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Chairman of the Defence Research Board

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O. W. Solandt.

SEVENTH ANNIVERSARY ADDRESS

by

Dr. O.M. Solandt

Chairman of the Defence Research Board

Ladies and Gentlemen – It is indeed a pleasure to have the opportunity of speaking to you again on the occasion of the anniversary of the Defence Research Board, and to welcome our many visitors. I hope they will realize that my talk is directed primarily to the Board's own staff, and particularly to the members of it who do not ordinarily deal with the broader issues of policy, and so cannot always see what their particular job means. However, none of our visitors should feel they are strangers, because they are in a way part of the same family. We all have the same objectives.

The Services and DRB

I shall begin with a brief review of the progress of the past year. By far the most important progress, to my mind, is the substantial improvement in our relations with the Services. When the

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Board was first formed there was a rather mixed feeling among the Services concerning it. Many people felt it was an excellent idea and were prepared to support it; a good many others were a little suspicious, and particularly felt that it was a competing rather than a cooperating organization. It seems to me that during the past year we have at last managed to get across to most of our friends in the Services that we are complementary to the Services, and in no way competitive. It is probably this, and our own growing competence to meet Service needs, that has presented this marked improvement. Our relations with the Services are now most happy and constructive, and I hope we can maintain and even improve them.

At risk of being repetitious, I would say again that good relations with the Services depend on everyone in the Defence Research Board realizing we have no independent reason for existence. The Board exists only to help the Services to apply scientific knowledge to the solution of their problems. While we should have a first-class scientific organization and the scientific community in Canada should know what we are doing, nonetheless, the real measure of our success and the thing in which we should take pride is the success of the Canadian Services.

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You will all agree that over the past year we have every reason to feel more than satisfied with the work the Canadian Services have done. Both at home and abroad in Korea and Germany, they have demonstrated that they are first-class forces in every way, and that they are well armed with modern equipment that they know how to use. Because our Services have achieved this, we can feel that our year has been a successful one. We must always remember that this is the real goal of the Defence Research Board, and that we measure our success by theirs.

Defence Research Resources

Another important development of the past year is the growing tendency of the staff officers at headquarters to think of all the resources available for defence research in Canada as an entity. This we have worked to achieve. As you know, the fundamental policy of the Board is to get work done for the Services by any agency that has suitable facilities and staff. We have built up our own laboratories only in fields where this could not be done. If we pursue this policy logically it means that our own staff by no means constitute the whole of the defence research effort in Canada. Many other organizations are as much a part of defence research as we are. I am delighted that our headquarters now think that way. When a problem turns up they do not

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immediately consider how they could place it in one of our laboratories, but look over the whole field to see what available resources are most suited to solving the problem.

These resources include many government laboratories, many university and industrial laboratories. It is dangerous to pick out a few because there are so many, but I would like particularly to mention the National Research Council and especially its Divisions of Radio and Electrical Engineering and Building Research, ~~the National Aeronautical Establishment, the~~ Mines Branch of the Department of Mines and Technical Surveys, Atomic Energy of Canada Limited, and the Ontario Research Foundation.

All of these agencies are an integral part of the defence research team. It would be presumptuous for me to report on their progress. They report their own progress, and they should certainly get credit for the work that they do, not only in their ordinary activities but also in defence work. I always feel, when any bouquets come in the direction of defence research, that all these agencies should share in the credit that comes to the group as a whole.

We in Canada can take considerable pride in this teamwork. I know of no other country in which such a satisfactory team spirit has been built up

among such a large group of diverse organizations. This is an example of the kind of cooperation that we can achieve in Canada, and must exploit to the full. Probably one of the main reasons why we find it easier to cooperate in this way is our small size; but it is pleasant to think that Canadians are fairly reasonable people, and that many different groups can pull together toward a sensible objective.

MATERIAL PROGRESS

Budget

I shall briefly outline the material progress of the last year. Reporting on the budget is quite easy for the Defence Research Board itself. We undertook some years ago to operate on a fixed budget, and are beginning the third fiscal year in which our total budget has been just under 23 million dollars. The plan was that as our staff and operating expenses rose we would gradually cut our construction program, with the hope that when it was complete we would be fully staffed and able to keep expenditures in balance.

This process has gone ahead smoothly, a little more slowly than we had hoped. Construction has been delayed and recruiting has about

kept pace with it, but the figures for total construction give an idea of what has happened. In 1952-53 we spent 6½ million dollars on construction, in 1953-54, 4.8 million, and in 1954-55 we are planning to spend 3½ million. We hope the construction budget will level off in about two years, when we should be at our present ceiling for staff. At that time we will have in our budget only enough money for maintenance of buildings, and possibly for one minor construction item each year. The success of the planning needed to fit a changing program into an inflexible budget reflects credit on all those concerned with it.

Construction

I shall not list here all the buildings completed during the past year. The list is available in other places. Highlights were the official opening by the Minister of National Defence of the Radio Physics Laboratory and of Defence Research Chemical Laboratories, both at Shirley Bay near Ottawa, and the opening of Defence Research Medical Laboratories, in Toronto, by His Excellency, the Governor General.

It is worth mentioning that we are on the last phase of our major construction program. When the Board was formed, we outlined a program that would house the staff then contemplated, and we spread it over many years because of the fiscal

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limitations. The big laboratory at Suffield was the last major building on this program, and it is well under construction. The next before it was the Pacific Naval Laboratory, which will be ready for opening this year. We are approaching the end of major construction, and soon will have all our laboratories housed in good modern buildings. Some of them are already bursting at the seams. We must start this year on the program of additions, and we hope to make the first addition to the Naval Research Establishment in Halifax. Since the Board was formed we have spent more than 20 million dollars on construction, and now have scattered across Canada a group of buildings of which we can be proud.

Development Planning

Before leaving the problems of budget, I would like to mention the development budget and to digress on the problems of development in general. This year, the money allocated for development has increased from about 19 million to about 27½ million dollars, so that the total budget for which the Defence Research Board has some responsibility has risen from 42 to just over 50 million dollars. This has been mainly due to increases in the Air Force development program.

The Air Force recently has had approval to start development of the new supersonic fighter

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aircraft called the CF-105. In addition, a lot of development work has to be done on the CF-100 and on the Orenda engine. The CF-100 and Orenda engine are now performing most satisfactorily in the hands of the Air Force, and the successful introduction of this aeroplane and engine designed and built in Canada marks the completion of what has undoubtedly been the biggest development project in the history of Canada. The Defence Research Board can claim no more than a small share of credit for that accomplishment. It has been largely due to the Air Force and the ~~manufacturers, and particularly to the faith and enthusiasm~~ of the few officers in the Air Force who backed the project through thick and thin.

One field in which our relations with the Services have greatly improved is in the control of development. It was agreed when the Defence Research Board was formed that the Board would have complete responsibility for research for all three Services and would advise the Minister on the Service development program, particularly on the wisdom of proposed expenditure from the scientific and technical point of view. The important feature in this agreement was that the Services should retain the initiative in deciding what things they wanted to develop. In the early days there were misunderstandings about this, but in the last year the fundamental misunderstandings have disappeared completely. The

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Defence Research Board has become convinced that it is right for the Services to have the initiative in proposing development programs. The Services, I think, have become equally convinced that the Defence Research Board can give them intelligent, objective advice on whether their proposals are sound and likely to succeed.

As the result of this teamwork, we have usually been able to get development projects approved quickly and to make good progress on them. During the year we have laid down a policy for selection of development projects that applies to all three Services, and we have built up the development committee as a subcommittee of the Board to review development problems affecting the Services. This mechanism is working satisfactorily.

One of the factors that has contributed somewhat toward the improved outlook on the development program has been some financial stringency. This is a good thing for any program, and is one of the main reasons why I was not unhappy when the Defence Research Board was put on a fixed budget.

In research and development, all projects are good projects - some better than others. If money is unlimited, you never have to decide which are best; but if you have even a slight limitation on funds, then you look critically at

CONFIDENTIAL

everything to pick out the least important projects and get rid of them. You never, of course, stop a bad project, because you never start any bad ones; but sometimes some are not quite as good as others. And here, both in the development program and in our own research program, we have achieved a fairly satisfactory pruning during the last year, but we must not feel complacent about it. This pruning process has to be continuous, and there will continually be disgruntled people who have had their favourite project pruned off. The only thing we can do is to get them interested in some other project, and try not to lop off the favourite too quickly.

Staff and Organization

The most unsatisfactory part of our progress during the past year has been recruiting. Our net increase in scientific staff has been only 38 persons, or about 8 per cent of the staff with which we started the year, compared with 10 per cent in 1952, previously our worst year. This is due partly to relatively unsuccessful recruiting and partly to increasing wastage of a larger staff. The percentage of wastage has not increased, but as the size of the staff increases so does the absolute wastage. This is a problem to which we must all give our attention in the coming year. Fortunately, I can report that the outlook at this time is much better than last year. Our acceptances during the first three months of the year

CONFIDENTIAL

are almost double what they were in the same period of 1953. We urgently need more scientists and engineers for the actual conduct of programs already under way. We do not propose to take on any major new projects. If we get more staff, we propose to do the things that we are doing faster and better.

There have been some changes in senior staff in the past year. Dr. F.H. Sanders has come from the Pacific Naval Laboratory to a full-time planning job in headquarters. Mr. J.S. Johnson went from headquarters to take Dr. Sanders' place at PNL, and Dr. W.L. Ford came in to take Mr. Johnson's place.

Dr. J.C. Clunie left his position as Secretary of the Board and moved to the Kingston Laboratory, to get some research done. He has always felt he should be a research worker rather than a staff officer, and this is an attitude of mind we like to encourage. Mr. A.M. Pennie has taken his place as Secretary.

Just recently Dr. H. Sheffer, who had been in headquarters, went to the Chemical Laboratories as Superintendent, and Dr. J.C. Arnell has come from the Chemical Laboratories to take a post-graduate course in bureaucracy at headquarters.

Dr. J.A. Pearce, who was Director of Research Personnel, left for an industrial job last year and has recently been replaced by Dr. H.W. Jamieson. We are fortunate to get such an experienced person for this job.

Also during the year Mr. A.J.G. Langley left as Director of Scientific Intelligence for an industrial job, and Mr. G.W. Rowley left Arctic Section for a larger arctic job in another department.

ACHIEVEMENTS

Team Competence

From the point of view of accomplishment, the outstanding feature of the year has been a marked general improvement in the level of productivity of the laboratories. Every knowledgeable visitor who has re-visited our laboratories this year has commented on this. One of the most surprising phenomena of applied research, and which must be seen to be believed, is that competent people can be together as a team for a year, or even two or three years, yet little seems to come out. Then suddenly they all seem able to do their jobs much better. The team as a whole becomes amazingly competent, and starts to solve problems and turn out results that surprise even the team itself. This phenomena has been occurring in several of our laboratories during the past

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year. It is gratifying to see, and we must now strive to keep alive this team spirit that results in productivity.

I have made a random selection of some practical accomplishments to illustrate what is being achieved, rather than to list them in order of importance.

McGill Fence

The development that has attracted the most attention in the past year is probably the so-called 'McGill Fence'. The naming of this has caused some concern, because the scheme was devised by a number of people. If any one person deserves credit for the idea, it is probably Dr. Lewis at Chalk River, but he would disclaim this. When we started to name it, we were faced with the problem of a hyphenated name with about ten people involved. Someone suggested the 'McGill Fence' because the work at that time happened to be located in McGill, and the Eaton Electronic Laboratory had made a substantial, probably the most substantial, individual contribution to it. But an unforeseen result developed over selection of the name, because there is a preponderance of McGill graduates in the Cabinet and our Minister, who is a McGill graduate, was suspected of propaganda. There were those in the Cabinet who suggested that, to remain neutral and keep the peace, it should be called the 'Toronto Fence'!

CONFIDENTIAL

This device is the outcome of several years of research and development work. What happened was that when the Air Force began installing their large, heavy radars, we were appalled by the cost of them. So were they. We called together a meeting of scientists who might be interested, and asked them to suggest ideas for a greatly simplified and cheaper early warning system. They came with a great many ideas. A good many were tried as models, and three were taken to field trial. The one that was developed to a more advanced state included many of the ~~ideas that arose in the earlier ones.~~

The final equipment is a remarkably simple device, made principally from fully developed commercial equipment. It is capable of giving an unequivocal warning when an aeroplane passes, and very little more than that, but it is remarkably simple and cheap and ingenious. We feel it represents an important step forward and will be used in many early warning systems, in many different places.

One of the most gratifying results of the past year was that during last summer our staff in cooperation with the RCAF did a large-scale test of this equipment, called Project Spider Web. This was done on the Ottawa River, from Arnprior to North Bay. It was carried out in the course of a few months with limited staff, at a cost that would bring joy to the hearts of the taxpayers. A little

later, the US Air Force, through its contractor the Western Electric Company, started on a much larger scale trial of this and some other equipments. When they bought some of these McGill Fence equipments from the RCA Company in Montreal, the equipments were delivered, set up, and turned on. They worked exactly as they were supposed to work. This is very gratifying, because new devices nearly always work well in the hands of their inventors, but by no means always work equally well in the hands of others, who may not be unfriendly but merely uninterested. It was gratifying to find that defence equipment has worked so well in a wide variety of circumstances.

Development of the McGill Fence equipment is of particular interest in headquarters, not merely as a technical achievement, but rather as an example of good organization. A wide variety of different agencies helped at various times in this job. In spite of the number of groups involved, progress was spectacularly rapid, and those in headquarters responsible for this deserve particular credit. Dr. G.S. Field and particularly Mr. Guy Eon did most of this work.

Heller

Another bit of equipment that has come to a late stage of development—in fact, to the early

CONFIDENTIAL

stage of use—this year is the Heller infantry anti-tank weapon, developed at CARDE in cooperation with the Canadian Army. I have already reported previously on this as a weapon, but I would like to mention it now as an exercise in organization. This is one of the first times that we have taken a device from research through development to production and use in Canada. We were anxious to see if we could learn something about bridging the difficult gap between development and production. In every country this causes trouble and delay. By close cooperation with the Army and with industry, and with the help of various expert advisers, we have not only done a good job in going from development to production, but have learned a good deal about how to do it so that we can do better another time. It is gratifying that the Canadian Army has placed a production order for this equipment. We are hopeful that other countries may follow suit.

Velvet Glove

Several other major development projects, in the Defence Research Board's own laboratories, have gone ahead well this year. One is the guided missile at CARDE. This air-to-air missile, which is being developed for the RCAF, is occupying probably a little over half the total effort at CARDE. In spite of the relatively small team on this, compared to teams used in the United States

CONFIDENTIAL

particularly, we have managed to achieve at least as high a rate of progress as has been achieved on comparable missiles in other parts of the world. This again has been largely due to good organization as well as competent scientific and engineering work; and we have been able to bring industry into the project very early and to get tremendous help from industry.

Dunker

The Naval Research Establishment at Halifax has, as its primary task, the job of helping the Navy to solve the problems of anti-submarine warfare in the particularly difficult waters off the east coast of Canada. They have made substantial progress in the past year toward devising a practical, improved asdic equipment for use in these circumstances. As their work has progressed, it appears that the equipment that they are designing for this job will have much more widespread use. There is growing interest in it in the Royal Navy, and to a less extent in the US Navy. We are hopeful that during this year we may work out a plan with the British for a joint development.

DATAR

In looking at the practical accomplishments of the year, I should mention DATAR. It is a project largely handled by the Navy itself, in

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cooperation with the Ferranti Company and other industrial companies, but DRB has taken an active interest in helping to guide the work. DATAR is a data-handling system designed particularly for the problems of the Canadian Navy. It is adapted to anti-submarine and convoy escort work, and seems to be several years ahead of comparable developments in any other country. It was demonstrated during the last year and worked satisfactorily.

This project represents a problem we meet continually in Canada. Here, the Canadian Navy has through its own initiative got a long way ahead of its colleagues. It has an equipment, or has at least demonstrated principles that could be rapidly built into an equipment, to meet its needs and that would tremendously increase the effectiveness of its anti-submarine escort work. Yet it is faced with the terrible problem of standardization. It would obviously be ridiculous for the Canadian Navy to install in its ships equipment that could not work with ships in the British and American Navies. And so we must decide whether to go ahead on our own with an equipment better suited to our needs than anything that will appear for several years, or to wait and in the end to adopt something possibly not as good as we now have. I do not know the answer to this, nor do I pose the problem with any suggestion of lack of good will on the part of the

British and American Navies; far from it, they are as keenly aware of and anxious to solve the problem as is our Navy. But it does seem almost insoluble.

Important Trend

The introduction of data transmission and data handling equipment throughout all three Services will probably be one of the major changes that will take place over the next two or three years. There is no doubt that the air defence system of Canada requires and will soon have a data transmission system. Anti-aircraft gunners need them, and probably so do other parts of the Army. This is one field in which there will be tremendous progress in the next two or three years.

Navigation Systems

Also worth mentioning among practical achievements is a wide variety of RCAF projects, which again have been done with varying amounts of help from the Defence Research Board, in the field of navigation. It is not well known that a little group of enthusiastic officers in the RCAF have for years been working away to perfect systems that are basically automatic dead-reckoning navigation systems. Several of these are now coming to the stage of practical application; some are even in production. Collectively,

CONFIDENTIAL

they represent a tremendous step forward in navigation, and particularly in navigation in a country like Canada, where radio aids are relatively widely scattered and will certainly continue to be so for some time.

Ideas

In reviewing progress I have mentioned principally bits of hardware, but this is not the major output of our laboratories. Far from it, because development projects taken on in our ~~laboratories for the Services represent only~~ a part of our activities. A good deal of time is spent on applied research, to polish fundamental ideas into forms that can be used by the Services. During the past year, nearly every one of our laboratories has made substantial contributions to knowledge in their particular fields of applied science, and has brought new ideas within the realm of practical application.

WORLD SITUATION

How does the world situation affect the future program of the Defence Research Board? First, there is no evidence of any change in the basic aim of the Russian imperialists to use communist doctrine as a means for dominating the world. It is important to realize that this is the way it should

CONFIDENTIAL

be stated. It becomes more and more clear that those who rule the Russians are not really communists at heart. They are old-fashioned imperialists setting out to dominate the world, and the communist ideology has proven a useful weapon.

There are three broad courses open to the Russians. They can continue to spread their ideology and their influence by methods successful in the past. They have an abiding confidence in the ultimate downfall of the capitalist system and feel they can afford to wait, and as one capitalist country after another collapses they can infiltrate with communism. They would, under this program, instigate no new armed conflict.

A second possible course would be to continue the spread of their influence by ideological means, while building up a series of minor wars with local objectives. The third possibility is total, all-out, atomic war.

It is clear that the Russians are tending at present away from the second course somewhat toward the first. That is, they are allowing the armed conflicts throughout the world to simmer down a bit, while they appear superficially more reasonable. They are still getting on with the spread of their influence through ideology. There is little doubt they have done this as deliberate

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policy, as the method best suited to the moment, the one which will now enable them to spread their influence most rapidly. The chances of a total war are now less than they have been for some time, and probably will remain low for several years. Nonetheless, we must at least prepare for the possibility of total war, because the Russians would embark on a total war if at any time they felt that they had a good chance of winning. We must continue our preparations on the assumption that a total war is possible, and try to make it so unattractive that they will not begin it.

Change in Atomic Weapons

The most important change in the world situation in the last year is the revolution in atomic weapons. This revolution, which is breaking into print in the newspapers at the present time, is really a greater revolution than the one that took place in 1945. The bombs dropped in Japan were of so-called 'nominal' size. That is, their explosive power was approximately equal to that of 20,000 tons of TNT, or 20 kilo-tons. Because of the overhitting at the centre of a large explosion, a 20 kilo-ton or nominal bomb is only equivalent in destructive power to about 2,000 tons of ordinary high explosive bombs well distributed over a city.

CONFIDENTIAL

Two-thousand-ton raids were relatively common in World War II. Consequently, the nominal atomic bomb did not introduce a new scale of destruction. Destruction on this scale was quite common. In many raids in Japan and Germany, the destruction and casualties from ordinary high explosives and incendiary bombs were substantially higher than in Hiroshima or Nagasaki.

But in 1954 we have learned of the existence of thermonuclear weapons with tremendously greater power. It is estimated that one of the latest put off by the United States gave a yield of 12 to 14 mega-tons. That is, six to seven hundred times the power of the so-called nominal bomb. The mega-ton is a million tons of TNT. It is announced that the crater formed by the first of these thermonuclear weapons was 175 feet deep and over a mile in diameter.

These weapons introduce a scale of destruction that is completely new to mankind. They make it possible to put a major city out of action. It is almost reassuring to draw circles of destruction for bombs of this size and put them over Ottawa. You begin to feel that Ottawa is no longer an atomic target, because the area of destruction is so much bigger than the city that it would hardly seem worth dropping a big bomb on the city. This is about the only cheerful thing I can get out of the development.

A New Problem

The dominant problem that faces the whole world today is: What should we do about world organization in the face of the development of these new weapons? It is important for all of us, as citizens and as people who may influence community opinion, to realize that we are up against a completely new problem — that this revolution in weapons that has taken place in 1954, or at least that was learned about in 1954, is more important than the one that took place when the first atomic bomb was used. This really does ~~bring within possibility~~ the almost complete annihilation of the important physical parts of the major countries: cities, factories, and so on. We have to ponder whether even the most lunatic dictator would resort to this kind of war; and if he would not, to what kind of war would he resort? I can never quite decide whether to put my weight on the side of the cynics who feel that we should not discuss disarmament or peace, but should just try to channel wars into some sort of lines, or whether we should strive to eliminate war.

It rather looks, from the way world affairs are going now, as if we may be in for a period of minor wars with limited objectives, with neither side feeling that they wish to start a total atomic war. This is only one of many possibilities. The urgent problem for the whole of the free world is

to decide what we want to do in this new atomic age, and then try to find how to do it.

From the Canadian point of view, the important thing to realize is that the Russians are capable of producing the aircraft required to deliver these weapons against the North American continent. A few years ago, the Russians were not capable of striking a decisive blow against the United States, much as they might have liked to do so. However, now it seems almost certain that if they want to build up that capability they can. There is no reason why they should not make the aircraft of the thermonuclear weapons required for a devastating attack on this continent.

EMPHASIS ON CONTINENTAL DEFENCE

We must begin in Canada to redistribute our effort, to match this growing capability of the Russians. We must give more thought and attention to the problems of continental defence. This may result in a little less effort in overseas defence. But it should not mean abandoning our commitments to NATO. They are still just as important a part of world defence as they were before. But we have to increase the emphasis on home defence, if for no other reason, merely to be sure we have a firm base from which to operate against the enemy should another war occur.

This means that the Defence Research Board program should be altered, to increase the emphasis on items particularly important to continental defence. This has already begun. You will realize, if you look at our program, that most of our work is important to continental defence: things like the air-to-air guided missile, all the work on radar early warning systems, communications, navigation systems, anti-submarine protection of our coasts, and so on. All of these are directly related to continental defence and emphasis on them will be continued.

Operations Analysis

We intend to put considerably increased emphasis in three directions. The first is in operational research, or operations analysis applied to continental defence systems. Any improvements of continental defence, and particularly of air defence, that will become available in the next few years will be the direct results of new and important scientific developments. They are untried in action. No one has any clear definition of how they will work as components of weapons systems. Consequently, the scientists now have a unique responsibility in working out some more or less objective opinion concerning the effectiveness of new elements in weapons systems. This has to be done by the operational research scientists before the military planners can get

CONFIDENTIAL

on with their job, because you cannot give a military planner a new guided missile and say, "Integrate that into your air defence system". He immediately says, "Well, what will it do?"

You tell him it will go so high, and it has a certain speed, and so on - the things the maker knows about it.

He says, "That doesn't mean anything in terms of a weapons system. You've got to tell me what is the kill probability, what kind of targets will it operate against most effectively, at what altitudes will it work, how is its performance related to the cover of our radar, and so on."

So, the scientists here have a tremendous job to do in going over all this technical performance data and trying to transform it into predictions of operational performance that can be used by military planners.

We are devoting a great part of the effort of our Operational Research Group to this kind of work. We have an excellent cooperative arrangement with the United States so that, where problems are of joint interest to the two countries in continental defence, we are able to prepare an agreed appreciation of the importance of new elements in the system and so save the military planners a good deal of argument. We hope that

CONFIDENTIAL

ultimately it will even save the politicians a great deal of difficulty in making final decisions as to what should be done about continental defence.

This basic cooperation between scientists of the two countries marks an important step forward in international relations and will substantially improve our already excellent relations with the United States.

Atomic Weapons Performance

The second field in which we must do more in Canada is that of atomic warfare. In the past we have been content to do a little, helping the Services with their problems of radiation detection and helping Civil Defence in similar work. It becomes increasingly obvious that should there be another total war it will be predominantly atomic. It will not be many years before no first-class armed force, no matter how small, will be able to engage effectively in battle unless it has atomic weapons. We must begin now to lay a foundation of knowledge that will ultimately enable the Canadian Services to use atomic weapons. Initially, most of our work will be on the defensive side, because there is still a big gap between our knowledge and our application of it.

For this year, the biggest job that faces the Defence Research Board is interpretation for the

CONFIDENTIAL

Canadian Services of the vast amount of knowledge about performance of atomic weapons. Most of this has been obtained from the United States; they have been generous in giving us information on the effects of weapons. But most of it is in a research form, and requires translation and interpretation before it can be effective as equipment and training of Armed Forces.

We plan to divert effort toward these atomic problems. The main diversion will probably take place in the Chemical Laboratories and at Suffield.

Civil Defence

We also must help to strengthen Civil Defence in Canada. If we really feel that the Russians can launch a devastating attack against North America, then the problem of survival becomes dominant. Survival depends on good air defence to minimize the attack, and on good Civil Defence to minimize the results of the attack.

I do not think that we are putting enough effort into Civil Defence. We have in Canada a unique opportunity to build a material civilization relatively resistant to atomic attack. Canada more than any other country is in the stage of building up the capital equipment of modern industrial society in the atomic age. It seems ridiculous to be building on patterns that are

CONFIDENTIAL

unsuited to the atomic age, yet we are in many places building atomic weapon targets that will require additional defences. I do not suggest that you can so disperse a modern industrial community that it will present no such targets. But you can reduce its vulnerability by intelligent dispersion, and structural design.

DOMESTIC PROBLEMS

Having briefly reviewed the world situation and its effect on the Board's program during the next year, I shall touch on a few domestic problems.

Productivity

The period of rapid expansion of the Defence Research Board is over. Unless there is some new challenge in the international situation, it is unlikely that we will greatly expand in the future. This means that after we reach our total complement of staff, which will probably take another two years, we will be in for a period of consolidation now in fact beginning in many establishments. Our aim in this period should be steadily to increase productivity. This means that we have to be sure that every new person hired is an excellent person for the job and someone we want to keep for a long time.

Promotions and Personnel Selection

It becomes even more important to see that the right people are promoted, and this is a very difficult problem. We are trying hard to devise an ideal promotion system, but because of human frailty it is an impossibility. I think you would all like to see a system in which promotion is largely on the basis of merit, but with some weight given to seniority; a competent person who has done a good job for a long time deserves some consideration in relation to the bright young person who is going to the top. We are hoping that we will get such a system.

It is also important that the promotion system should be as democratic as possible. No one should feel that his promotion is blocked by the antipathy of the single individual above him who may not like him, and we are trying to avoid that. One of the most important developments in this matter in the past year has been getting each member of the Selection Committee to adopt one of the establishments as his particular problem. He will spend some time at the establishment to get to know the people and problems, so that he can bring some personal knowledge to bear on problems of selection and promotion.

We will continue to make promotions, particularly to higher posts in the Board, as competitive as possible. This means that there will

be a few senior people brought in from outside to fill major positions. The number that will come in will be very small. I am confident that before long, for every senior position we will have candidates coming from within the Board who are so much better than any from outside, there will be no question of recruiting outside the Board. We are trying to keep an eye on future promotion needs, and to give not one but several people an opportunity to gain the experience needed for senior positions, so that when the time comes there will be several people within the Board competent to fill the post. I would be very surprised if there will not be at least one in each case who is better than any outside competitor.

Security

On looking over my anniversary talks to you, I find that my early upbringing has shown through. My father was a Presbyterian minister, and no good Scotch minister felt Sunday was well spent unless he scolded the congregation about something. So I will put in a bit of scolding here.

This year, it is on the problem of security. Everyone in the Defence Research Board may not realize that we have a unique responsibility in relation to security. There is no other group of civilians anywhere in the world that has been trusted with as much classified information as

CONFIDENTIAL

we have. We have been trusted not only by our own Services, but also by the Services in the United States and in the United Kingdom. Most of us have realized this responsibility and have taken security very seriously. We must continue to do so and must emphasize that good security springs ultimately from a feeling of responsibility on the part of every individual. Security means not only locking up documents and being careful of where you leave classified papers; it means being careful of where you talk, what you talk, to whom you talk; being careful that anyone who seeks information is well known to you, and that he has thoroughly established his need to know. This is probably particularly important, because often when a person seeks information, you know he is fully cleared, you know who he is, but you find out later that he was just curious about the particular problem and had no real need to know in the course of his work.

In addition, we must each accept some responsibility for the rather distasteful job of helping all our colleagues to be secure, and if they will not be helped, of reporting them. This is one field in which our group responsibility must transcend the welfare of the individual. If our security is not good, all else will fail. In the past, the Defence Research Board has been remarkably successful. This success has been due to a genuine

CONFIDENTIAL

feeling of responsibility on the part of everyone, and I hope that this will continue.

Unfortunately, there is a new danger to our security that seems to have grown up in the past year. I have no evidence that it has been particularly prevalent in the Defence Research Board, but it certainly has throughout the Government as a whole. This is the danger of the calculated leak to the Press. You must almost daily be surprised by the information that appears in the Press. Fortunately comparatively little of it is of Canadian origin, but quite enough is of Canadian origin to make it really a problem.

As far as I can see, what usually happens is that some person who considers himself thoroughly loyal and deserving of confidence decides that the public does not know enough either about the work he is doing or about the work his group is doing. He thinks it would be in the national interest if the public was told something about it. He carefully suppresses the things that he thinks might be important to the Russians, and tells someone the rest. He thinks he has done a service to himself, to his group, and I am not sure whether he thinks he has done a service to his country, but I want to emphasize strongly that this is something that none should do.

CONFIDENTIAL

No individual should take on himself the task of deciding what should be revealed and what should not be revealed. There is an established mechanism for dealing with this decision. In Canada we have the particularly difficult problem that frequently we cannot reveal something without consultation with Britain or the United States, because it contains information they have supplied. Again, there is no reason to do it in Canada because we have so much to lose by destroying our good reputation for security, and practically nothing to gain by getting kudos from the public.

As far as the Defence Research Board is concerned, it is important for us to have a good reputation with the Canadian Services, a good reputation with the US and UK Services, and a good reputation in the scientific community in Canada and throughout the free world. It is fitting that we should be able to tell the public a certain amount of what we are doing. The taxpayer pays for our work and so deserves to know something of what we are doing, but that must be a secondary objective. We can achieve credit with all the people who are important, without publicity. I hope that no DRB employee will be guilty of any calculated indiscretions to the Press.

Important Year

In conclusion, it seems to me that we are embarking this year on one of the most interesting

CONFIDENTIAL

and probably most dramatic years in the history of the world. The breaking on the world of this new atomic revolution will undoubtedly produce international changes of great significance.

From the more domestic point of view, we in the Defence Research Board now have a competent organization. We are beginning to feel self-confident, to feel we can do a good job for the Services. Our relations with the Services are excellent. I think we can look forward to our most productive and interesting year.