be engineered for production. Our procedure when we get a prototype, which appears to have some promise, is to negotiate with industries, and we usually ask them what deal they will offer, just like asking for bids and accepting the best proposal that will be made to us. Then we will make an arrangement with them to have the development carried out and we will arrange for some financial return, it may be on a royalty basis or some other basis. This is negotiated. However, we hand all our patents over to a Crown company, the patent corporation whose sole purpose in life is to get the best they can out of patents for the government.

Mr. LOW: You feel you are fully protected against possible encroachments on your field?

The WITNESS: Let me put it this way. We operate there precisely the way any modern progressive industry would operate.

Mr. BREITHAUPT: But you retain the right to the manufacture, I think that is what Mr. Low means. These machines have been designed by your scientists and are manufactured by certain companies that we know about through our visit to Chalk River, but the rights to manufacture are retained by the commission, are they not?

The WITNESS: We would enter into an industrial contract with a company to produce it and in the contract it would be specified what each party would do and what each would get out of it. Our general philosophy, of course, like any ordinary company, is to get the most we can out of the general development without cramping the real thing we are after.

Mr. LOW: I think, Mr. Chairman, that there would be no harm in saying this, that there are some people—and I confess I am one of them—who feel a bit concerned about the possibility of some corporation moving in and getting control of some of these inventions, even including the results of your research in nuclear fission so as to make access to it very costly to the ordinary man.

The WITNESS: I would say, Mr. Low, that we have an organization which has been set up to prevent that as far as it can be prevented. We feel that the handling of patents is a subtle matter. You can stop the exploitation of an idea by a too rigid application of patents and the optimum that we are after is the greatest use for this equipment we are putting out at the best return to everybody concerned. All our agreements, of course, call for cancellation if there is any attempt to hold up production or costs. We have it in our hands to cancel the arrangements. I think that no organization is perfect but we recognize the problem, we recognize that it is not a simple problem; that it is wrong to be too categorical in any of these patent matters because the more experience you have the more you realize how involved the matter can be.

Mr. LOW: I felt sure that was the case but I just wanted to have it on record.

Mr. BROOKS: There is a question I want to ask in reference to isotopes produced in Canada. Do we make these available to industries in the United States as well as in Canada?

The WITNESS: Might I just explain our position in respect to isotopes. The first thing we did was to adopt a system for distribution within Canada, and in that we followed very largely the general principles laid down by the other two countries which are involved. The second thing we have done is we have made arrangements for the distribution of isotopes outside our own borders, which we do not think will be a very large activity, but there are a number of isotopes which we can make at the moment that other countries cannot and we want the machinery to permit us to export them.

Mr. BROOKS: Are there reciprocal arrangements with the United States to receive theirs here?

The WITNESS: Yes.

Mr. PINARD: What would be the relation with the United States Radium Company, for instance? I will explain the purpose of my question.

The WITNESS: I do not know the company.

Mr. PINARD: The name of the company is United States Radium Co. They advertised isotopes for sale and I know of a plant in Quebec that tried to purchase these isotopes and were referred to Chalk River to get them and they did get them. I just wanted to know why the United States Radium Co. could not sell to this plant and why they referred the application to Chalk River?

The WITNESS: Are you talking about isotopes going out of Canada or isotopes that came from the United States?

Mr. PINARD: This plant saw an advertisement offering to sell isotopes. The advertisement was one sponsored by the United States Radium Company. These people in Quebec wrote to the United States Radium Company and were told in reply they could not sell to the Canadian industry and that they should make their application to Chalk River, which they did, and they got these particular isotopes from Chalk River.

The WITNESS: I do not know the details of this company but it is quite possible for a company to operate in Canada and buy isotopes from the United States and process them here, but the United States regulations would have to be complied with; but it is altogether probable that the United States would not do that without coming through Chalk River because their interest is in finding out what these are used for. They would probably refer them to us to see if we could supply them. But I have no precise information as to the company you are talking about.

Mr. PINARD: In this case it was the Rolland Paper Company in Quebec and they afterwards got in touch with the Board at Chalk River and purchased the isotopes they required for the sum of $900.00. This plant wanted to use these isotopes as a device to help in the manufacture of paper. Now I wanted to know also how you establish the prices on these items.

The WITNESS: Well, we have a very elaborate system of establishing a price of—you mean the price of isotopes?

Mr. PINARD: Yes.

The WITNESS: We have a booklet which gives information on that. It has to be arbitrary because it depends on whether you consider the isotope a by-product or a main product and here again we follow very closely the system followed in the United States and in England. We arrive at prices which bear some relationship to the extra cost that is involved over and above what would be there if we did not make isotopes. So it is not any more precise than any other manufacturer could give in a similar case.

Mr. MURPHY: There is a principle involved in the question that is asked. I do not know whether it is too involved or not. But it had occurred to me when the question was being asked and answered that industry in this country in order to avail itself of any product as a result of research in this line cannot obtain it unless it obtains it through your organization. Here is an illustration where private industry endeavoured to obtain a material from a private industry in the United States, and this is, of course, a crown company, and the point I am making now is—I will not say it is restricted, but it is limited to obtaining any requirements that it may feel it needs from one source only, no matter where it is manufactured.

The WITNESS: That restriction would be put on by the United States not by Canada.

Mr. BREITHAUPT: Is that the sort of agreement that is in effect?

The WITNESS: Canada could have no control at all over what United States information is available.

Mr. PINARD: Well, my people were informed by the United States Company that they could not be supplied with these isotopes from their plant, that they would have to make their application to the Atomic Energy Control Board here in Canada.

The WITNESS: That would be by reason of the United States regulations.

Mr. STUART: Could those materials be sold in Canada without the knowledge of your Board?

The WITNESS: No.

Mr. LOW: I think Dr. Keys indicated to us while we were at Chalk River, roughly that industry had not yet taken as much advantage of their opportunities as they might have done; but I just wanted to ask this question: Has industry been allowed to send their research men to Chalk River for the purpose of being schooled in the uses of isotopes?

The WITNESS: Yes.

Mr. LOW: Have they taken advantage of it?

The WITNESS: Some have. I have not the figures before me. Might I just say this? This was the point on which all the misunderstanding arose. We felt, and I think a number of members felt, that these generalizations were rather unfair to industry and that is why you decided to take the question Mr. Murphy asked me and my answer off the record. To a simple question: Is Canadian industry using isotopes to the same degree as American industry? I say no. But this is an unfair answer until you explain the whole situation and my point is that I do not want anything to come out that looks like an unfair remark to anybody. It was taken up the other day as something that Canada was doing in an unfair way to industry. But I think we should be very careful to get this thing clear because it is difficult to understand. Naturally Canadian industry is not in as good a position as American industry to take full advantage of these developments as they have not got nearly as many scientific laboratories. But they are getting better all the time and I would not like to see Canadian industry censured for this at all. I feel they are coming to realize the opportunities and are getting a lot of results perhaps through subsidiary companies. Now, with regard to this question you just asked about a pulp and paper company, there may be many cases like this which are not in operation yet but just about ready to become operative. The actual figures of use now do not tell that story.

Mr. LOW: If they know the opportunities are there?

The WITNESS: We have referred several times to the conference on the industrial uses of radioactive isotopes which we organized in January 1949.

The CHAIRMAN: December 7, 1948.

The WITNESS: I am sorry. I was quoting the date of publication. I refer to the proceedings of the conference held on December 7, 1948. This meeting was organized for the specific purpose of laying before industry all the possibilities that we knew of and suggesting to them that it was a very promising field for their own ingenuity.

Mr. GREEN: That is the field of using isotopes.

The WITNESS: Yes.

Mr. GREEN: And isotopes are only a by-product?

The WITNESS: Yes, at the conference we had addresses by various gentlemen: Dr. Keys, Dr. Guest, Mr. Beam; and then we broke up into informal groups in the afternoon. There is a list in this document of the people that attended and as you can see it was a very representative group. I would say between one hundred and one hundred and fifty representatives from industry spent a day looking at this overall picture. They went home and unquestionably they are turning this over in their minds. But you have to wait a little time for the results. I think it will be very unfair to say that Canadian industry is not interested in this. I think you would find a lot of them are interested and in future you will find them beginning to put this interest into effect. But we have no definite evidence until they ask us about the purchase of isotopes.

Mr. GREEN: Is Canadian industry widening out into the field of development such as that being carried on in the United States by General Electric?

The WITNESS: No, it is all secret and cannot be passed over.

Mr. GREEN: Not at the moment.

The WITNESS: As soon as they can pass it on to American industry it will be declassified and then we can pass it on to Canadian industry.

Mr. GREEN: Would that not help Canadian industry if some such development were carried on in Canada?

The WITNESS: The real question you are asking is: Should we have these large production plants costing anywhere from fifty million to one hundred million dollars? I would say that if we had them they should be operated by a commercial company. But until you have that there is nothing to compare. We had originally an operating contract with D.I.L. Now, D.I.L. is one of the most competent industries in Canada to know whether or not there was any advantage in it to them and they said—"There is no advantage. We would like to be relieved from the operation of the Chalk River plant".

Mr. BREITHAUPT: Regarding the point you raised earlier—that D.I.L. said it was of no benefit to industry—would you enlarge on that, because that statement might be misinterpreted?

The WITNESS: I do not know that I said D.I.L. actually used those words.

Mr. BREITHAUPT: Yes, you used those words.

The WITNESS: I am afraid I use words too loosely. What I meant was this. D.I.L. had this contract, and they asked to be relieved of it because they thought the project should be operated the way it is operating now. My inference is that if there had been something of great value to them in such an arrangement—and their company was in on the ground floor—they would not have asked to be relieved.

Mr. COLDWELL: In other words they could see no immediate return for their investment or labour?

The WITNESS: No financial or any particular advantage to them as a company in being associated with what we were doing.

Mr. GREEN: Would you not say that the final position is likely to be that the United States will be doing all the productive development and that Canada will be doing all the research?

The WITNESS: That is a problem that the Parliament of Canada has to decide.

Mr. BREITHAUPT: It would very foolish for the Government of Canada to spend a lot of money in development duplicating what is being done in the United States. All of these companies mentioned have branch plants in Canada so why should the duplication occur?

Mr. GREEN: Is there not some field in which Canada could do the development work? There is no reason why the United States should do all this development work.

The WITNESS: A very large percentage of the work which we are doing in Chalk River is what we would call development work, but we are not operating primarily as a production plant.

Mr. GREEN: A research plant.

The WITNESS: Hanford is operating just like any major chemical industry in the United States. It is a very large enterprise and it is operated along the lines of any first class industry. But they are not carrying on research and development work. That is being done in other establishments. Now the two large development laboratories are those having to do with commercial power and the power units for a naval vessel.

Mr. MURPHY: You spoke a few minutes ago about this power project being secret and Canada knowing nothing about it. That surely has nothing to do with the atomic bomb?

The CHAIRMAN: Will you repeat that question?

Mr. MURPHY: You spoke some time ago about these power projects being secret and that Canada knew nothing about them at all. Now that has nothing to do with the atomic bomb. It would appear to be an industrial development. Why should Canada be kept out of that field? It seems to me that that is something that Canada might take on in the field of atomic energy.

The WITNESS: Well, it is classified at the present time.

Mr. MURPHY: By the United States—

The WITNESS: That comes right back to the point which I have been trying to emphasize, that you cannot separate the military uses and the civilian uses in the way you can in ordinary developments.

By Mr. McCusker:

Q. A while ago you mentioned a fifty million dollar commercial plant. Would that be an atomic energy plant? You were about to welcome industry coming in and building a commercial plant at a probable cost of fifty million dollars. Would that commercial plant be something like General Electric on the other side or would it be an atomic energy plant?—A. I was talking about those large commercial contracts that certain companies have with the government.

Q. Not a structure but a contract?—A. Yes I used that figure as an indication of the size of them, not as the precise cost of a plant.

Q. Do you not feel that we, as a nation, cannot afford such an expense and that we are indeed fortunate in having a tie-in with the United States to give us all this information once it is declassified?—A. It is perfectly obvious we cannot spend as much money on research and development as is being spent in the United States.

Q. I do not know whether you saw it but you might be interested in a press report that a very small pile had been constructed by a British scientist—it can be operated in a basement and its expense is negligible.—A. Where did that come from?

Q. The report concerns an English scientist who has a sort of ashcan pile.

Mr. BROOKS: The British turned the thing down and he is peddling it now to the United States.

The WITNESS: The Times had an article on that a few days ago. We have a liaison office in London and when the matter was demonstrated our liaison officer was present and he reports that one should not take it seriously.

Mr. PINARD: You mentioned a price catalogue. Has that catalogue been made available to Canadian industry?

The WITNESS: Yes, it is a public document.

Mr. GREEN: What methods were used in the United States to increase the use of isotopes by industry? You said that the Americans were using them to a far greater degree than the Canadians. It may be that the United States had some better method of acquainting industry with the possibilities?

The WITNESS: I would not say that. I do not think they have done any more than we have done. This matter has been publicized; we have spoken about it; we have called conferences; and it has been published in unclassified documents ever since the end of the war, and anyone at all interested could hardly have escaped knowing about it.

Mr. PINARD: Do you advertise in any magazines?

The WITNESS: We do not advertise in that way.

By Mr. Stuart:

Q. Under the present setup, Dr. Mackenzie, is there any possibility that there may be a discovery whereby atomic energy can be used in industry?—A. We would certainly hope so.

Q. The same study that you mentioned was being carried on secretly in the United States would be taking place in Chalk River? You hope that some day you will reach that objective?—A. When you undertake a scientific problem that is always your aim. You undertake it because you think that something must come out of it.

Q. That would be one of the achievements to which you would look forward?—A. Yes.

The CHAIRMAN: It is a very necessary outlook in every type of scientific work.

By Mr. Breithaupt:

Q. Are there any by-products of Chalk River or any of the associated projects, available to industry, that can be used in their present form? As I understand it industry would have to do a great deal of research work to apply the use of isotopes—that would be true of any other by-product—before they can actually be used on a commercial scale?—A. They would have to decide what use they wanted to put them to and once the decision was made there would be a very great deal of information available. There are companies that will do that sort of thing for you.

Q. According to the information we received the other day, I do not know of any use to which any of those by-products could be put immediately—as they are delivered from the Chalk River project?—A. That may be true but it is not a big thing; the conditioning or placing of those tagged atoms into any compound is not a difficult thing and, if the demand was there, a lot of laboratories would do it immediately.

Q. It is a very difficult thing for any industry in Canada to use any of those products in their present forms?—A. That is true; and that is why, when I mentioned them, I did not use that particular expression. I said a good area for development is in the preparation of radio tracer compounds.

Q. For adoption by industry?—A. For use in industrial laboratories and processes.

Q. I think that clears the situation.

By Mr. Green:

Q. Dr. Mackenzie, you said this information concerning atomic energy for power purposes is secret at the moment. It is what you call classified but,

as I understood you, when it is declassified Canadian industry will have information available in just the same way as American industry?—A. That is true.

Q. Now is there any agreement with the United States to that effect?—A. That is what declassification means. The information then becomes public property.

Q. You simply meant that once it is declassified the whole world will know? —A. That is what declassification means.

Q. There is no arrangement with the United States whereby Canadian industry will be put on exactly the same footing as American industry which has been concerned with this development?—A. No, but once the development is declassified all industry is in the same position. General Electric is in a somewhat better position by virtue of its greater experience in operating the Hanford plant, but there are thousands of other companies in the United States which have no more connection with that than have Canadian industries. General Electric, of course, has a subsidiary in Canada.

The main point is that a development cannot be declassified in one country and not in another.

Q. General Electric in the United States will be miles ahead of companies in these other countries and they will not likely start producing in Canada, for instance, but they will probably proceed in the United States.

Mr. COLDWELL: Is there not something else that comes into this field—the policy of Canada in regard to the use of these things. It may be, as Canada has gone into publicly owned Hydro electric power, that we will decide that a similar plan should be followed in this field and that General Electric or any other corporation should not go into the field. It is not a simple matter of making this available to industry; there is the matter of public policy that enters into the picture.

Mr. MCCUSKER: Should we, in committee, bring that up and express our opinions?

Mr. COLDWELL: I think we can express any opinions we hold, and I would certainly do so. It is not a matter of whether it is a right or wrong expression, but it seems to me that policy does enter into the matter of making this resource available to private industry.

Mr. GREEN: General Electric will have the information because they have a head start.

Mr. COLDWELL: Yes, they certainly will have a head start.

The CHAIRMAN: Is that not based on the assumption that what is being produced is usable in its present form? Is not that the flaw in the discussion? We have reached a point in this whole development where we do not yet know what will come out of it or whether it will be usable.

Mr. COLDWELL: I know, Mr. Chairman, but as I mentioned, public policy is a factor.

The WITNESS: The thing that stands out incontestibly is that Canadian industry is in exactly the same position as American industry. Certainly, you can pick out one industry and say that for instance General Electric has a little advantage over the other industries in Canada and the United States, but, in the general picture, American industry and Canadian industry are in the same position.

Mr. GIBSON: D.I.L. said that they did not want to take advantage of their situation?

The WITNESS: I do not wish to quote them directly but they asked to be relieved.

Mr. GREEN: It was not the same sort of development. They did not want to continue to be in charge of a research plant.

Mr. GIBSON: They could not anticipate how far we would go in our development.

Mr. MCCUSKER: I do not think that we can say anything that could be considered as a reproach to industry. We should not ask them to accept a burden that we cannot carry ourselves.

Mr. GIBSON: A company might have to put a thousand men at work on an endeavour without any possible immediate results.

By Mr. Green:

Q. How is this declassification handled? Is it a matter of a decision by the United States or is there co-operation between the three countries?—A. It is a co-operative decision.

Q. Is there any agreement?—A. I do not know how far I should be talking about these other things but certainly you are asking questions that are beyond the scope of the Atomic Energy Control Board. However, declassification is done internationally. It is not just a decision handed down by the United States. There is agreement between the three countries—by experts.

Q. Experts?—A. The committee that declassifies has as its members a group of real experts in the field.

Q. Is Canada represented on the committee?—A. Oh, yes.

Q. You spoke about industry being able to go ahead in the field of mining and milling. Can you amplify that at all? I ask because I understood from the evidence at one meeting that all production at the present time comes from the government company—Eldorado, and that they also do all the milling? Now where is there a field for private industry?—A. I said that the system is precisely the same as exists in the general mining field—that is as far as private enterprise is concerned. Whether or not anybody is active in the matter does not have any bearing on what the system is. The system is that any company can engage in the activity if it has the properties. Companies are trying to do that and, although I think it will take some years, it will be very surprising to me if out of all this activity there does not appear some company which will operate extensively.

Q. There is no company at the present time doing that?—A. There are a lot of companies which are in the preliminary stages.

Q. Could a company like Consolidated produce uranium or does it have to be produced by Eldorado?—A. No; any company is allowed to produce uranium. The only control exercised is over the sale of the product.

Q. Any company is permitted to produce finished uranium?—A. Yes.

The CHAIRMAN: Dr. Mackenzie has to attend another meeting at one o'clock and if it is agreeable to the committee, I suggest that we now settle the matter of what further evidence we shall hear.

(The committee went into closed session).

1949

SECOND SESSION

HOUSE OF COMMONS

SPECIAL COMMITTEE

ON THE

OPERATIONS

OF THE

ATOMIC ENERGY CONTROL BOARD

MINUTES OF PROCEEDINGS AND EVIDENCE

No. 4

THURSDAY, NOVEMBER 24, 1949

WITNESS

Dr. C. J. Mackenzie, President, Atomic Energy Control Board

OTTAWA
EDMOND CLOUTIER, C.M.G., B.A., L.Ph.,
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
CONTROLLER OF STATIONERY
1949

MINUTES OF PROCEEDINGS

THURSDAY, November 24, 1949.

The Special Committee appointed to examine into the operations of the Atomic Energy Control Board met at 11.30 a.m. The Chairman, Mr. McIlraith, presided.

Members present: Messrs. Breithaupt, Brooks, Bourget, Gibson (*Comox-Alberni*), Green, Kirk (*Digby-Yarmouth*), McCusker, McIlraith, Murphy, Pinard, Stuart (*Charlotte*), Winkler.

In attendance: Dr. C. J. Mackenzie, President, and Mr. G. M. Jarvis, Secretary, Atomic Energy Control Board.

Dr. Mackenzie was recalled and further examined.

On motion of Mr. Kirk, seconded by Mr. Murphy,

Ordered,—That 500 copies in English and 200 copies in French of this day's Minutes of Proceedings and Evidence be printed.

At the conclusion of Dr. Mackenzie's evidence, the room was cleared and the proceedings were continued *in camera*.

The Committee adjourned to meet again at the call of the Chair.

R. ARSENAULT,
Clerk of the Committee.

50837—1½

MINUTES OF EVIDENCE

House of Commons,
November 24, 1949

The Special Committee appointed to examine into the operations of the Atomic Energy Control Board met this day at 11:30 a.m. The Chairman, Mr. G. J. McIlraith, presided.

The CHAIRMAN: Order, gentlemen. When we adjourned on Tuesday we were discussing questions arising out of our two day visit to the Chalk River plant, and, at the close of the meeting the matter of the relation to industry of the whole development had been raised. Are there any further questions on the subject?

Mr. MURPHY: Mr. Chairman, I wonder if Dr. Mackenzie would like to comment on anything that he saw in the news this morning. I noticed that the Ottawa *Citizen* ran an article "Lilienthal quits U.S. post"; and certain reasons are given. Would that incident have any bearing on information which, shall I say, can be exchanged in relation to the agreement between the different countries.

Dr. C. J. Mackenzie, President of The Atomic Energy Control Board, recalled:

The WITNESS: I would not think so. That is a personal matter; but I have seen what you have seen. I heard a radio broadcast, as well, indicating that Mr. Lilienthal had resigned. I have no idea what is behind it.

Mr. MURPHY: There is another matter reported in the same paper—"Plutonium produced by French project". Have we an arrangement with France similar to the one we have with the United States?

The WITNESS: No. The work in France is, I believe, unclassified. I was in Paris last year and was invited to go to their plant. It is a very small plant. They had a very small reactor in which we have not much interest because we are far beyond that stage. We know the people who are working there very well.

By Mr. Bourget:

Q. Are they working in close relation with Russia or are they working alone?—A. I cannot answer that. I would say that the plant is of such low power that it has no significance at present. Their pile is the equivalent of the little ZEEP that we put into operation within a very few months of our commencement in the field. It is a very low energy pile and it has no significance outside of the first stage.

Q. Is it a heavy water pile or a graphite pile?—A. I cannot answer that at the moment. I should know, and I was immediately going to say that it is a heavy water pile, but I had better not do so. The Paris laboratory worked on heavy water just before the war, or just as war broke out, and my inclination is to say that it is a heavy water pile but I had better not go that far.

By Mr. Breithaupt:

Q. In inviting the group of manufacturers to the plant a number of years ago, or last year, how did you arrange your invitation?—A. They were not invited to the plant. You are referring, I presume, to the industrial conference that was held in Ottawa.

Q. Well, who had the privilege of attending and how was the list chosen?

The CHAIRMAN: I think a complete list of the representatives attending is given in the document filed at our last meeting. We tabled the proceedings of that meeting.

The WITNESS: I was trying to get the information Mr. Breithaupt wanted—the exact machinery of how we got in touch with industry.

By Mr. Breithaupt:

Q. Yes.—A. I will submit that information to you. The fundamental intention was to get all industries represented which had scientific or technical officers, and industries that might have been interested. We did not want to get a group of executive officers such as presidents and vice presidents at the conference who had no scientific knowledge. We wanted to have a round table discussion by technical people who might know the technical and scientific plans of industry. That was the general scheme.

Q. I suppose there were chemists from the industries that had laboratories?—A. Yes, directors of research laboratories and so on. If a company director or president was interested he would have attended. For instance, we did have presidents of companies at the conference, and I think the presidents of the Frosst Pharmaceutical Company was interested. The Merck Company in the United States has as its president a chemist but, we did not have representatives from any American companies present. I am trying to point out that we did not limit attendance in any way other than the matter of scientific or technical interest.

Q. In other words I suppose it was a good cross section of people in Canada who would be interested?—A. We had 150 people there and it would be a pretty good cross section.

Q. Regardless of the size of the industry?—A. Yes. We had no intention of preventing anyone from coming, and what we were trying to do was to make sure that we had good representation. We did not try to exclude anyone.

By Mr. Murphy:

Q. Was the oil and automotive industry represented?—A. The Chrysler Corporation was represented, but I cannot say what others.

Q. How about the oil industry?—A. The oil people are very interested. As you know, the Imperial Oil Company is doing some work in Sarnia. This is information I have not got in an authoritative way but I understand they are interested in doing some work and are working with one of the universities. The oil companies are interested in the over-all picture.

I have some further information, Mr. Chariman, which we obtained after the last meeting. We did not realize how interested you were in this participation of industry and, as I tried to indicate on the last day, you cannot rate participation by the amount of isotopes that have been demanded because there is a very long period of study required. When I returned to my office I asked the Chalk River people to give us what information they had as to what the interest by industry might be. I think you might be interested in the answer we got. Five companies have applied for and received shipments of cobalt 60; four companies have ordered Cobalt 60, their plans have matured to the point where they have ordered; eleven companies have made inquiries about cobalt, and the inquiries may result in orders; seven companies have made inquiries

about the use of isotopes to deal with specific problems and those are being worked on; four companies have consulted Chalk River about programs of isotope ultilization; twelve companies have presented problems to Chalk River but it was found that isotopes were not suitable for the purposes which they had in mind. In addition, we know by hearsay of at least four other companies that are working on isotopes but who have not been in consultation with Chalk River for advice or by way of direct application. If you put those all together you have forty-seven companies that we know are interested in this field. If you apply the fifteen to one ratio that would be the equivalent of about six hundred companies in the United States. I think that is a picture which is more representative than the simple answer given to the question of how many have ordered isotopes.

Mr. GREEN: Did you have representation from the medical profession attending this conference in Ottawa?

The WITNESS: We have had the medical people in on many, many, conferences. The medical people and the biological people are more interested in this field than perhaps any other groups. By far the largest proportion of isotopes we have delivered has gone to hospitals and medical schools for research. I would say that the biological and medical institutions in Canada are very much in the picture at the moment.

The CHAIRMAN: There is just one part of Mr. Murphy's question that remains. He asked about automotive companies attending the conference and I notice from a quick glance of the ones purported to have attended, that three companies at least, General Motors, Ford, and Chrysler were represented. There may have been others. I noticed that some of the other oil companies attended as well, for instance, Shell and I also notice a tire company.

Mr. BREITHAUPT: Was that a Canadian tire company?

The CHAIRMAN: Dunlop Tire and Rubber Goods, Toronto.

Mr. MURPHY: Was Polymer represented?

The WITNESS: Polymer is carrying on experimental work. I do not know whether it was represented that day or not, but Polymer is carrying on the work with isotopes. A lot of government departments are also using isotopes. Polymer is one of four companies using isotopes which I mentioned.

By Mr. Briethaupt:

Q. In connection with rubber companies I understand that one company in the United States has actually perfected a gauging instrument that is in constant use there. It is based on the experiment you showed us the other day on the thickness of paper. The same principle is applied to rubber.—A. Yes, and you can buy commercial equipment to do that work today.

Q. I see.—A. It is in the stage of the development when you would have to be sure that the specific problem in which the company is interested is of a type that the equipment was designed for.

The CHAIRMAN: In answer to your question, Mr. Murphy, I find that Polymer was represented. I also notice that another tire company, the Dominion Rubber Company of Guelph, attended.

Mr. BREITHAUPT: The Dominion Rubber Company is located at Kitchener.

The CHAIRMAN: Yes, I stand corrected.

Mr. PINARD: Did you have any pulp and paper companies represented?

The CHAIRMAN: Yes, many of them.

By Mr. Pinard:

Q. What would be the use of isotopes in the pulp and paper industry?—A. I am not an expert on the matter. That is why we called the conference—

to expose the general type of things that these isotopes can do—and then leave it up to industry to determine whether they have any specific uses for them. One could think of determining the thickness of paper as one of the uses, for gauging, and perhaps for control. Also, I think I am correct in saying that the problem of static which develops with paper is an important problem.

Q. I understand that the Mont Rolland Pulp and Paper Company is using uranium isotopes to destroy the static on paper going through the equipment?—A. Yes, but if my information is correct they are not using uranium; they are using radium. It is the same sort of principle—merely the discharge of the electrical charge on the paper. Then, it is possible to do all sorts of things by remote control. You can determine or gauge the height or levels of liquids in tanks without having to have an instrument inside the tank. You can carefully determine the strength of liquids and their specific gravity. You can follow the proportion of various ingredients and you can do so many things that it is almost impossible for anybody who is not in intimate touch with an industry to answer the question specifically.

Mr. WINKLER: Are any universities working on the use and application of isotopes to industry?

The WITNESS: That is something, Mr. Winkler, which I cannot say because we do not know everything the universities are doing. The indirect information which I received yesterday, and which I did not have before, is that some of them are doing so. I am not informed on that except indirectly. They would not have to report to us but probably in our whole organization it would be known. Some individuals in our organization would probably be in contact with specific universities, but I personally would not be and I could not hope to know what was going on in all the universities in a detailed way.

By Mr. Murphy:

Q. Are those industries—those engaged in research—in contact with your department?—A. I have given the table showing the ones which have applied for isotopes. There are nine which have either received or ordered isotopes and they would have to have a business or contractual relationship with us, but there are thirty-four which have been in correspondence with us, putting their problems up to our people.

Q. They put their problems forward with the idea of getting information?—A. Yes, just in the way that anyone might write to a firm asking for suggestions.

Q. The point I am making is whether the inquiries are followed up? Are the industries continually in communication with you or with your department respecting their research?—A. That would be entirely up to the industry and I could not answer that question. If the industry found it advantageous it would probably do so, but, as far as we are concerned, we give them all the help we can.

Q. Is there any suggestion that another conference similar to the last one should be held?—A. Well, we have that in mind but have not made any precise plans about the date. I thing it would be well to have another conference. but, as in all these things, we have a great deal of work to do in preparation and we are willing and happy to do that work if the interest is there. The normal way we would operate would be to discuss it with the industries we are in contact with and get their views as to the desirability of holding another conference. If we find a general desire we will arrange the conference.

Mr. BROOKS: Are any industries expressing any concern—and I am thinking of oil companies, Hydro Electric companies, or coal companies—that they may be driven out of business in future years by atomic energy?

The WITNESS: Of course, you see that expressed in newspapers from time to time but I do not think any well informed power people are worrying very much about it at the moment. That is an opinion only.

Mr. GREEN: You think there is unlikely to be a conflict of interest?

The WITNESS: I do not think that anyone can foresee anything in the immediate future that would put Hydro Electric power plants or ordinary central power stations out of operation. You will find most people thinking in terms of power plants in remote places where power is not available, or where the expense of getting fuel in would be very great. The United States has indicated that they have a project for the development of a power plant for naval vessels. Obviously that would be of advantage but I do not think it would have much significance competitively.

By Mr. Stuart:

Q. You are doubtless familiar with the Quoddy power project?—A. I know where Quoddy is.

Q. Very recently I had information to the effect that the project may be held up owing to the fact that we are pretty much convinced that atomic energy may replace water power. Now what, in your estimation, is the possibility?—A. That is a little bit beyond the scope of the Atomic Energy Control Board.

Q. Your reply to Mr. Brooks would indicate that there is no danger of hydraulic power being replaced by atomic energy?—A. I do not think I would like to give an opinion beyond what I have already said.

By Mr. Brooks:

Q. I noticed that when they exploded the bomb at Bikini the battleships became radioactive and that scientists have not been able to eradicate the radioactivity from the material. That is one reason why it is thought that large battleships may not be used in future wars. I wonder if there is anything that can be done to remove that radioactivity from battleships?—A. I would say again that is technical. I think that if a battleship got hit in action by an atomic bomb—

Q. These ships were not hit.—A. No, but that is what I am leading up to. That was a test made in a confined body of water in which these battleships rested. That would not be a situation one would envisage for war. It was not the bomb hitting directly, it was the water that the ships were in that had become radioactive.

Q. But the ships themselves became radioactive and the men could not stay on them?—A. Oh, undoubtedly the after effects are there, and the reports of what happened in Japan, of course, are quite extensive.

Q. But evidently there has been nothing developed yet that can remove it?—A. No.

The CHAIRMAN: There is one question that occurs to me. There has been some discussion about what we in Canada are publishing in this respect. I have here two publications showing the published papers in 1947 and 1948. The title of these volumes is "National Research Council of Canada Atomic Energy Project—Published Papers, Volume I, 1947, and Volume 2, 1948." They are purely scientific papers and I do not think they are of any interest to the committee. I am however bringing to your attention the fact that they are being published. I think the committee would be interested if Dr. Mackenzie would say a word about them.

The WITNESS: Mr. Chairman, these volumes which you see here are merely compilations of papers that have appeared in scientific journals. As you know all scientists publish or try to publish all their work in a scientific journal. A scientist would never dream of putting out a book like this on his original work because he would get no credit for it. These volumes merely bring together for the use of the people at Chalk River all the published papers in connection with this subject. I think there were something like a hundred papers published in

the two years covered by these two volumes. For instance, I will read the first item of the contents of Volume I—"Analytical Chemistry—Determination of Thorium and its Separation from Uranium by Ferron, by D. E. Ryan, W. J. McDonnell and F. E. Beamish (June 1947)" and here is another one from the British Journal of Radiology, Volume XIX—"Applications of Recent Advances in Nuclear Physics to Medicine—by J. S. Mitchell." Most of these papers appeared in the Canadian Journal of Research.

By Mr. Pinard:

Q. Could I ask if these papers were all published by your people?—A. Oh, yes; they were all published by people who are or have been connected with the project. For instance, here is one by Pierre Demers, the title of which is "New Photographic Emulsion Showing Improved Tracks of Ionizing Particles". Mr. Demers was on the atomic energy project. He is at present professor of physics at the University of Montreal, but the work he did on that subject was done at Chalk River. I could go on and list any number of these. Another one of the papers listed here: Volume I, the Growth of LA 140 and BA 140 by W. E. Grummitt, J. Guéron, G. Wilkinson, and L. Yaffe. Of these authors Dr. Guéron has gone back to France and Dr. Grummitt and Dr. Yaffe are still with us.

Q. Is it the intention of the Board to keep on publishing these books?—A. These are published by the individuals as soon as the material is declassified. The individual author writes the paper, gets permission to print it, and then sends it to the journal.

Q. I refer to the compilation of these articles?—A. Oh, this is just made up so that we can have them on file in my office instead of referring to all the individual papers. Perhaps half a dozen of these volumes have been made up; that is all.

Q. They are not made available?—A. They are of interest only to scientists but I thought it might be of interest to show the committee the extent to which new material is being published in a field which is supposed to be pretty secret.

By Mr. Brooks:

Q. Does there seem to be an increasing sentiment in the different countries to keep atomic energy information less secret than it has been?—A I think so.

By Mr. Winkler:

Q. There has been some reference to the catalogue in which the products of Chalk River were listed for sale. Would it be possible for members of this committee to have that?—A. Yes, we will have those sent to you. Do you wish all the conditions or would you just want it without the conditions under which they are sold and the precautions that have to be taken and the routine and all the details connected with the sale and handling of these items? There is quite a long document on that but perhaps you will be content with the list of the products that we are producing and the price lists and if so we can let you have that readily.

By Mr. Pinard:

Q. This catalogue is not sent to industry generally?—A. No, but it is sent to anyone who inquires. It would not be of any value to anybody who had not an interest. It would not be of any value to inquire about zirconium, for instance, if the inquirer did not know what zirconium was.

Q. Would it be possible for you to tell us what were the total sales of your plant of isotopes to industry?—A. Do you mean in money?

Q. What were the returns?—A. I could not tell you that offhand. I could tell you, however, it is a small figure in comparison with our costs.

Q. My idea is not to relate it to cost. It is simply to know how much money industry paid for isotopes?—A. I can tell you this that in the year 1948-49 we shipped one hundred and fifty isotopes to nineteen institutions in Canada.

By Mr. Murphy:

Q. The same applies in the United States; the revenue is very small?—A. Yes, it is almost negligible. I would like to make reference to the shipments in Canada and the shipments in the United States. I made this calculation after the last meeting. The shipments in the United States last year, if my calculations are correct, were about 3,500 samples to three hundred institutions. Now, if you divided that by the factor fifteen to equate it to Canadian size that would be two hundred and twenty samples to twenty institutions. In Canada we shipped a hundred and fifty samples to nineteen institutions so it is not such a bad picture by comparison. The more you look into it the more you come to the conclusion that the ratio works out pretty close. I might mention those shipments are not all to industry; they are industries plus universities, hospitals and other institutions.

By Mr. Pinard:

Q. Do you include in that the sales made to the United States?—A. We sell very little to the United States and they sell very little to us. I do not know how much it is but it is small, so small that one really would not think very much about it. It is the same way with the United States; perhaps there were half a dozen sales from the United States to Canada during the year.

By Mr. Green:

Q. Our plant at Chalk River is essentially a research project?—A. Research and development.

Q. Just what is the position that your board takes with regard to less secrecy in research work? I have here before me the latest edition of "United Nations World" for November 1949 where I find two articles under the one heading "The Future of American Atomic Research", the first of which is entitled "The Fatal Myth of 'The Secret' " written by Harold C. Urey, who is Professor of Chemistry at the University of Chicago, with the sub-heading "Two Great Scientists Speak Up Against Unreasonable Thought Control and for Freedom of Research and Discussion". The other article is entitled "Security vs. Progress", by Frederick Seitz, who is the Chairman of the Department of Physics at the Carnegie Institute of Technology?—A. I know of those articles.

Q. They are very disturbing, and if these men are right the situation may be very serious largely because there are restrictions on the distribution of information. Professor Urey points out that quite a few of the best scientists have left the United States atomic energy project because they feel that it is useless carrying on under the restrictions; and they seem to blame congress largely and the military people and the public for keeping these restrictions on far past the time when they will be of any use. What is your opinion about that?—A. I would say that all scientists deplore secrecy because their whole tradition has been one of completely free exchange of information, and science in essence has been built up and its strength is dependent upon that. Speaking broadly, scientists always dislike very much working under secrecy conditions, but they also dislike war, and yet they have to do certain things in war. Scientists have had to do work under secrecy conditions during war and I do not think any of us could object to that. I think most scientists would say that we must cease carrying over these wartime secrecy restrictions to peacetime work. Personally, I feel, and I think the majority of scientists in the United States feel that way. I could say that Urey is an extreme advocate

on one side but even the more conservative people are looking forward day by day to the gradual removal of secrecy restrictions. All our scientists would be very happy if we had no secrecy at all. That does not mean to say there should not be any secrecy, because these other issues of national security and general aspects are not really the scientists' responsibility, and I would not say that if you put it to a vote the scientists will likely say "we will immediately open up everything". They would say "we would like to and we would like to be sure that what is maintained secret is only maintained secret because there is a proven case that it is in the national interests". That, I think, is a fair statement. You will get differences of opinion among scientists. Professor Urey, one of the most distinguished scientists in the United States, is very extreme in his views. That does not say that he is wrong. I do think that I would be on safe ground in saying that practically every scientist dislikes working under secrecy conditions.

By Mr. Brooks:

Q. Advances in science have always been considered as international?—A. Yes. I do not think you win races by looking behind you. I think you have to look ahead, and scientifically and technically we in science feel that that is the way to keep ahead.

By Mr. Green:

Q. Of course, the disturbing features of these articles to me is that they indicate the Russians have a wide open field, they are going right ahead, and on our side our scientists are being handicapped by the fact that there are these restrictions. I do not know which is right.—A. My personal opinion—you can take it for what it is worth—is that the situation is completely the reverse and the Russians behind the iron curtain are so extremely restricted in their interchange that it is very doubtful if they can operate to anywhere near their maximum efficiency. Interchange means interchange of private views and round table discussions. How can you have that if people are not permitted to talk to each other?

(Discussion off the record.)

By Mr. Green:

Q. There is not much doubt that Canada would like to have far more information from the United States than she is getting.

Mr. BREITHAUPT: It might not be a good thing to have that now, with the international situation the way it is. I thought our studies had to do with the industrial and other uses that the work at Chalk River could be adapted to and not so much with the military angle.

The CHAIRMAN: Our reference is to examine into the operations of the Atomic Energy Control Board and in the main, these come down pretty well to the operations of the Chalk River project. This project, I think it was explained, is not a military installation.

Mr. GREEN: It affects such things as power.

Mr. BREITHAUPT: Yes, but in our discussion of a few minutes ago, we were going pretty far afiield.

The CHAIRMAN: I think we were far afield but I would like to say that all matters of secrecy are out of order. I deliberately took that discussion off the record.

By Mr. Pinard:

Q. Mr. Chairman, to what extent can those documents be consulted—I mean the classifield documents—if they need to be consulted by anyone in that line

of work. If university men need to look into classified documents in order to keep up with their work, are they allowed to do so?—A. They are not allowed to see a classified document unless they are specifically cleared and arrangements are made to have the work done for the project. What would happen is that a university professor might be working in cooperation with Chalk River on a project; then he would be a part of a group and in that case he could be cleared and could have access to whatever documents he would need.

By Mr. Murphy:

Q. Would you prefer to have the universities working with you not on such a limited basis?—A. I do not quite understand your question.

Q. The funds allocated to universities are limited. Would it not be to your advantage if the funds were increased to permit further research? You just said a moment ago that these universities are entitled to classified information.—A. I am sorry. I did not say they were entitled to it. I said whenever that material is passed it must be passed under specific agreement and for specific purposes. But let me say that, generally speaking, I personnally would resist very much the universities getting into too much secret work. I think it is destructive for a university to get involved in secret work and I believe the universities feel the same way about it. We like to have them work as much as possible on work which is open and declassified and which they are set up to do and which they want to do. I would not advise setting up large secret projetcs in the universities if there is any other way to do it. You may find in certain specific cases that it becomes necessary, but the tendency seems to be the other way.

Q. Their ability would be available to you, would it not? It would be part of the whole scheme?—A. Yes.

By Mr. Pinard:

Q. How do you follow the progress of the work done by the universities in their research work?—A. Very easily and informally. We visit the universities. Our physicists know every physicist in every university in Canada. We visit them and they visit us. It is a very simple thing in Canada because we are very small. You will find in most of the departments of physics there are men on the staff who have worked in our organizations in the past. Sometimes we employ as many as a couple of hundred students during vacation and everyone knows what is going on.

The CHAIRMAN: When you say that you employ students you are referring to the Research Council?—A. And the Atomic Energy Control Board.

Mr. WINKLER: While I have not got the slightest claim to being a plant engineer, it seemed to me while at Chalk River that the plant was almost bursting its seams. Could you make any comments on that? I mean the various sections of the plant appeared to be working to full capacity, and then some. Would it not be well to consider expanding the capacity?

The WITNESS: Well, I indicated at the meeting at Chalk River what our general opinion was about that.

Mr. GREEN: Dr. Mackenzie, is there anything that you can suggest whereby we could help the project at Chalk River? I think we are all very much convinced it is a worthwhile project?

Mr. BREITHAUPT: And extremely well run.

The WITNESS: Really, the thing you can do as a committee, and this I think is the real responsibility of the committee—provided you believe the project is reasonably well run and that there are no gaps that you wish to plug,—is to determine where we are going to go from here. I thing probably the public should be aware of that too. We are very interested in that feature and I think it is a question that you should, perhaps, discuss in your closed sessions.

Mr. GREEN: Do you feel free to suggest where we should go from here?

The WITNESS: Yes, I do, but not in open session. I really made a suggestion in outline at Chalk River. It is not so much a matter of secrecy but it is not my business to formulate public policy. It would be very improper, even if it were not in a secret category, for me to stand up and tell the government of Canada what it should do. I think the function of those of us engaged in the work should be to give our views and then it will be up to the government and parliament to decide what shall be done. That would be my appreciation of the situation. I would hesitate very much to advocate in public what should be done, even if it were not secret.

Mr. MURPHY: Has not the committee just about arrived at the point where that phase could be dealt with?

The CHAIRMAN: Yes, I think so.

By Mr. Stuart:

Q. I would like to ask a question on an item appearing in the *Ottawa Citizen* this morning. It says that "the French atomic energy pile—is under the supervision of Atomic Energy Commission Frederick Joliot-Curie, a Communist—". Has he ever been connected in any way with Chalk River?—A. No, but he made some of the original discoveries without which there might be no atomic energy piles at all.

Q. That would indicate to me then that there is still perhaps a need for secrecy in connection with atomic energy?—A. As Mr. Green points out, it is stupid to hold on to secrecy after everyone else knows the facts. For instance, it would be rather unrealistic to withhold from Joliot-Curie certain fundamental things which he discovered. It is very difficult for anyone who understands the whole physical picture to say that there is much in nuclear physics that Joliot-Curie does not know.

Mr. PINARD: It is also very difficult to keep from the Russians something that they themselves discovered?

The WITNESS: The secrets are, generally speaking, of the type that industry has—how they do certain things—trade secrets if you like. As far as the theory of a pile is concerned it is declassified and actually Joliot-Curie was one of the first men who proposed the fundamental theory.

The CHAIRMAN: Are there any more questions before we go into our closed session?

Mr. GREEN: Are you having any difficulty in getting scientific men for the Chalk River project?

The WITNESS: Perhaps the best answer is that our establishment is completely filled at the moment.

By Mr. Murphy:

Q. What is that again?—A. Our establishment is completely filled. We have a certain establishment, like a military unit, and it is now full. We could not appoint any more people today because we have no more positions for them.

Q. Does that apply to chemical engineers, too?—A. Well chemical engineering is something we are trying to build up. The overall picture in Chalk River, however, is that we have all positions filled. We have not got enough room or houses for the people we have. I think if the scope of the project were extended and the establishment enlarged we would be able to fill further positions in time. We can not say, as we were saying two years ago, that we are badly handicapped because we can not get all the staff we want.

By Mr. Green:

Q. Are you lising many of your scientists to the United States?—A. No. We have a number on the British team who go back and forward in a temporary capacity but offhand, I cannot think of anyone whom we have lost to the United States in the last couple of years.

Q. I think it is a great tribute to the scientists at Chalk River. I have no doubt that many of them could command much higher salaries in the United States or in private industries here but they are doing a very fine and patriotic job for Canada.—A. I think it is also a tribute to the quality of the type of work that is being done there. Chalk River is the type of place at which scientists like to work.

The CHAIRMAN: They want to work at Chalk River because there are opportunities there which do not exist elsewhere. I think the suggestion is capable of the two answers and that the effort is not all patriotic.

By Mr. Green:

Q. One of them said to me "Oh, this is so exciting!"—A. If you want an overall picture, without knowing anything of the scientific details of the organization, you can look at the morale. Good people will only stay where there is a good show; so, if you want to judge whether this is a good effort, you may judge it that way. Morale at Chalk River is very high and the fact that people want to stay there is, I think, probably the best evidence that we can produce that the work going on is first class.

Q. Dr. Mackenzie, you suggested at one of the meetings that we might be able to help with regard to your community. Perhaps you have written us off as potential assistants in that direction?—A. I thought that, perhaps, you might be able to see something wrong with us in that regard. I realize that you do not know as much about nuclear energy as we do but with respect to the village, you are on your own playing field. You know as much about villages as we do. However, we think it is a pretty good village. If you can see anything wrong with it we would be very glad to hear about it. We do not expect you to be able to walk into a most intricate and scientific laboratory and see anything in a detailed way—I could not do that myself—but you can get general reactions as to the morale and as to the general overall appearance in the plant. In the village, however, you can go beyond that.

By Mr. Pinard:

Q. Would the housing difficulty in the village affect your personnnel in any way? In other words, have you had any cases where scientists could not stay on account of the conditions?—A. It is usually a fact that to get the man we have to get a house for him first. People would like better things but when you get an enthusiastic group like that you are all right.

Q. In other words you do not lack personnel on account of that feature?—A. If we lost personnel on that account they would be of a type we would not want.

Mr. GREEN: There is one other thing I would like to clear up. Dr. Mackenzie said that the question of the agreement between the United States, the United Kingdom, and Canada, was a question of policy. Would it be possible for the chairman to find out from the minister whether there are any written agreements and whether they can be included in our records?

The CHAIRMAN: Yes, I will find that out. My own impression is that the whole relationship is not a matter of a written document; it has been a continuing and a developing thing. Perhaps the main lead on it was the Quebec conference from which point it has been a developing matter. I would be surprised if there were any documents spelling it out, but I shall pursue the question.

Mr. GREEN: Canada and the United Kingdom, apparently, have a very small portion of the information and for that reason it is to their interest that there should be some sort of an agreement.

The CHAIRMAN: I do not know of any written agreement. As you know, a committee sits from time to time—a policy committee—but if there is a written agreement I am not aware of it.

Mr. BREITHAUPT: Could you find out?

The CHAIRMAN: Yes, and I shall bring the matter before the committee at the next meeting.

Now, if the committee agrees, I would like to close the open meeting.

1949

SECOND SESSION

HOUSE OF COMMONS

SPECIAL COMMITTEE

ON THE

OPERATIONS

OF THE

ATOMIC ENERGY CONTROL BOARD

MINUTES OF PROCEEDINGS AND EVIDENCE

No. 5

THURSDAY, DECEMBER 1, 1949

MONDAY, DECEMBER 5, 1949

WEDNESDAY, DECEMBER 7, 1949

WITNESSES

Mr. J. L. Gray, Chief of Administration, Chalk River Atomic Energy Project.

Mr. T. W. Morison, General Superintendent of Administration Services, Chalk River Atomic Energy Project.

INCLUDING REPORT TO THE HOUSE

OTTAWA
EDMOND CLOUTIER, C.M.G., B.A., L.Ph.,
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
CONTROLLER OF STATIONERY
1949

MINUTES OF PROCEEDINGS

THURSDAY, December 1, 1949.

The Special Committee appointed to examine into the operations of the Atomic Energy Control Board met at 11.30 a.m. The Chairman, Mr. McIlraith, presided.

Members present: Messrs. Breithaupt, Bourget, Gibson (*Comox-Alberni*), Green, Kirk (*Digby-Yarmouth*), Low, McCusker, McIlraith, Murphy, Pinard, Stuart (*Charlotte*), Winkler.

In attendance: Mr. J. L. Gray, Chief of Administration, and Mr. T. W. Morison, General Superintendent of Administration Services, Atomic Energy project at Chalk River.

Mr. Gray was called and examined. He was assisted by Mr. Morison who also answered questions.

Before the witnesses retired, a vote of thanks for their attendance was moved by Mr. Green and conveyed to Messrs. Gray and Morison by the Chairman.

On motion of Mr. Bourget.

Ordered,—That 500 copies in English and 200 copies in French of this day's Minutes of Proceedings and Evidence, be printed.

On motion of Mr. Low, the Committee adjourned to meet again *in camera* at 11.30 a.m. on Monday, December 5.

MONDAY, December 5, 1949.

The Special Committee appointed to examine into the operations of the Atomic Energy Control Board, met *in camera* at 11.30 a.m. The Chairman, Mr. McIlraith, presided.

Members present: Messrs. Breithaupt, Brooks, Coldwell, Bourget, Gibson (*Comox-Alberni*), Green, Kirk (*Digby-Yarmouth*), Low, McCusker, McIlraith, Stuart (*Charlotte*).

In attendance: Dr. C. J. Mackenzie, President, and Mr. G. M. Jarvis, Secretary, Atomic Energy Control Board.

A number of matters coming under the scope of the Committee's Reference were discussed with Dr. Mackenzie.

On motion of Mr. Coldwell,

Resolved,—That a Subcommittee of three be appointed by the Chairman to act with him in the drafting of a report for the House.

The Chairman designated Messrs. Coldwell, Gibson and Green to act as members of the Subcommittee.

The Committee adjourned to the call of the Chair.

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WEDNESDAY, December 7, 1949.

The Special Committee appointed to examine into the operations of the Atomic Energy Control Board met at 11.30 a.m. The Chairman, Mr. McIlraith, presided.

Members present: Messrs. Breithaupt, Brooks, Coldwell, Bourget, Gibson (*Comox-Alberni*), Green, Kirk (*Digby-Yarmouth*), Low, McCusker, McIlraith, Pinard, Stuart (*Charlotte*).

On behalf of the Subcommittee appointed on December 5, the Chairman submitted a draft of the Committee's First and Final Report to the House.

The said Report was considered, amended and adopted as amended.

The Chairman expressed his appreciation of the energetic and active cooperation he had received from all members of the Committee, and Mr. Coldwell conveyed to the Chairman the congratulations of the members for the able manner in which he had presided over the activities of the Committee.

The Committee adjourned *sine die*.

R. ARSENAULT,
Clerk of the Committee.

ERRATA

1. On page 72 of the printed evidence, first line of the second last paragraph, insert the word "not" between the words "would" and "like", the corrected sentence to read: "I think we were far afield but I would not like to say that all matters of secrecy are out of order".

2. On page 35, line 6, for the word "source" substitute the word "destination".

MINUTES OF EVIDENCE

HOUSE of COMMONS,
December 1, 1949.

The Special Committee appointed to examine into the operations of the Atomic Energy Control Board met this day at 11.30 a.m. The Chairman, Mr. G. J. McIlraith, presided.

The CHAIRMAN: Gentlemen, we have a quorum. There are two preliminary matters which I would like to discuss now. In the proceedings and evidence, volume No. 4, of November 24th, in the remarks of the chairman at the bottom of page 72 the word "not" in the first line has been omitted. The evidence reads: "I think we were far afield but I would like to say that all matters of secrecy are out of order—" and what I said was "I think we were far afield but I would not like to say that all matters of secrecy are out of order."

I have checked the copy which went to the printers and I find the word "not" was included in that copy and that omission of that word is a printer's error. I should like to have the correction made on the record.

The second matter is that the business of the House of Commons appears to be proceeding rather rapidly. I thought that in view of that situation, I would try to arrange a meeting for Monday morning at which Dr. Mackenzie can be present. Dr. Mackenzie will be back on Sunday sometime and, if it meets with your wishes, I can confirm the date today and arrange the meeting for Monday morning.

MR. BREITHAUPT: What time Monday would you suggest we meet?

The CHAIRMAN: 11.30 a.m.

Agreed.

It will be a meeting in camera with Dr. Mackenzie in attendance.

We have here this morning Mr. J. L. Gray, Chief of Administration of the Chalk River project, and with him, Mr. T. W. Morison, General Superintendent of Administration.

Mr. Gray is prepared to go ahead with the evidence just as you wish to question him, but I did tell him that our interest would primarily be in the village and the housing end of the operation. Perhaps we could start with Mr. Gray.

Mr. J. L. Gray, Chief of Administration of Atomic Energy project, Chalk River, called:

MR. PINARD: Perhaps Mr. Gray has a prepared statement and after he has given that we can ask questions.

The CHAIRMAN: Mr. Gray has not prepared a statement but he has notes.

MR. BOURGET: Can he give the setup of the village as far as construction is concerned?

The CHAIRMAN: Yes, he can do that.

The WITNESS: Mr. Chairman, I will just follow these notes and try to review the whole structure of the village. I presume there will be questions after that.

The original design was carried out under the direction of quite a group of people. It included representatives from N.R.C., D.I.L., the Department of Munitions and Supply, and Professor John Bland of McGill University. The structures at the village consist of family dwelling units which you saw, various wartime housing units, some duplexes and apartment units, and a number of single dwelling units. The total number is 442 for the married units, of which 93 are wartime sixes and 132 are wartime fours that we moved in from Nobel and Arvida between 1945 and 1947. They were not constructed at Chalk River but were merely re-erected. Some ten duplex units, 3 single units, were also moved in from Nobel but we have actually constructed 68 detached units, erected six Faircraft houses—the aluminum houses—94 duplexes and 36 flats. Those represent construction on the project, which gives us a total of 442 family dwelling units for married personnel.

The single accommodation consists of the staff hotel which you saw, and which has 182 rooms with 200 beds. That hotel was built on the site. The twelve dormitories were moved from Brownsburg and re-erected. They have 177 rooms and 243 beds. They are occupied by junior male salaried staff, prevailing rate employees, and the Crawley McCracken staff who do the catering. We also have some accommodation which you may have seen on the top of the hill there—it is a construction camp built by prisoner-of-war labour and is used mainly by contractors who come in to do construction work. In our contract agreements we agree to give sleeping accommodation at a fixed rate to the contractors—the arrangement is included in the bidding process.

Mr. Bourget: Those units are not suitable for your own personnel?

The Witness: No, they were built for construction reasons and are very very temporary in nature and not in too good shape. They are, however, suitable for a construction camp. One of those units we have taken over and use as a community handicraft shop. It is used mainly by the boat building club and the woodworking people. The shopping centre which you saw consists of a post office, an office for Crawley McCracken, the caterers, a drug store, an A. & P. store, a T. Eaton Company store, a beauty shop, a barber and valet shop. Those were all built in 1945 and 1946. We also have the town office and maintenance facilities, including the heating plant, the power station, the sewage disposal plant and the recreation centre.

By Mr. Breithaupt:

Q. Is there a filtration plant in connection with the waterworks?—A. No, we do not filter the water but it is screened and chlorinated.

Q. Is it from the Ottawa river?—A. The water is from the Ottawa river. It is inspected by the government and we have grade A water.

Mr. Winkler: Is the sewage disposal unit a plant by itself?

The Witness: It is a plant by itself. It has what we call Imhoff tanks and we treat all the sewage before putting it into the river. It is a safe and modern plant.

The school which you saw consists of ten rooms and there are grades 1 to 8. The hospital which you were not in but which you drove by has accommodation for 13 adults, 6 babies, and 5 children. The babies and children take up two rooms.

By Mr. Pinard:

Q. There is an addition being built on now?—A. In 1950 we expect to have doubled the capacity. We will not finish the addition this year but we hope to have it finished next year.

Q. Can you tell us who is in charge of the hospital?—A. Dr. W. E. Park is in charge of both the plant and the village hospital.

Q. One of the doctors is supposed to be leaving the project fairly soon? —A. That is Dr. Park.

Q. Do you know who is going to take his place?—A. The appointment has not been made. We know that it is a Dr. Taylor from Toronto. He is a research man and he is expected to take Dr. Park's place.

Q. I was informed that Dr. Park is leaving for the States. I do not know where he is going but I believe it is to San Francisco?—A. Minnesota.

Mr. BOURGET: Is he the one who was working with Dr. Cipriani?

The WITNESS: No.

Mr. PINARD: He is attached only to the hospital?

The WITNESS: Yes, he is a medical doctor and he is being replaced.

The CHAIRMAN: He had no part of the responsibility for research work.

Mr. BREITHAUPT: He showed us around the plant hospital, did he not?

The WITNESS: Yes.

Mr. KIRK: The addition you are putting on the hospital is going to mean that it will have double its present capacity?

The WITNESS: Yes, that is right. There is one matter I have not mentioned and that is that our hospital serves an area between Pembroke and Mattawa where there is no other hospital. Ours is the only hospital in that whole stretch of country and we get about 25 per cent of our patients from outside of the village.

By Mr. Stuart:

Q. Have you modern equipment in the hospital?—A. Yes, we can do practically anything. We have a good operating room and good x-ray facilities.

Q. Even though it is small you have the equipment?—A. Yes.

Mr. BOURGET: And nurses?

The WITNESS: Yes, we have nurses.

By Mr. Low:

Q. Does the hospital come under the provincial Department of Health as far as grants are concerned?—A. No, it does not. We get no grant at all for the hospital itself; it is not a public hospital.

Q. But you are taking into the hospital patients from outside?—A. Yes, if it is not full of Deep River patients.

Q. Why should you not qualify for a provincial grant?—A. It is a matter of policy which I am not able to settle. I think I better leave the statement that way. We have some very good reasons for our position but it is a matter of policy for the control board.

Mr. BREITHAUPT: Would it not be more helpful, Mr. Chairman, if Mr. Gray were to finish his statement? We are anxious to ask questions I know, but perhaps it would be better to let him finish without interruption.

The CHAIRMAN: It is a matter for the committee to decide. Mr. Gray was listing the structures in the village.

The WITNESS: I could finish it quite quickly. There are only a few more. In addition to the hospital there is the cafeteria, a separate building which services the dormitories, and the cafeteria in the staff hotel where you had your breakfast.

There are some other miscellaneous buildings such as the veterans hobby building, entirely built by veterans using their own labour and materials; the yacht club; and the radio club. The tennis court is used as such in the summer but we are now putting up boards for a rink so that area does double duty. Then there are the play grounds. We have garages which are not attached to

the houses but are six car units located strategically around the village. All the design of the new structures at the village is done by our own architectural design group. We do our own designing at the plant and in the village. That pretty well covers the construction.

By Mr. Breithaupt:

Q. You did not mention the gymnasium?—A. I mentioned the community centre.

Q. Can you enlarge on the activities that take place there? We are very interested.—A. The community centre has a coffee shop, a bowling alley with six alleys, an auditorium that seats 500, and an assembly hall which seats 200. There is a small library and other miscellaneous facilities such as the small handicraft rooms.

Mr. MURPHY: If we knew what other subjects were coming up for discussion we might consider them first and then go on with the details.

The CHAIRMAN: Mr. Gray has been following a pattern or list of structures about which we might want to have some information regarding personnel and occupancy; and then there is the question of meals, of administration of the different parts of the village such as the hospital and the staff hotels, dormitories, and the matter of rentals and so on.

Mr. MURPHY: Is he going to take up the financial picture?

The WITNESS: I have the information here.

The CHAIRMAN: Yes. Mr. Gray has the information which affects each part of the village. For instance, the ordinary house rentals, the question of meals, transportation, schools, and so on.

The WITNESS: It is just a matter of what questions you wish to ask.

Mr. PINARD: Are you dealing with schools as a separate matter? I heard you mention one school—what type of a school is it? We visited it and I gather that it is just a primary school?

The WITNESS: Grades 1 to 8.

Mr. GREEN: Could we not have Mr. Gray's full explanation and then ask questions?

The CHAIRMAN: All right.

Mr. GIBSON: Would it save time if we dealt with those things which are uneconomical?

The CHAIRMAN: I think we should be able to cover all of these matters within the next hour or so. Would it be convenient if we go on with occupancy?

Agreed.

The WITNESS: Of the 442 family dwelling houses we do have to allow a bit for others, outside of the N.R.C. personnel. There are 395 houses occupied by our people, 20 by treasury, 24 by village services, and 2 by the caterer. We have to provide about 50 houses outside of those for our own group. The dormitories have a similar ratio with the exception that Crawley McCraken have two of the 12 units which they take over completely. Meals are provided at the staff hotel by the hotel cafeteria, and there is the dormitory cafeteria. Both are under one contract with Crawley McCracken Limited. The operation is on a straight cost plus contract—cost plus 8 per cent. The Council pays the cost.

The hospital operated last year at a deficit of roughly 50 per cent. The figures to October 31st of this year have indicated a loss of 30 per cent. Our revenue is better, I think mainly from the dental group which has been reorganized and is showing a much better picture. We feel that there will always be a loss in operating the hospital under present conditions. I do not know

how much you want of this information—I have a whole page of it concerning rentals in the village, but they are based primarily on wartime housing rates. The rates are scaled up to a maximum rental, for Dr. Key's house, of $65 a month.

By Mr. Breithaupt:

Q. What does that include?—A. Just rental.

Q. Does he heat the house himself?—A. He heats it and he has to pay for power and for anything that has to be done to it. If he wants his storm windows washed and put on for instance, there is a set scale of 80 cents a window. We have a separate charge for everything.

Mr. Low: Is he charged for water?

The WITNESS: Water is free. I have the details of the rentals if you wish them.

Mr. PINARD: They pay no taxes?

The WITNESS: No taxes.

By Mr. Breithaupt:

Q. If $65 is the top level what is the rate for the low income groups?—The wartime four is the smallest unit and that is $22. It has no basement.

Q. What is the rate for the ones where you have put in basements?—A. $35 with a basement.

The CHAIRMAN: Perhaps we could clear that up a little; the ones where you are putting in basements are wartime sixes?

The WITNESS: Yes, wartime sixes.

Mr. BREITHAUPT: And they are $35?

The WITNESS: With the basement.

By Mr. Bourget:

Q. There is no central heating?—A. In the ones with basements there is central heating but in the other wartime houses they have stoves in the kitchens and little heaters in the living rooms.

Q. Is it your intention to put central heating in all those houses?—A. We propose to continue putting basements under wartime six houses—those are the ones with the upstairs and six rooms, but we are not sure whether it is economical to put basements under the wartime fours.

Mr. PINARD: Would it not cost more to do that than to build a new house?

The WITNESS: Well it costs more than the value of the house and we feel that it might be better to replace them with better houses.

By Mr. Murphy:

Q. What does it cost to put in a basement?—A. About $4,000 but that includes, in addition to the heating system, all of the new plumbing and heating required.

Q. It is hot air?—A. Yes.

Q. How big is the basement?—A. Perhaps Mr. Morison could give us that?

Mr. MORISON: The house is 24 feet by 28 feet.

By Mr. Murphy:

Q. And to put in a basement costs $4,000?—A. We raise the house and put the whole basement under it and add an addition about 12 x 12 feet. We equip the house with the furnace, hot water, laundry tubs, and all the new plumbing that is required.

Q. What sort of hot air is it?—A. An ordinary coal, hand fired hot air furnace.

Q. Pipeless?

Mr. MORISON: No, it has about four ducts going to the basement and a cold air return.

Mr. MURPHY: I think that is a problem that should be discussed, Mr. Chairman. I am wondering about this $4,000 item for digging out the basement. The heating unit would not cost over $250.

The WITNESS: Are you asking the heating cost for a year?

Mr. BREITHAUPT: What is the cost of the heating unit?

By Mr. Murphy:

Q. $300 at the most?—A. I think that is low. The contract for this work was let as a normal contract and it went out to about ten contractors. The contractors were given the specifications and we let the contract to the lowest tenderer. The two lowest tenders were within $5,000 on a $100,000 order so it is quite a competitive bid. We feel that we are getting value for our money.

Q. These are just temporary houses, or at least they are houses you had moved there and they are not of a permanent nature?—A. They are houses that we moved there.

Q. The point I am making, Mr. Chairman, is that I am just wondering whether the expense is warranted for that particular type of house. Your soil there is sandy is it not? Do you use machines to the the excavating?—A. Yes.

By Mr. Stuart:

Q. Do you move the house off its site?—A. No, straight up.

Q. Then how can you use machines?—A. They use a shovel that goes in on a slant.

Mr. BOURGET: You cannot do work with a bulldozer when the house is there. You must dig underneath; you cannot use a bulldozer, although the bulldozer would do all the work in half a day?

The WITNESS: It is not a bulldozer, it is a shovel.

Mr. BOURGET: Oh.

The WITNESS: It is a shovel with a scoop on the front of it. We have added to those houses a back portion in order to get the stairs down the basement. That back portion is about 12 feet by 12 feet.

By Mr. Murphy:

Q. That is included in the $4,000?—A. Yes, there is a twelve by twelve basement in addition to the basement under the main part of the house.

Q. Is your basement only twelve by twelve?—A. No. In the house as originally constructed there was no allowance made for stairs leading to the basement, so in order to get down there without cutting up the house, we put this back porch on which is acting as a sort of an additional room.

Q. Tell me this, Mr. Gray—and this is not the subject of criticism—all we want to do is to solve any problems that you have—is it your policy to continue putting basements under that type of house at that price?—A. Under wartime sixes at that price we feel it is good business but on wartime fours we do not know; we are not putting any basement under wartime fours.

Q. And you have a lot of wartime fours?—A. Our big majority is wartime fours. We have one hundred and thirty-two wartime fours and only ninety-three wartime sixes.

Q. How many basements have you put in so far?—A. Twenty-five. And we will not put basements in all of them due to terrain conditions, but I would guess in at least eighty-five of the ninety-three we would recommend putting basements under.

Q. Have you the cost of the basement in the houses you are now building? —A. No, I have not these figures separate.

The CHAIRMAN: I think, perhaps, there is one item I might clear up. There seems to be a question as to the cost of the basement at $4,000. I think the picture is a little different from that. Four thousand dollars is the over-all item of cost and it turns out to be quite a different house after that $4,000 is spent. In addition to the basement there is a different type altogether of heating plant and there is this small addition at the back.

Mr. BREITHAUPT: And some additional plumbing.

The CHAIRMAN: A furnace and additional plumbing.

Mr. BREITHAUPT: That is important: You provide plumbing. What is the cost of plumbing included in the $4,000 figure you mentioned?

The WITNESS: I have not the details.

By Mr. Murphy:

Q. You stated that a heater tank and laundry tub also were installed?— A. Yes, and a furnace. And all the piping has to be changed in the house. There is new piping from the bathroom which has to be reconnected, and from the kitchen also.

Q. Are the bathrooms on the second floor?—A. No, on the first floor.

By Mr. Stuart:

Q. How many bedrooms are there upstairs?—A. Two.

By Mr. Bourget:

Q. Is not the greatest expense for that type of work the excavating costs? —A. No, we feel that without doing this we would have to spend $500 to $1,000 on repairs. Dry rot is setting in and that is an important problem.

By Mr. Murphy:

Q. After the basement is put under those houses what do you expect their life will be?—A. I am sure that twenty-five years from now they will still be occupied and quite good.

By Mr. Pinard:

Q. What are you going to do about those where you cannot dig cellars as you say, on account of terrain condition?—A. When the maintenance becomes too much we will have to tear them down.

By Mr. Murphy:

Q. I noticed that some contractors are doing work there, is that being done by contract, by tender?—A. All the work done by contractors is done on a straight tender. We use the normal method of issuing contracts and calling tenders.

By Mr. Pinard:

Q. How do you invite the contractors to tender?—A. We use the newspapers in advertising for tenders.

By Mr. Murphy:

Q. Are you building some of the larger houses now?—A. We are building larger houses because our families are housed in such a large proportion of houses which are small ones.

Q. The ones you are building—are they pretty much the same in size and design?—A. Yes, we just let a contract last year for forty identical houses.

Q. How many bedrooms are there in them?—A. Three bedrooms.

Q. What size would these houses be?—A. Twenty-eight by twenty-two but they have an upstairs.

By Mr. Murphy:

Q. What is the cost of those? Are they heated as well?—A. They are heated by hot air. The cost is approximately $12,000 of which approximately $2,000 is for services, that is the sewer, water and electrical services, roads that we have to put in and landscaping.

By Mr. Stuart:

Q. What interest rate do you figure on that money advanced for the construction of these houses on which you are trying to figure out an economic rental?—A. We do not work on capital amortization of the building at all.

By Mr. Murphy:

Q. What is the cubic footage of those houses? Can you tell us?

Mr. MORISON: The cubic footage of that particular house now is, I think, about 16,000.

The CHAIRMAN: I might say that the figure of $12,000 represents the cost of the project, the unit cost of the additional houses, but not the cost of the house alone. It includes the cost of the house plus whatever has to be done by way of installing the water and sewerage, roadways and so on.

By Mr. Bourget:

Q. How much would it be if you took that figure of $2,000 out?—A. About $10,000.

Q. For about 16,000 cubic feet. Would this house be insulated?—A. Yes, all insulated and treated for vapour transmission.

Q. That is not bad—sixty cents a cubic foot.

Mr. BREITHAUPT: Especially up that far where they have to haul in all materials.

By Mr. Stuart:

Q. Yes, in that particular area. I remember you stating it was rather difficult to get contractors to come in as it is quite a distance from cities. What would be the difference between a normal rate in a city or town as compared with a rate in Chalk River? I mean what variation would there be in their contract rates, in your estimation?—A. It is not so difficult now to get contractors to come in there. We are opening up a contract today and we expect there will be ten tenderers. It is becoming much easier now because the contractors can get labourers. I would not like to estimate how much more it would cost.

Q. But you do know it costs more?—A. We feel it costs more to do work up there due to the location of the area.

By Mr. Bourget:

Q. I do not see that is costs more because for a 16,000 cubic feet house you pay $10,000. That works out at about sixty cents per cubic foot and I think in general an over-all price of sixty cents per cubic foot is quite reasonable.

By Mr. Murphy:

Q. Are those houses of frame construction?—A. Yes.

Q. And is there siding paper on the outside?—A. Siding, building paper, and we are using asbestos shingles.

Q. And what are you using on the inside?—A. Plasterboard, treated.

Q. Not plaster?—A. No, gyproc which is a standard Central Mortgage type of housing material for inside.

Q. And what kind of flooring?—A. Hardwood floor.

Q. Double flooring?—A. Yes.

Q. What does this $2,000 include?—A. Sewerage, water, electrical service, roads, landscaping.

Q. That is all charged up in each unit?—A. That is charged up in a straight contract.

Q. Have you broken that down?—A. We have it broken down in the contractor's tender, but I do not have it here.

Q. But the contractors who are building the houses, are they interested or have they anything to do with these other services?—A. The contractor supplies them according to the contract.

Q. Suppose you are awarding a new contract, a contract to build homes, does the contractor include in his price the building of a road, the installation of the water and sewerage, the landscaping and all the electrical work as well? He does the wiring, does he?—A. He does everything; it is all in the contract. Of course, he sublets to sub-contractors.

Mr. STUART: But he is responsible.

By Mr. Murphy:

Q. The point I am making is whether or not some of these other items should be included in the bookkeeping? For instance, does the electrical work, include fixtures, too?—A. Yes, that is the complete house ready to move into.

Q. Well, the fixtures would not be very much, would they?—A. A minor item.

Q. The installation of the water, connecting up the sewerage,—does that mean the complete sewer?—A. Yes, the complete sewer constructed down the street.

Q. On this one street would there be room for twenty--five or fifty more houses that could be built to cut down this $2,000 per house for services?—A. No.

The CHAIRMAN: Perhaps, I should make it clear that the figure given represents the unit cost for the whole group of houses, including everything connected with the adding of forty houses to the site. It includes the whole cost of the development, the additional streets required, the laying of the sewer, the supply of water, and so on. It does not include the land which is owned by the project.

By Mr. Murphy:

Q. Is your rent based on the $12,000?—A. Yes.

Q. And what would these units rent for?—A. They rent for $40.

By Mr. Breithaupt:

Q. Are they for single occupancy?—A. Yes.

Q. Those are not the larger houses we saw?—A. When I say it is based on the $12,000, I refer to the overall rental picture; that $40 pays for a certain amount of space compared with rental we are getting for other houses at the present time. For instance, we have houses with three bedrooms, which are renting at $45. We have four bedroom houses which are renting at $50 and some at $55 and $60, so the rental we are getting for these new houses is fixed in comparison with the rentals we are getting now.

By Mr. Pinard:

Q. There is no garage furnished with these houses?—A. No.

By Mr. Stuart:

Q. In the cost of installation of water and sewerage, would that include hydrants for fire protection?—A. Yes, that includes everything, including street lights.

Q. Do you install a main sewer?—A. Yes.

Q. There would be a main sewer with all individual connections to the different houses?—A. Yes.

By Mr. Bourget:

Q. You put all those in your over-all cost?—A. Yes, that $12,000 includes everything.

By Mr. Murphy:

Q. Has any building been done on a cost-plus basis? What was your experience in that type of contract?

Mr. MORISON: All the initial houses built under D.I.L. were built on a cost-plus contract by Fraser Brace Construction Company, but conditions at that time were extremely difficult, they could not get workers in there at all unless their full board was paid.

Q. When was that?

Mr. MORISON: That was in 1944, 1945 and 1946.

By Mr. Kirk:

Q. It seems to me that anyone who has had any experience in building in the last few years would be of the opinion they have done exceptionally well to get the type of houses they did for that price, and I would think there are more serious problems for us to discuss at the moment.

The CHAIRMAN: Perhaps, I could indicate one of the problems: the question of administration of the village, the administrative authority, and how it is handled. That is a bit of a problem.

By Mr. Breithaupt:

Before you leave the cost of building, Mr. Chairman, I think if you are going to discuss the over-all picture it should be remembered that the hospital is included in the cost of buildings there, and apparently the entire cost of all of those buildings comes out of the grant to National Research. There is a big question involved there in connection with the hospital. We saw the building going on there, and I understand it was not possible to complete it because of the fact there were certain impediments in the way of financing due to the method of financing through National Research. I think we might give consideration to that. It seems too bad that that hospital could not be completed under the circumstances outlined by Mr. Gray at the village.

Mr. PINARD: I am wondering if the project could not receive assistance from the National Health and Welfare department on their plan to help in building hospitals. I would think that the hospital there should be eligible for that type of assistance.

By Mr. Low:

Q. That was exactly the reason I was questioning you whether this hospital came under the supervision of the provincial health department because it is only through them that these grants are made.—A. As I said, it is not a public hospital and the question is now under consideration, but I would not like to state the policy on that.

By Mr. Breithaupt:

Q. Would you care to comment to the committee on the situation as it exists in connection with the hospital and the completion of the work?

The CHAIRMAN: Perhaps you could leave that hospital question off the record, just the reason for the delay in completing construction. If that is left off the record Mr. Gray can answer.

(Discussion off the record).

By Mr. Green:

Q. One thing that concerns me is whether you have ample accommodation to retain your staff. The conditions I found were excellent but I was just wondering if you are unable to keep some of your staff?—A. We have lost people because they were not satisfied with the accommodation. We have only a certain number of the larger houses and we are building as many as we can.

Q. How much accommodation are you short of now?—A. I think we could use fifty more houses immediately and we need an addition to the staff hotel. We feel that some of the accommodation in the staff hotel should be altered from these single occupancy cubicles with toilet facilities down the hall, to something more like a single self-contained apartment for some of our well known research men who are single and who would like to have a small apartment. We have none of that type of accommodation available but we are thinking of a new type of staff hotel for next year which will have a few apartments of that type. We do occasionally lose people because we have not got good accommodation.

By Mr. Pinard:

Q. Has there been a steady increase in the personnel?—A. Yes.

Q. Ever since 1945?—A. Yes, it is going up continually.

By Mr. Murphy:

Q. The fifty houses you mentioned—is that the minimum you think you should have?—A. I think we should have fifty immediately plus a staff hotel.

Q. Besides the staff house you were talking about?—A. Yes.

By Mr. Green:

Q. It seems to me that enters into the whole picture of cost and everything else; you have to have accommodation that is good enough to enable you to keep these experts there.—A. People also leave because of the location. It is a very nice place but it is not a city; it is a country rural area that we try to keep as nice as we can, but some people do not like living there and do not stay.

By Mr. Pinard:

Q. How about the school problem there? Have you lost some of your personnel on account of that problem? You have no high school, and I was informed that this was something that was definitely lacking; that you should have a high school as soon as possible.

Mr. MORISON: That is correct. I would not say we have actually lost any senior personnel because of no high school being there, but some are thinking seriously about it and when an offer comes up for a job in the city it might well be a deciding factor for that individual.

By Mr. Green:

Q. When are you going to build a high school?—A. We have it in the estimates for next year.

Mr. MORISON: We have only thirty-five pupils going to high school at the moment and to build a high school which would compare favourably with the one at Pembroke would be quite expensive.

By Mr. Murphy:

Q. Would you anticipate a great many more going to high school?—A. Yes.

By Mr. Pinard:

Q. You have two schools there?—A. Yes, a public school and a separate school.

Q. You have your separate school?—A. Yes.

Q. Do you know how many pupils go to your separate school?—A. There are approximately eighty pupils from the village of Deep River going to Wylie separate school.

Q. How many to the other?—A. Two hundred.

By Mr. Murphy:

Q. Are there many from outside the village going to the other school?—A. The Wylie separate school in fact belongs to the Wylie municipality or the Wylie separate school area, and one-third of the pupils there comes from outside the village.

Q. Are you able to get a high type of teachers?—A. We feel we have a good staff at the moment.

Mr. GREEN: You have the best record in Canada.

Mr. BREITHAUPT: That is for the birth rate.

Mr. MORISON: I do not think that is a correct statement. Our people are a good cross section of the community. We have a lot of scientific people living there but we also have a lot of tradesmen and people who, in an ordinary community, would be average citizens.

By Mr. Pinard:

Q. You have no taxes there?—A. There is no school tax. We pay all of the school expenses but the provincial government pays fifty per cent by provincial grant of our total cost of operation of the two schools. We pay a pro-rata cost of operation to the separate school based on the number of pupils who are attending.

By Mr. Murphy:

Q. Did they assist in the construction or is that just for maintenance.—A. The separate school?

Q. I mean did the provincial government assist in the construction of your school?—A. Just as far as the operation is concerned. The capital cost is ours.

By Mr. Pinard:

Q. How do you get your teachers? Do you get them through the provincial government or directly?—A. We advertise the same as we do in recruiting all staff, and interview applicants.

Mr. MURPHY: In your construction of a new school, would you not be entitled to a provincial grant?

Mr. MORISON: Again, that is a question between the federal and provincial governments. The provincial government today pays fifty per cent of the operating cost, but they do not pay on capital cost of the construction of schools.

Mr. GREEN: I do not suppose that anybody who occupies a house up there is getting wealthy because of the rent they pay. As a matter of fact, a great many of those men could be earning much higher salaries in other places.

The CHAIRMAN: I think that describes the situation pretty well. The rent is related directly to the cost of operating the project and you can, I suppose, change the rent materially if you change the level of salary on the project materially. It is not possible to wholly separate the two.

By Mr. Pinard:

Q. In establishing the rent there did you take into consideration at all the wages earned, or how do you come to establish the rents?—A. They are established originally on the basis of the original wartime housing plan; they were considered wartime houses, houses of the wartime type, and we increased the rent as we felt we should for the accommodation we built.

By Mr. Green:

Q. No one owns his own house?—A. No one owns his own house.

By Mr. Low:

Q. I presume as your employees progress up the scale of salaries, they are free to get or apply for better housing for which they can pay?—A. That is right. There are two reasons to move anyone from a wartime to a bigger house, either a large family or his position in the salary range.

By Mr. Murphy:

Q. Is your income from the business establishment self-sustaining?—A. The income from particularly the T. Eaton Company, is self-sustaining. We have a very good contract with them. The other establishments in some cases are self-sustaining and in some cases are not. The bank is not.

By Mr. Pinard:

Q. What about the A. and P.? Is that self-sustaining?—A. That is self-sustaining.

By Mr. Murphy:

Q. What is your big bug bear there? At the beginning it was to get anybody to go in there. What is it now, I mean from a profit and loss statement? I think that is what we are interested in.—A. The cost of operation, mainly in the maintenance of the village. We have about one hundred personnel employed doing nothing but maintaining roads, streets, ditches, houses, sewer lines, staff hotel, dormitories.

By Mr. Bourget:

Q. And you also have a staff as the manager of the town?—A. That is right. The operating charges are quite heavy. The things that we break even on—we do not make money—are ice, and coal, power. Water, of course, we lose on.

By Mr. Breithaupt:

Q. You can hardly compare this with a town, a village which is municipally run with a council and a utilities commission and all that. These people do not pay any taxes, of course.—A. The real reason, I feel, we cannot operate the village at a profit or even break even is that we have no industrial or commercial tax; and from a survey that I have made I found that in communities of our size which have income from taxation, forty-five per cent of it comes from industry or commercial establishments. We have none of that at all so we feel that is the National Research Council is operating the project and they have to put in a certain percentage which is about twenty, it is not out of line.

By Mr. Murphy:

Q. Does the staff hotel pay any tax?

By Mr. Low:

Q. How do you operate the community centre? On a fee or membership basis paid by the people who take advantage of it?—A. There are forty-four clubs in the village.

By Mr. Bourget:

Q. Forty-four clubs?—A. Different clubs.

By Mr. Murphy:

Q. Have you with you the total income that you get from any source in the village as well as your expenditures?—A. The expenditures for 1948-49 were $836,913.37. Revenue was $572,931.29. There was a deficit of $263,982.08.

Mr. PINARD: Is that on the recreation alone?

The WITNESS: On the whole village.

Mr. GIBSON: That is for 1,200 employees?

The WITNESS: 1,200 employees at the plant, and about 2,000 residents at the village.

By Mr. Low:

Q. Can we go back to the community centre. Mr. Gray started to tell us that there were about 40 different clubs. What do they do?—A. They are mainly social and educational groups. If they use space in the community centre we charge them for about the cost of power and heating and in turn they charge their members from a 25 cent membership fee up to $5 a year, which I think is the maximum, and that is for the tennis club. The gun club membership is 50 cents, the art club is 25 cents I think. The bowling congress pays for itself. They are charged $500 a year and with that we are able to resurface one or two alleys a year.

Q. In making your charges you try to look after maintenance and replacement costs?—A. That is right.

Mr. BREITHAUPT: What about the boating club, is that run separately?

The WITNESS: It is run entirely separately by yacht club enthusiasts.

Mr. MORISON: They pay $1 a year.

By Mr. Breithaupt:

Q. Do you give them any assistance in building those dinghies?—A. We have given them the area in the construction camp up on the hill.

Q. And the use of the machines?—A. They have their own machines. Nearly all the work is handwork but the woodworking club has that area. The community association has given the woodworking and the boating club nearly all of that area.

Mr. STUART: They do all their own work?

The WITNESS: They do all their own work; they buy material and sell it to themselves.

Mr. PINARD: You have a motion picture theatre?

The WITNESS: Motion pictures are shown in the community centre. We take the chairs out or put them in as required, and the operation is conducted on a straight percentage basis.

By Mr. Gibson:

Q. The deficit you mentioned works out to about $300 per employee?—A. Yes.

Q. Has it ever been explained to the people up there that, although they may be only receiving $200 a month in cash, they are actually getting $225 in cash and services?—A. Yes, but the reply is that they must get out of there at least once a month and buy clothes and so on in Ottawa, and that costs them more than $25.

Q. Yes, but that applies to everyone living in pulp towns or mining towns?—A. It is a typical rural community. People cannot live there all the time; they have to get out. We feel that the subsidy which they receive in the matter of rental cost is used up in other ways.

Mr. PINARD: Do you consider that you have as much service there as there would be in an ordinary rural community?

Mr. BREITHAUPT: I would say that the service provided is much better than in the average rural community.

The CHAIRMAN: You are trying to operate a community service for 1,200 employees but your revenue has to come from the housing end of it and none comes from the industrial end. If the village was able to collect rent from the buildings down at the plant then it would break even?

By Mr. Murphy:

Q. Is it not a fact that you always will have a definite fixed overhead which you cannot overcome? There is no hope of you ever having a surplus; that is one thing certain?—A. Yes.

Q. I was going to ask you if you had thought of some way of increasing your revenue without jeopardizing the interests of your employees?—A. Without going to commercial establishments where we could tax or obtain quite heavy rentals there is not much chance of getting a much increased revenue. Even if we put up our rents 20 per cent it would only mean an increase of $23,000 a year.

Q. Speaking for myself, and I think the other members of the committee, I would not be interested in an increase of rents. I think, as you said a moment ago, that to operate a community like that, it is absolutely impossible for you to come out with a surplus?

By Mr. Gibson:

Q. Does the loss include the loss on the dining room?—A.—Yes.

Q. Then I think you are doing very well. I do not know of any industrial town of that size which runs a boarding house that can do better than you are doing?

The WITNESS: Do you know of any place running a boarding house which is breaking even on the meals?

MR. GIBSON: I do no tthink that is possible.

MR. GREEN: What form of self government do you have in the community?

The WITNESS: Very little. We tried it but since this self governing body had no funds we found that it did not work out. People lost interest entirely. We try to listen to the people in the community now and satisfy them, but there is no real self government except that for the school. The school is run by school trustees.

By Mr. Gibson:

Q. Has there been any request for a beer parlour or a beverage room up there?—A. Yes.

Q. It was not thought advisable to accede to the request?—A. The decision was not to accede to the request.

By Mr. Breithaupt:

Q. Is there a police force or anything like that?—A. The plant security force has a man on duty in the village. We operate the village police force with our security men.

Q. The same force?—A. The same force as we have at the plant.

MR. MURPHY: You have a fire department?

The WITNESS: We have a fire department which is also part of the plant fire department. We have a fire engine and two men on duty at all times.

By Mr. Pinard:

Q. Have you any idea of the number of employees who own their own cars?—A. I would say of the people living in Deep River that about 30 per cent have their own cars.

Q. They have to pay for garage facilities?—A. $5 for a garage.

MR. STUART: You said 30 per cent of the employees owned their cars?

The WITNESS: 30 per cent of those who are living in Deep River.

MR. PINARD: The other employees have to use the bus?

The WITNESS: Most of the employees use the bus. They do not drive to the plant; they leave their automobiles at home.

By Mr. Breithaupt:

Q. We noticed the big buses up there; do you charge the employees for using those buses?—A. The charge is 6¼ cents.

MR. MORISON: You are referring to the trip to the plant?

MR. BREITHAUPT: I refer to the big buses that leave for the plant early in the morning. Dou you charge for that service?

The WITNESS: They are standard street car rates—6¼ cents to Deep River, and 12½ cents to Pemmroke. We maintain the buses and the transportation but it is really a project function; the servicing and everything comes under the plant.

MR. MURPHY: You do not charge them to ride to Chalk River?

The WITNESS: Yes, anyone who rides on the bus is charged.

Mr. Breithaupt: Do you lose money on that operation?

The Witness: Yes, we lose money on that.

Mr. Gibson: Is it part of the over-all deficit you mentioned?

The Witness: No, it is not included in the figure I gave you.

Mr. Bourget: Could you build a road directly from Chalk river to Deep river? At the moment you have to go around?

The Witness: It has been considered but at the moment it is thought too expensive for the amount that we would save. The old original road is still there; the one that runs along the river. Mr. Green, Mr. Morison says that he can elaborate upon the matter of self government.

Mr. Green: I would be very grateful. Outside of Vancouver there is a district known as University Hill which is on provincial government land. While the people do pay some taxes the area is run by the provincial government and there they have a school board made up of people elected from the residents. It seems to work very well. I was wondering if your school board is something the same.

The Witness: The school board is properly elected; there are three school trustees. Two of them are elected by Deep river and one elected by the plant. I have here a notice from the deputy returning officer. These people are elected subject to approval by the provincial government. To date those whom we have nominated have always been approved. The school is run by a normal local group.

Mr. Morison: Initially we had a village council but it was very difficult for them to continue to keep the interests of the residents because they had no real responsibility. That situation worried us. The next step we took was to turn over to a committee, as much of the operation of the recreation as possible, and now recreation is pretty well run under the direction of a committee of residents. They are controlling body and have charge of the operation of the community centre plus all the activities there. In order to raise funds they operate a coffee shop which gives them a source of funds and the sense of responsibility we were talking about.

Mr. Pinard: I wonder if Mr. Gray could give us any suggestions as to improving conditions there? After all, I think consideration of those matters is part of the work of this committee, and I would like to know what suggestions he has to improve conditions generally?

Mr. Bourget: That would help us in making our report.

The Witness: We feel that the community is in pretty good condition but right now we lack some facilities. We need a church very badly—a community church. The Roman Catholics are well supplied with a church which belongs to the Wylie district. It has been there for years.

By Mr. Pinard:

Q. It is an old church.—A. Yes. Our community church, composed of all the Protestant churches, meets in the assembly hall in the recreation centre. It seats about 200 and it is becoming very much overcrowded. That church is one structure which we require. We hope to get it built next year. We have an amount which will not build the whole church but will build the main structure and we expect the residents to complete it. It will be available to all groups, including Roman Catholics, if they wish to use it. There will be facilities in the basement for boy scout meetings and things like that. We also need some more houses.

Q. You mentioned that you needed about 50?—A. About 50 new houses would satisfy our immediate requirements. We need a new staff house and we need a new high school.

We will not get 50 houses, but we will get a lot of these things next year if our estimates are approved.

Mr. Low: What do you estimate is your over-all capital need for the things which you have just mentioned? Around $1,000,000?

The WITNESS: A little over $1,000,000. 50 houses will cost about $600,000; the high school will cost at least $100,000.

By Mr. Pinard:

Q. How about the hospital?—A. The hospital will cost another $50,000, or a little over $100,000 in total.

Q. The high school?—A. $100,000.

Q. The church?—A. We hope to build the structure for about $60,000.

Mr. BOURGET: What about the staff house?

The WITNESS: At least $100,000.

Mr. PINARD: How about this road? Is it contemplated that you will build the shorter road?

The WITNESS: That is not in our estimates at all. We feel it is a big expense and not warranted at the moment.

Mr. BOURGET: The road can be used as it is now?

The WITNESS: No, only for fire patrol.

The CHAIRMAN: It is pretty rough country there. I do not know whether the members are familiar with it, but it is pretty rough.

Mr. PINARD: What is your estimate on the staff house?

The WITNESS: About $100,000 would build what we need to satisfy our immediate requirements.

By Mr. Bourget:

Q. How many rooms would you have in that?—A. It would depend on how many we had with bath and kitchenette. At the moment it costs us about $4,000 a room for the present type of accommodation, so it would be more than that; it would be nearly $5,000 on $6,000 a room, maybe $10,000 a room if we put in bath and kitchenette.

By Mr. Pinard:

Q. Do you intend adding anything to your shopping centre?—A. Our program for next year is to add a part on to the Eaton's store, which will cost something between $40,000 and $50,000. We feel we should have, before very long, a hardware store and a sporting goods store. We have no space at all for that. We also need a theatre. We hope to get one next year through private enterprise—the theatre company we are negotiating with now. We may make a contract for them to build a theatre on our property at a rental rate. That would not involve any capital cost to us. We would get a rental.

By Mr. Green:

Q. Under what vote do you get the money for those capital expenditures? Is that under the Atomic Energy Control Board vote?—A. That is right.

Q. And you cannot move unless these amounts are voted by the house?—A. That is right

By Mr. Murphy:

Q. Regarding the contracts for any of these capital costs, say for construction, who accepts those, who enters into the contract?—A. The National Research Council.

By Mr. Bourget:

Q. You have equipment also in the winter time for road maintenance?—A. We maintain all the roads winter and summer including both clearing of snow and maintaining of surface.

By Mr. Pinard:

Q. You do that yourself or do you get somebody to do it?—A. We do that ourselves with plant forces. It is part of the general maintenance group at the plant.

By Mr. Murphy:

Q. That is charged up to the plant and not to the village administration?—A. It is a charge that goes back against the village.

By Mr. Bourget:

Q. Is all the machinery paid for by the village?—A. No, not all, part of it belongs to the plant—the big grader, for instance—but all the small machinery belongs to the village.

The CHAIRMAN: Are there any more questions?

By Mr. Kirk:

Q. There is just one more question I would like to ask: Has the project been running long enough to give you an idea as to the repair and upkeep costs on wooden houses and aluminium houses?

Mr. MORISON: I would not like to pass an opinion on that. The roof on the aluminium type houses gave us quite a bit of trouble initially. The roofs were knocked down when they came in and we had to lift them up.

The CHAIRMAN: The aluminium house, in any event, is no longer in production.

By Mr. Green:

Q. What is the expected life of the houses you are building now?—A. I am sure that fifty years from now, if the project is still going, people will be living in my house. It is a well built house the same as is built in Western Canada, and I know I lived in one in Winnipeg that was fifty years old, and there is no difference.

Q. You are really building permanent homes now?—A. Yes.

By Mr. Murphy:

Q. You did not experiment with any prefabricated houses?—A. No, other than those Faircraft aluminium houses.

The CHAIRMAN: Those Faircraft houses referred to earlier were the prefabricated houses made in Montreal.

Mr. MURPHY: What did that cost, Mr. Gray?

Mr. MORISON: Every house cost about $3,300 f.o.b. Montreal. Putting it on the basement of the type we built ran the price up to $7,500.

Mr. MURPHY: That would be just one floor and two bedrooms?

Mr. MORISON: Yes. The interior was rather a poor finish.

By Mr. Green:

Q. Has any thought been given to setting aside a portion of your land there for homes that might be owned by individuals? After all, the project is apt to be at Chalk River for a great many years, it will probably be permanent, and I was just wondering if there was consideration given to the long term view?

The CHAIRMAN: That is selling part of the land to employees for private homes?

MR. GREEN: Yes.

The CHAIRMAN: I think I can go so far as to say that has not been very seriously considered. So far, you see, there has been back of all this the question of security, controlling the area, and I think a fair answer to that question is that it has not yet been given any real consideration.

MR. MURPHY: That would also apply to leases. It is completely controlled.

The CHAIRMAN: It is completely controlled, yes.

By Mr. Winkler:

Q. Do any employees live on private property?—A. Yes. They are building now on the road adjacent to Chalk River, which is not our private property and some are building in Chalk River.

By Mr. Pinard:

Q. They are allowed to reside anywhere?—A. Yes, they are allowed to reside anywhere as long as they can get to the plant.

MR. GREEN: You may find that eventually you will have a regular settlement around there.

The CHAIRMAN: That is happening to some extent now. I do not know whether that was pointed out to you in the cars as you were going along.

MR. GREEN: Yes, it was.

By Mr. Green:

Q. I think that happens in every company town.—A. Yes.

By Mr. Murphy:

Q. Why are those people who are living outside the village doing so? Is it because they have not been able to get homes of the type they want or because they cannot get homes of their own at a lesser price?—A. Mainly because we cannot house them. There is only one individual I know of who built because he wanted a different type of house and wanted to live separately. But mainly it is because we cannot house them. However, we may not have to house them. For instance, he may be a carpenter or some one whom we can employ locally.

The CHAIRMAN: Are there any other questions?

MR. LOW: There are a lot of them but it is nearly 1:00 o'clock now.

The CHAIRMAN: What is the wish of the committee on the subject of further questions?

MR. GIBSON: I think we have had a pretty good over-all picture.

MR. PINARD: I think we have pretty well exhausted the subject of the village.

MR. GREEN: I would like to move a vote of thanks to Mr. Gray and Mr. Morison for coming down here and answering all our questions.

The CHAIRMAN: Your chairman will have considerable pleasure in conveying that vote of thanks to Mr. Gray and Mr. Morison. Now, will someone move the adjournment.

MR. LOW: I move we adjourn.

The committee adjourned.

REPORT TO THE HOUSE

THURSDAY, December 8, 1949.

The Special Committee appointed to examine into the operations of the Atomic Energy Control Board begs leave to present the following as its

FIRST AND FINAL REPORT

Your Committee was appointed on October 31, 1949, under the following terms of reference:

> *Resolved*,—That a special committee be appointed to examine into the operations of the Atomic Energy Control Board: that the said Committee be empowered to sit during the sittings of the house and to print such papers and evidence from day to day as may be ordered by the committee; and to report from time to time; that the said committee consist of Messrs. Breithaupt, Brooks, Coldwell, Bourget, Gibson (*Comox-Alberni*), Green, Kirk (*Digby-Yarmouth*), Low, McCusker, McIlraith, Murphy, Pinard, Stuart (*Charlotte*), Winkler.

Your Committee held six public sittings, several meetings in camera, and, in addition, visited the atomic energy project at Chalk River on November 15 and 16. It made a general survey of the Atomic Energy Control Board's activities in the field of scientific research and in particular examined the operation of the atomic energy project at Chalk River. Evidence was also adduced in regard to the financial aspect of the project in relation to the organization, housing and general administration of the whole community involved, as well as in relation to the scientific activities.

Your Committee is of the opinion that the atomic energy project at Chalk River is well and efficiently run, and that the Canadian activity is in the forefront of atomic research. It finds the calibre of the personnel excellent, the general morale of the employees high, and the administration efficient.

For Canada to continue in the forefront in this field, it will be necessary to press forward the work with vigour. Your Committee recommends the expansion and development of the project as required from time to time, and further recommends that the government undertake the expansion of the present facilities by the construction of an additional reactor and such research equipment as may be required.

Your Committee believes that Canadian universities should be given every support which will enable them to continue and expand their contributions in the field of nuclear research. Already, with financial aid and encouragement from the Atomic Energy Control Board, it has been made possible for our universities to participate in several projects of vital importance in developing the use of atomic energy. By assisting the universities in important phases of atomic research, young persons with scientific aptitude and training can be recruited for the new and challenging fields of physical, biological, agricultural and medical sciences which have been enlarged by recent developments in the study of nuclear physics. Your Committee considers that a wise course is being followed in making grants to various universities throughout Canada which display interest and capacity in nuclear physics; and we believe that this policy avoids duplication of effort and consequent waste of public funds. Your Committee therefore recommends that the Atomic Energy Control Board be encouraged in its policy

of granting aid and assistance to Canadian universities and to Canadian students in the study of nuclear physics and the beneficial uses of radioactive material.

Evidence placed before your Committee indicates that important research in the realm of medicine and agriculture is being undertaken at Chalk River, in some Dominion and Provincial government departments, medical institutions, and universities. Your Committee commends this work and recommends that further encouragement be given to it.

Evidence adduced also indicates that Canadian industry is becoming increasingly aware of the possibilities inherent in the field of atomic science; and in order that further encouragement be given to industry in carrying out these investigations, your Committee recommends that consideration be given to the free distribution of certain isotopes to approved industrial concerns for another year. Your Committee further recommends that the work initiated at the Conference on Industrial Uses of Radioactive Isotopes held at Ottawa on December 7, 1948, be continued and extended by holding further conferences. It is suggested that consideration also be given to holding regional conferences on this subject.

Your Committee is of the opinion that the closest liaison should be maintained between scientific groups operating in Canada and all other friendly nations, and commends the present attitude of Canada in this regard.

Your Committee has been in existence for only six weeks and in that time has been unable to complete its examination into the field of atomic energy development. Furthermore, this field is a new one, is widening rapidly, and may well be of tremendous importance to Canada. For these reasons your Committee recommends that a special committee be reconstituted next session.

Your Committee desires to place on record its appreciation of the assistance given to it by Dr. C. J. Mackenzie, President, National Research Council, and President, Atomic Energy Control Board; by Dr. David A. Keys, Vice-President (Scientific), National Research Council, in charge of the Atomic Energy project at Chalk River, and by the members of the Board's staff as well as the employees of the Chalk River project.

A copy of the printed minutes of proceedings and evidence together with a list of the documents filed with the Committee is appended.

All of which is respectfully submitted.

GEORGE J. McILRAITH,
Chairman

APPENDIX

LIST OF DOCUMENTS FILED WITH THE COMMITTEE ON ATOMIC ENERGY

1. An Act relating to the Development and Control of Atomic Energy, Chap. 37, George VI, 1946, together with Statutory Orders and Regulations under the Act.
2. A group of papers presented before the sixty-first Annual General and Professional Meeting on The Engineering Institute of Canada, May 8, 1947, in Toronto, Ontario, and reprinted from The Engineering Journal under the title "Atomic Energy — A Canadian Symposium".
3. Chart showing the Chalk River Site.
4. Chart of the organization at Chalk River.
5. General outline of organization and duties of the Atomic Energy Control Board, prepared for the information of Members of the Committee.
6. Chart showing the staff organization of the Chalk River project.
7. Health Radiation and Contamination Control, by G. H. Guest, Health Radiation Branch, dated January 1, 1948.
8. Proceedings of the Conference on Industrial uses of radioactive isotopes, held in Ottawa, December 7, 1948.
9. Industrial uses of radioisotopes, published by G. H. Guest, dated December, 1948.
10. The Melchett lecture of the Institute of Fuel, delivered October 8, 1947, by Sir James Chadwick (reprinted from "Nature", March 29, 1947).
11. Unclassified researches in Nuclear Physics at Chalk River—1948, by W. B. Lewis, dated 24 November, 1948.
12. Atomic Energy as the servant of humanity by David A. Keys. (Offprint from Queen's Quarterly, Vol. LV. No. 2, 1948).
13. Applications of recent advances in Nuclear Physics to Medicine, by J. S. Mitchell (reprinted from The British Journal of Radiology).
14. Short Bibliography on Nuclear Physics, dated November 14, 1949.