Brief to the Senate

Special Committee on Science Policy

presented by the Honourable C.M. Drury,

Minister of State for Science & Technology

November, 1975

BRIEF TO

THE SENATE SPECIAL COMMITTEE ON SCIENCE POLICY

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THE HONOURABLE C. M. DRURY

MINISTER OF STATE FOR SCIENCE AND TECHNOLOGY

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INTRODUCTION.

1. Senator Lamontagne in his letter of September 17, 1975, inviting the presentation by MOSST of a brief to the Committee, made specific reference to the role of MOSST as the main central agency for science policy and its involvement in the government's response to the Senate Committee's proposals. The Ministry is anxious to assist the Senators in every way possible and in preparing this document we have aimed at three specific objectives: to present a clear picture of the developments in federal science policy and organization that have taken place since the establishment of the Ministry; to explain how the Ministry's role and procedures have developed and, in meeting these two objectives, to identify as far as possible the extent to which the recommendations and suggestions of the Senators have been followed. Many of the recommendations were of a nature that called for a response from the government as a whole rather than the Science Ministry. For this reason, it has seemed appropriate that the Minister should himself respond to the Committee since he is in the position to speak for the Government regarding matters of organization and broad policy.

A. BACKGROUND.

2. The Senate Committee's examination of Canada's policies, practices and organization in science has undoubtedly constituted a major landmark in the history of science. It has been recognized internationally as probably the most complete and searching examination of its type made anywhere in the world and the three volume report of the Committee has been read with deep interest throughout the scientific community.

3. The Committee's report has been and continues to be required reading for all those in government who are involved in the development of science policy and organization, and the Committee's

recommendations have been discussed, analyzed and evaluated on innumerable occasions. Some have been accepted, others have not. Many have been partially adopted.

4. The Committee in the Foreword to Volume 3 of its report acknowledge that - "Many of the recommendations contained in the second volume of its report, Targets and Strategies for the Seventies, have been implemented or accepted in principle by the Canadian Government".

5. The Committee made a number of recommendations concerning its own future and the actions that Parliament should take such as the organization of a group of Parliamentarians from the Senate and the House of Commons to study science policy matters. It would be inappropriate for the Ministry of State for Science and Technology to comment on these recommendations other than to confirm strong support for any new mechanisms by which Parliament can be increasingly informed and concerned regarding science and its impact on Canadians.

6. The Ministry of State for Science and Technology (MOSST) came into being in the midst of the Senate Committee's deliberations and it may be helpful to reiterate briefly some of the main events that led up to its establishment.

7. The Royal Commission on Government Organization recommended in 1963 that senior responsibility for science policy be placed on a single Cabinet Minister and that a suitable secretariat be established to serve this Minister and the Cabinet. The Commissioners did not however recommend the setting up of a department of science because they felt that scientific activity, like economic activity, pervaded such a large segment of the Public Service, that attempts to centralize it would impair the effectiveness of the many departments of which it was an important part.

8. In January, 1964, Dr. C. J. MacKenzie made a report to the Prime Minister on Government Science and stated that he was in

general agreement with the Glassco Commission's concept of a Central Scientific Bureau but thought that it should be in the Prime Minister's Office rather than reporting to the President of the Treasury Board as the Glassco Commission had recommended.

9. The OECD examiners in their "Review of Canada's National Science Policy" in 1969, recommended the establishment of a Minister of Science assisted by a Central Scientific Secretariat. They also recommended the creation of a Government Research Board to establish a balance between government targets and the research work done at the department level.

10. There was clearly a trend in all these recommendations towards a centralization of science policy efforts and the development of a mechanism whereby the Federal Government could develop such a policy and oversee its implementation.

11. The changes stemming from these investigations did not in the final event correspond to any one particular recommendation. A Science Secretariat was formed within the PCO and reported to the Secretary to the Cabinet.

12. This was the situation when, in November, 1967, the Senate adopted a resolution setting up a special committee to review the science policy of Canada.

13. The Government's decision to establish a Ministry of State for Science and Technology was reached in the Fall of 1970, while the Senate Committee was in the process of preparing Volume 1 of their report. The Ministry was not, however, brought into being until August, 1971.

14. The second volume of the Committee's report was released in January, 1972, at a time when the new Ministry was in the early stages of finding its feet. The recommendations in this volume were primarily concerned with the fundamental thrust of Canadian Science, the level of funding and the need to build up the scientific and technological strength of Canadian industry.

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MOSST made an extensive appraisal of the Committee's recommendations and found itself to be well in tune with the Committee's views on the importance of supporting innovation in Canadian industry.

15. The major organizational changes recommended in Volume 2 by the Senators in areas such as the Granting Councils and the NRC laboratories presented issues that, while of prime concern to MOSST, were on a scale demanding government rather than Ministry action. The development of a federal position on these issues has since culminated in draft legislation. MOSST has contributed to the discussions that have led up to this draft legislation.

16. In their third report, the Senate Committee were in the position of having studied MOSST's mandate and terms of reference and of having observed the Ministry in action over a short period. This volume dealt with the Ministry's role in some detail and made a number of recommendations specifically directed to it.

B. SCIENCE POLICY AND THE ROLE OF MOSST.

The Development of Science Policy.

17. In the concluding paragraph of Volume 1 of their report, the Senate Committee stated . . . "We must develop a coherent overall science policy so that we can not only meet our economic objectives more effectively but also more realistically face our social problems."

18. This challenge was accepted by the Ministry of State for Science and Technology which, from the day of its inception, faced the fact that it could not deal rationally with specific problems nor establish sound working relationships with other government departments and agencies until it had developed, and had had accepted by Cabinet, a basic science policy framework that would

define the essential role of the federal government in the field of science. The primary difficulty in developing such a framework was the insistence of some authorities in both government and the academic sector that science policy should be a single indivisible entity. The Ministry found this concept to be unworkable and there is nothing in the Senate Committee's report to indicate that the Committee espoused it. The Ministry has concluded, and the Cabinet has now agreed that Federal Government science policy includes the sum of policies in three distinct areas.

a) Policies for the support of science under which are included:
   - the support of post-graduate university research;
   - the arrangements for scientific representation abroad;
   - the support of Canada's participation in international scientific organizations;
   - provision of scientifically trained manpower and dissemination of scientific information; and
   - provision by the government of certain basic research facilities.

b) Policies for the application of scientific and technological resources under which are included:
   - policies developed within departments and agencies for the use of science and technology in support of their objectives;
   - policies developed through cooperative interdepartmental means for the achievement of broad multidepartmental objectives having a high technological content; and
   - policies to govern procedures involved in the use of science and technology such as the "Make or Buy" policy.

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c) Science in Public Policy, the active participation of scientifically trained personnel in the development of long term national strategic policies and the introduction of scientific knowledge, analysis, and methodology into such planning activity.

The Role of MOSST.

19. MOSST has experimented with a number of organizational structures during its lifetime and its role has been subject to a variety of interpretations. The experience of the formative years will be further discussed in the next section of this document but it is appropriate at this juncture to examine the role as it is now maturing and comment on the extent to which it matches the role recommended in the Senate Committee's report.

20. The Senate Committee felt strongly that MOSST's role as described in the Order in Council came . . . "within the framework of the coordination model", and lacked the authority needed for an effective central agency. The Committee recommended that the Ministry's role be within the framework of the "concerted action" model and specifically that the Ministry's terms of reference be modified to give it budgetary authority in relation to science.

21. While the Ministry tended to agree with the Senators that its role should be more positive than that of its predecessor the Science Secretariat, it could not agree with the Committee's recommendation that it be given authority over science expenditures. The reasoning behind this stemmed from the Ministry's contention - a contention that has since been confirmed as one of the main pillars of the Federal Government's science policy framework - that science is not an end in itself but a means of solving national problems and achieving national goals. The Government's interpretation of national goals and its perception of national problems are reflected in large part in the objectives set for its

departments and agencies. These objectives, in turn, form the basis for the development of programs and the allocation of resources. The level of funding provided for a specific departmental program should reflect the importance of its objectives; and within the program, science and technology must compete for funds with alternate means of meeting these objectives.

22. It follows that, since science is not, in itself, a program but rather one of the means used in the performance of programs, a science budget in the conventional sense (i.e. as a basis for resource allocation) cannot reasonably be accommodated in the existing structure and procedure of the Government; nor can the Government organize its decision-making processes in such a way that final judgements on the mix and balances of science expenditures can be made separately or by a different authority than judgements about the allocation of other resources to the Government's objectives.

23. The Government can however, through the Ministry of State for Science and Technology, ensure that plans and budgets for scientific activities are screened by competent analysts knowledgeable in program objectives and operations as well as in scientific activities across the Government, and that advice by the Ministry is effectively introduced into the decision-making process.

24. MOSST's role may be considered to lie somewhere between the coordination and concerted action models. The Ministry sees itself as part of the central policy making apparatus, working in conjunction with PCO, Treasury Board Secretariat and major science departments in the preparation of proposals to Cabinet. It will complement and coordinate rather than duplicate the scientific or policy analysis expertise in departments and central agencies. It will bring to bear its knowledge of Government objectives and operations and of scientific activities in departments,

its growing analytical competence, and the impartiality that comes from not having any operating programs of its own. In particular, it will assist a "lead" department or take the initiative itself where no "lead" department exists, in seeking solutions to problems of science policy or programs, including the coordination of the programs where more than one department is involved.

25. In accordance with the philosophy expressed in the third arm of the new science policy - Science in Public Policy - the Ministry will be particularly concerned with providing a science input to long-term national strategy, and within this context, note is taken of certain recommendations made by the Senate Committee regarding the overall national expenditure on R&D and the priorities that the Senators felt should be given to certain fields of science.

26. The Senate Committee placed strong emphasis on the need for long-term planning and the establishment of national R&D priorities. MOSST has fully supported the idea of forward planning, but has reservations regarding the Committee's proposal that national expenditures on R&D should reach 2.5% of the GNP by 1980 and that approximately 10% of this effort should be devoted to basic research. National problems and priorities change over the years, and so must the judgements made by Government about the balance of resource inputs to the programs for dealing with them. A fixed GNP-related target for the input represented by science is not therefore meaningful over the long haul. MOSST takes the view that the amount of curiosity oriented basic research performed should probably reflect the wealth of a country in so far as it is directed at a search for new knowledge, while reflecting national needs in so far as it is directed at the training of skilled personnel. The amount of applied research and development effort should be related directly to the solution of national

problems. The means of supporting basic research are discussed further in a later section.

27. The Committee recommended that, at least during the 1970's, the Government's emphasis in support of basic research should be on the human sciences. The Ministry agrees and has highlighted the importance of the human sciences in its advice to Cabinet.

C. THE DEVELOPMENT OF MOSST'S ORGANIZATION AND PROCEDURES.

Early experiments in organization.

28. The Ministry of State for Science and Technology was launched as an experiment in government organization and has had to make its way under difficult circumstances. The Senate Committee recommended that an outside task force be set up to review the organization and structure of the Ministry. However, it is not an exaggeration to say that the Ministry has never ceased to be the subject of review since the day it was founded and has undergone several changes in organization and emphasis as it sought to establish its proper role and method of operation.

29. The original nucleus of the Ministry was provided by the staff inherited from its predecessor, the Science Secretariat of the PCO. As of September 30th, 1971, there were 41 continuing employees on strength. This number has built up over the 4 year period to the present authorized strength of 169. The budget for the first year (1971-72) was $1.1 million and that for the current year $4.9 million. Charts describing the budget and personnel complement for each year are given in Appendix 'A'. The main organizational structures adopted by the Ministry are given in Appendix 'B'.

30. The early problems of MOSST have been well described in a Science Council Background Study - "Knowledge, Power and Public Policy". MOSST is a central agency without the power bases that are the strength of the other two primary agencies, PCO and the

Treasury Board. There were no obvious fields of decision-making responsibility for it to step into. Whatever it did was likely to transgress the boundaries of other departments and agencies. Its proper course was to try to provide a new and needed advisory and coordinating capacity to assist the central agencies, to establish bonds of confidence with departments and to take initiatives in areas that seemed to require it.

31. Mistakes were made in developing this role. At the outset, MOSST had perhaps too high a public profile and tended to make public pronouncements on matters that concerned other departments and agencies. There was also a temptation to take on everything at once and not concentrate the limited resources of the Ministry on a few important tasks. The Ministry also had difficulty in finding the right organizational structure to carry out its role most effectively.

32. It is now clear that a small central agency cannot monitor and comment on every aspect of day-to-day science activity in government. The sheer volume of material passing through the Cabinet Committee system alone, a great deal of which has scientific and technological aspects on which MOSST could have some comment, would totally swamp the organization.

33. The Ministry is now taking an entirely new approach to its principal role, based on a highly selective choice of policy issues and projects. A flexible organization is being created to operate mainly on a task force basis. This matrix approach is not of course a new idea. It has been employed with success in both the public and private sectors. It permits a small group of policy analysts and scientists, or others appropriate to the problem under study, to be organized as a team for a specific task and to be reassigned to handle other problems as they arise.

34. In order that those outside the Ministry shall have some means of identifying who to approach in broad areas of concern,

the Ministry has been organized for administrative and communications purposes into three branches; Government, Universities and Industry. Each branch will have senior project directors who will normally take the lead in organizing and carrying out policy analysis projects of special relevance to the branch. The officers of all branches, however, may be called upon to take part in projects in any field where their experience or abilities is appropriate. The Ministry will expect to obtain assistance from other departments and agencies or from outside government when it is needed for certain project studies.

35. Within the organization, certain units have been identified to carry out continuing responsibilities of the Ministry. While these units will operate mainly on a continuing rather than on a project basis, specific officers within them or indeed the unit as a whole, may be tasked for certain portions of study projects. Appendix 'B' contains the present organization chart and identifies the "continuing activity" units.

36. The Senators have emphasized the need for MOSST to have staff with policy analysis and development experience. The Ministry agrees completely with this view and will continue to apply it in its staffing policies.

37. The role of the Minister was a matter of some concern to the Senators who specifically recommended that he be a member of Treasury Board and of the Priority and Planning Committees. The prerogative for appointing Ministers to Cabinet Committees rests, however, with the Prime Minister, and the Ministry is therefore not in a position to comment on this issue.

MOSST's responsibilities in relation to budgetary matters.

38. The Senate Committee suggested that departments should separate their budgetary proposals for scientific activities from their other operational programs. The science budget proposals

would then be submitted to MOSST for review and assessment. The Ministry would in turn submit them with recommendations for approval to an interministerial committee presided over by MOSST's Minister. The Committee's views would then be presented to the Treasury Board as a package. If Treasury Board judged the package too high in the light of overall government priorities and budgetary constraints, the amount of the cut necessary would be referred to the interministerial committee to determine how and where cuts should be made, again with the advice of MOSST. When approved, the science estimates would be published separately, to give Parliament and the public a better idea of the size and distribution of the Government's scientific activities.

39. While, for the reasons set out earlier, the Treasury Board remains responsible for the approval of science proposals in the context of departmental programs, procedures have been established for the review and assessment by MOSST of proposed science expenditures, and for advice thereon to be provided to the Treasury Board Secretariat. Highlights of the approved science estimates are published separately in "How Your Tax Dollar Is Spent". Thus, except for the creation of an interministerial committee to approve a science budget, substantial changes have been made in the budgetary process for science and technology that are generally in accord with the Senate Committee's recommendations.

40. A Program Review and Assessment Group was established in the Ministry in 1973 to provide advice and support to operating departments and agencies, and to the Treasury Board Secretariat (TBS), on budgetary, program, and management issues having a significant scientific and technological content.

41. The interactions betweeen MOSST and TBS take place in the review of science proposals by departments and agencies within the framework of submissions for program forecasts, main estimates and supplementary estimates. Procedures for carrying out these

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cooperative efforts and for the computerized science expenditure display system which provides historical and current manpower and expenditure data in support of the review process, have been developed and improved through the 1975-76 and 1976-77 budgetary cycles.

42. The separate preparation of data in connection with science expenditure proposals was initiated with the Treasury Board call letter to departments for program forecasts in January, 1974. The call letter included a request, on behalf of, and in support of MOSST, for detailed information on current and proposed scientific expenditures. The data thus obtained, together with past expenditure trends based on annual Statistics Canada surveys of federal science expenditures, were incorporated in a computerized data base,along with Main Estimates data for 1975-76,in the fall of 1974.

43. The data base included information on science resource requests and made possible displays categorized by program and activity, by research and development and related scientific activity, for both the human and natural sciences. Expenditures could also be categorized by performer (intramural, industry, university, others), by region; and to some degree by area of application.

44. Overall trends, as indicated by the science expenditure data, as well as individual requests for new activities were reviewed in the context of government priorities and objectives, with particular attention being given to the response of departments to, for example, the Make or Buy, Oceans or Space policies. Specific recommendations were made to MOSST and TBS managements, and to MOSST's Minister during 1975-76 Program Forecast and were updated during the course of 1975-76 Main Estimates Review. The highlights of the Main Estimates decisions were published at the same time as Main Estimates, in "How Your Tax Dollar Is Spent". Thus, science budgetary information was, for the first time, made

available with Main Estimates data.

45. MOSST has also been advising TBS on requests to TBS for approval of program plans developed by departments, subsequent to their inclusion in program forecasts, and MOSST's Minister is briefed on selected submissions to the Treasury Board.

46. Over the past year, departments have increasingly been seeking MOSST advice during the development of program plans and program forecasts prior to their submissions to TBS. The Treasury Board strongly supports this MOSST role, and TBS has advised departments, who have not done so, to consult MOSST before putting forward submissions.

47. Significant improvements in the MOSST-TBS interaction have occurred during the 1976-77 Program Forecast reviews just recently completed. MOSST carried out a systematic analysis of individual departmental "B" budget requests and made recommendations to TBS with respect to them. In providing advice to TBS on the program forecast, the Ministry has been on the lookout for duplication of effort, lack of adequate interdepartmental coordination, research not related to departmental mandates, and non-uniformities in the planning, budgeting and management of S&T activities.

48. Thus, while MOSST has not sought the central role in the development and approval of a science budget, recommended by the Senate Committee, a working relationship has been developed with departments and TBS which is providing increasingly effective support to departmental program planning, and increasingly useful advice to TBS.

MOSST's responsibilities in relation to international affairs.

49. Science information from other nations is extremely important to Canada and our policies in science and technology must take account of what is happening elsewhere. Opportunities for international cooperation in scientific and technological fields are

increasing and Canada is involved in a large number of understandings and agreements that are highly scientific in content.

50. The responsibility for international science is shared between MOSST and the Department of External Affairs, and involves a very close consultative relationship between them as well as with other departments. External Affairs is responsible for international liaison and communications, both bilateral and multilateral. The Ministry, while recognizing the responsibility of External Affairs to manage Canada's overall international activities, considers itself responsible for developing appropriate policies in relation to international science matters. Where appropriate, it may provide leadership for delegations or chair interdepartmental meetings to establish national positions.

51. The Senate Committee in the second volume of their report emphasized the need for a good scientific and technological network on R&D activities at home and abroad, and the futility of attempting to repeat a scientific discovery or develop an innovation that has already been introduced elsewhere.

52. The Ministry is in full agreement and has had a major role in increasing Canada's scientific representation abroad and in promoting scientific and technological missions to foreign countries including China and Japan. Since MOSST was formed, four additional Science Counsellor positions have been established bringing the total to eight.

MOSST's responsibilities in relation to industrial strategy.

53. MOSST has, since its earliest days, had a major interest in the problems of Canadian industry and the possibility of overcoming these problems by strengthening industry's technological base.

54. The Senate Committee was very concerned at the low level of industrial R&D in Canada and the proportionally high level of R&D performed in government departments. This general concern has also

been expressed in numerous briefs and letters to Ministers and in reports of outside bodies.

55. MOSST put forward the proposition that if government procurement in scientific fields could be steered into industry rather than into government laboratories, it would have a major beneficial effect. This proposal led to the development of the Make or Buy policy and its adjunct the Unsolicited Proposals Program. The development of these policies is described in more detail in an appendix to this brief.

56. The acceptance by the Government of the Make or Buy policy was a distinct achievement for MOSST. It involved intensive consultation and persuasion since the concept tended at first to appear contrary to the individual interests of departments.

57. The importance of the industrial aspects of science and technology cannot be overestimated and while the primary responsibility for relations with Canadian industry rests, of course, with the Department of Industry, Trade and Commerce, MOSST from its early years has expended a major part of its effort on industrial matters. The Ministry continues to give a very high priority to industrial issues: indeed, it is currently reviewing the operation of the Make or Buy policy and examining the possibility of extending its application. A review of industrial research and development incentive programs is also underway, as is the examination of the recommendations of a report on the availability of risk capital for technological innovation which was prepared for the Ministry by Mr. Robert Grasley.

58. In 1974, MOSST made representations to Cabinet on the need to enhance the international competitiveness of selected sectors of Canadian industry through the development of comparative advantages based upon technological excellence. Cabinet instructed MOSST to set up and chair an Interdepartmental Committee on Industrial Technology Policy. Working papers prepared for this committee have

dealt with the shortcomings of existing industrial R&D assistance programs and the general issue of industrial R&D support. These issues are presently under consideration.

59. A close association exists between the above Committee and the Interdepartmental Committee on Industrial Policies and Strategies set up by the Department of Industry, Trade and Commerce. It is understood that IT&C will be briefing the Senate Committee separately on the working of this Committee and on other recommendations directed specifically by the Senators to that Department.

60. The Senate Committee's recommendation regarding the creation of the Canadian Innovation Bank (CIB) has been partly implemented in the context of the Federal Business Development Bank (FBDB). A recent MOSST funded study (The Grasley Study referred to in para. 57.) supports the need to provide venture capital and specifically recommends awards for inventors.

61. In relation to the Senate Committee's recommendation that MOSST and IT&C develop a "marriage bureau" to expedite partnerships between Canadian firms and complementary companies in other countries, MOSST is advised that, in recognition of the complexities of such an undertaking, IT&C is in the process of forming a highly specialized group within the department for this purpose.

62. The Committee expressed concern regarding the training of R&D managers. As a result of a study at Queens University sponsored by MOSST, the Canadian Manufacturers Association has initiated plans to establish a training course on innovation management at one of the leading business administration schools in Canada. The formation of the Innovation Management Institute of Canada, an independent group which plans to establish R&D management courses at a number of centres across Canada, is also a step in the direction called for by the Senate Committee.

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MOSST's responsibilities in relation to the Universities and the provision of Highly Qualified Manpower.

63. Although the Federal Government makes a major contribution to higher education through federal-provincial fiscal transfers, its direct involvement is limited to the support of post-graduate research. MOSST has been involved since its formation in numerous studies of the granting system through which the government supports such research. Its aim has been to thoroughly investigate the many issues and problems associated with the government-university interface and develop mechanisms that satisfy both the government and academic constituencies. Meetings have taken place with university authorities at all levels and also with officials of the Granting Councils. There are many important issues to cover; trends in employment of those with post-graduate training, the effects of inflation, the question of the indirect costs of research and who should pay for them are examples.

64. The Senate Committee indicated major concern regarding Canada's ability to develop the needed future supply of highly qualified manpower and made a number of specific recommendations along this line. MOSST shares the Senators' concern and takes the position that the level of support provided by the Government in any particular scientific discipline, including support of graduate students, should be responsive to foreseeable demands for research trained graduates.

65. In support of this philosophy, the Councils will need to gain an insight into the training and deployment patterns of university educated persons generally and of research trained persons in particular. Accurate information on this subject is not readily available for all disciplines. The post-census Highly Qualified Manpower survey, jointly sponsored by the Ministry of State for Science and Technology and Statistics Canada,

and the analyses which will subsequently have to be carried out, represent an attempt to improve the information on the subject, and should assist the Councils in their decision-making.

MOSST's role in technology assessment.

66. MOSST is particularly concerned with providing a science input into the long-term national planning. As part of its ongoing program, the Ministry has established a Technology Assessment Division within the Industry Branch which is its central focus for assessment studies. Its main role is to provide assessments of likely advances in science and technology, their alternatives and effects on the quality of life in Canada. The assessments are designed to provide essential background for the policy formulation and advisory roles of the Ministry.

67. These studies are selected with due recognition of the potential contribution which they can make to national priorities. Proposed studies are then reviewed by the Project Management Committee of MOSST and either approved, modified or postponed for later consideration.

68. In the category of long-term impact R&D, MOSST has recognized the need for technological assessment in the areas of solar, fusion and hydrogen energies. Following a detailed study funded by MOSST and the Atomic Energy Control Board with assistance from the Departments of Supply and Services and National Defence, a report was released in June, 1975,that examines Canada's options for R&D in fusion systems. The Government, in undertaking the study, recognized that nuclear fusion is an important area of science which may contribute in an important way to the national long-term energy needs.

69. A comprehensive assessment,funded by MOSST, of solar energy systems and their potential for Canada,was prepared by the Brace

Research Institute. The fusion and solar energy reports were made available to the Interdepartmental Task Force on Energy R&D and considered in establishing the R&D priorities. At present, a report on the general subject of hydrogen as an element in the national energy base is being prepared. It will be completed by the end of 1975 and it too will be submitted to the Task Force. These three areas of energy technology coincide precisely, though not by design, with the topics in the International Energy Agency of OECD R&D program which deals with new energy sources and the longer range problems.

D. MAJOR POLICY INITIATIVES.

70. In an earlier comment regarding the role of MOSST, the point was made that the Ministry would take the lead in promoting policy development studies or expediting specific programs when it was clear that the necessary organization or initiative were lacking.

71. MOSST has on a number of occasions identified problems or opportunities in high technology areas that were not receiving adequate attention and has taken the initiative in bringing together the necessary departments and organizing the development of policy.

72. Two types of policy are involved: policies for the development and use of technology in areas of priority concern such as the oceans, space, food and energy (these will usually be areas which do not fall within the statutory responsibility of any one department or agency), and policies governing general procedures relating to the use of S&T resources. The latter will be policies such as "Make or Buy" which the government wishes observed by all departments and agencies.

73. MOSST has had a full central role in two of these R&D policy developments: "Make or Buy" and "Oceans Policy", and a

major role in the development of "Space Policy". The Ministry has had a participating role (under EM&R leadership) in developing policy for Energy R&D. The history of these is given in Appendix 'C'.

74. The procedures used in these major policy study initiatives differ from one to another. The general practice has been to assemble an interdepartmental committee at senior level to give general direction to the work and to ensure reasonable balance and accordance with the Government's existing policies and intentions. Under this committee there would be formed a group of experts from appropriate departments who would be responsible for providing information and taking part in the analysis and development of policy proposals.

75. Outside consultants may be brought in to give specific advice or, as in the case of the Ice Covered Waters Study (described in the case history of the Oceans Policy), to act as central coordinator of the study.

76. Within MOSST a senior officer (usually at project director level) will be responsible for the general organization and running of the study program and the Ministry may, if appropriate, provide a secretariat in support of it.

77. Once a policy proposal has been completed and agreed to by the main committee, the Ministry will, in conjunction with appropriate departments, decide who should present it to the Cabinet. It will often be appropriate that such a policy be put forward by a number of Ministers.

78. The acceptance by Cabinet of a policy proposal stemming from this procedure does not necessarily mean that MOSST has no further part to play. The Ministry may be instructed by Cabinet to take further action such as setting up an appropriate co-ordinating mechanism. MOSST will, of course, continue to monitor the S&T aspects of both new and existing policies.

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E THE GOVERNMENT'S POSITION REGARDING THE GRANTING COUNCILS AND THE SUPPORT OF BASIC RESEARCH.

79. Canada's scientific capability can be measured in terms of the number and calibre of its scientists, the excellence of its scientific facilities, its ability to generate, store and retrieve scientific knowledge, and its ability to obtain needed scientific knowledge from outside sources.

80. The Federal Government encourages and supports the improvement of Canada's scientific capability through its support of post-graduate university research (an important component of post-graduate training), its provision of special facilities and equipment, its arrangements for scientific representation abroad, and its support of Canada's participation in the activities of international scientific organizations.

81. Research stemming from the curiosity of individual scientists is the process by which knowledge is generated and the foundation of the whole edifice of scientific and technological achievement. Some experience in research is an essential part of the scientist's training and his performance of research in the universities gives strength and vitality to the whole academic system. Furthermore, it assures that Canada has a capability to identify and assimilate new scientific knowledge.

82. The Senate Committee made a number of recommendations concerning federal support of basic research and suggested a revised granting organization consisting of a Canadian Research Board with three foundations. These recommendations, together with others, received very intensive study and in the spring of 1974 the Government reached a number of fundamental decisions which have since been translated into draft legislation.

83. All the studies of the granting council system have recommended organizational changes to strengthen it, improve the balance between the support of the various disciplines, increase the

emphasis on interdisciplinary research and harmonize procedures. The alternatives offered have ranged from retention of the present system to a single granting council covering all disciplines. The Senate Committee's proposals had an attractive neatness, simplicity and symmetry, but they implied a disassociation of curiosity-oriented basic research from mission-oriented basic research and a rather strict disciplinary basis for the organization of the granting foundations.

84. The Government's position tends to be more flexible. While maintaining the fundamental criterion of excellence as a basis for supporting university research, the Government wants to encourage scientists to tackle problems that relate to national needs and objectives. Furthermore, it places much emphasis on the need for interdisciplinary research and will encourage universities to relax the disciplinary boundaries of former years. In summary, the Government, while not of course using grant assistance to support research directly related to departmental missions, favours a more flexible system with greater stress on relevancy to national needs. These needs are not limited to research results but also include the development of trained manpower, the maintenance of a regional balance in research work and the build up of excellence in fields of specific importance to Canada.

85. In order to implement this policy the Government has announced its intention to make certain structural changes in the granting system. These changes will be detailed in the legislation but, as Senators will be aware, the Government's intentions have already been made public in the Speech from the Throne, and in a number of Ministerial speeches.

86. It is intended that there shall be three granting councils; a Social Sciences and Humanities Research Council, which will be responsible for the social science and humanities support previously provided by the Canada Council, a Natural Sciences and Engineering

Research Council which will consist of the present NRC granting function separated from the NRC laboratories, and the Medical Research Council which will retain its present functions.

87. The Canada Council will, if this legislation is approved, be concerned entirely with the arts. The establishment of a separate granting agency for the social sciences and humanities will give the added emphasis that is seen to be needed in these fields - emphasis that was specifically recommended by the Senate Committee.

88. With one exception, all studies of the Granting Councils have recommended the separation of the granting and laboratory functions of the NRC (the Science Council agreed that separation would take place eventually as a matter of course, but did not recommend that such a step be taken at the time of writing, 1969). The main argument in favour of separation has been that the management of both functions would be enhanced. The Senate Committee felt it particularly important that the management of the laboratories be free of the granting responsibility in order to be able to devote more time and attention to the laboratory function. These and other factors were considered when the Government decided that the functions should be separated. The future of the laboratories will be discussed in the next section in relation to government performance of S&T activities.

89. Suggestions were made by the Senate that the NRC support for the biological sciences be transferred to the MRC to create the proposed life sciences foundation. This proposal did not, however, receive unanimous support in the scientific community, and it was recognized that the presence of biology within the support programs of the NRC would be advantageous to the encouragement of interdisciplinary science.

90. The granting operations of both the NRC and the MRC are highly regarded in the science community and the Government does

not feel that any redistribution of responsibilities is called for.

91. The terms of reference of the Medical Research Council will remain basically the same.

92. Coordination of the operations of the existing Councils is at present carried out by the Tri-Council Coordinating Committee. This committee is composed of the heads of the three Councils and the Secretary of MOSST and is chaired by the President of one of the Councils. This coordinating mechanism was criticized by the Senate Committee and others as being ineffective, and a number of alternatives have been proposed.

93. The Senators recommended a Canadian Research Board which would advise the Minister responsible for the three foundations on the overall allocation of funds among them and, in addition, would perform the coordinating functions now performed by the Tri-Council Committee. The Board would have a part-time independent chairman and its membership would consist of the heads of the granting agencies and others,including a number of non-government scientists.

94. While the Government agreed that a strong coordinating board or committee was needed, it was recognized that, since its main functions would be of an internal or inter-council nature, the involvement of non-government scientists would be inappropriate. Taking into account the coordinating and advisory role of MOSST, it was felt that the Committee should be chaired by the Secretary of the Ministry and should report to the Minister of State for Science and Technology. It would be composed of the heads of the Granting Councils and the Secretary of MOSST. Other Senior Officials may be asked to participate in the deliberations on occasion, depending on the subject-matter under discussion. The functions of the Inter-Council Coordinating Committee will be:

a) to ensure coverage of all recognized disciplines;

b) to ensure that the needs of interdisciplinary research are met;

c) to harmonize granting practices;

d) to provide a forum for the discussion of matters of interest to all three Councils.

95. It is emphasized that the Granting Councils will not report to the new Inter-Council Coordinating Committee. Each will report to Parliament through its own Minister. Each Council will have a governing board made up of members selected from the scientific community at large and appointed by the Governor-in-Council. Finally the Councils will continue to use the peer assessment mechanism in the operation of their programs.

F. THE GOVERNMENT'S POSITION REGARDING THE SCIENCE COUNCIL OF CANADA.

96. The Senate Committee has made a number of recommendations relating to the Science Council. They include changing the Council's name to the Science and Engineering Council of Canada, making its chairman and vice-chairman full time, increasing its membership to include social scientists and doing away with the status of associate membership. The Senators were concerned that the present roles of MOSST and the Science Council tended to overlap, and they suggested that, unless MOSST achieved the authoritative budgetary role that they had recommended, the Science Council as a second advisory body should be abolished.

97. The Government is receptive to the Senate Committee's recommendations regarding increased membership and the abolition of associate membership, but is less inclined to accept the change in the Council's title or the appointment of a full time chairman and vice-chairman.

98. There are distinct differences in the roles that MOSST and the Science Council play as advisers and the Government intends to amend the terms of reference of the Science Council in such a way as to emphasize this difference.

99. The Science Council is independent of government direction

and, as well as developing views on science and science policy, plays an important role in educating the public about the impact of science and technology on society. MOSST, on the other hand, is an "in house" advisory body concerned primarily with internal policy development, advice and coordination. The Government intends in its new legislation to emphasize the public role of the Science Council and will expect that in the future the Council will concern itself more with public awareness of science and its implications for society.

G. THE GOVERNMENT'S POSITION REGARDING THE PERFORMANCE OF S&T ACTIVITIES IN FEDERAL DEPARTMENTS AND AGENCIES.

100. The S&T functions implicit in the statutory responsibilities of federal departments and agencies can be grouped under five headings:

1. Science-based Services
2. Regulatory Functions
3. S&T Support of Major Government Functions (e.g. Dèfence)
4. Support of Basic Research and Overall National Capacility in Science.
5. Support of Canadian Industry.

101. It is under headings (1), (2) and (3) above that the Federal Government actually performs research and other related activities (e.g. scientific data collection, testing, standardization, etc.).

102. The Senate Committee made far-reaching recommendations regarding the performance of research in federal departments and agencies. The "Make or Buy" policy has constituted the Government's response to some of these recommendations, and since this policy has already been referred to and is described in detail in an appendix, it will not be further covered at this point. Recommendations concerned with the Granting Councils have already been referred to in an earlier section. Those concerned with departments and with the NRC laboratories were:

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1. that most basic research activities of the Federal Government be concentrated in a National Research Academy,
2. that government laboratories with an industrial orientation be brought together in a new Crown agency.

103. The Committee called for a National Research Academy with three Institutes for the physical sciences, life sciences, and social sciences. The NRC laboratories (separated from the granting function) were to provide the nucleus of the new organization. The future of the NRC laboratories has been debated at great length, both inside and outside government, and the decision has been reached not to make radical changes to its structure or terms of reference, but rather to encourage the agency to make a significant internal shift in emphasis towards support of Canadian industry and contribution to solution of specifically Canadian problems.

104. The recommendation calling for a new Crown agency to incorporate those government laboratories involved in industrially oriented research implied massive and complex organizational and operational issues. The Government is not, however, satisfied that benefits of such a large scale reorganization would justify the disruption and cost imposed. An example of the problems inherent in bringing about such a radical reorganization is the difficulty of deciding what aspects of research and development are separable from the mission of a department without destroying its operational capability. The dividing line between research and other scientific activities such as data gathering is often almost impossible to determine.

105. The Government has noted the Senate Committee's general emphasis on the need for a continuous overview of the scientific activities of departments and agencies, and agrees that such an overview is indeed necessary in order to avoid waste, duplication and lack of relevance to stated objectives. The Ministry of State

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for Science and Technology is becoming increasingly equipped to perform this function and Senators may be assured that the Ministry's overall concerns and objectives are very similar to those that the Senate Committee has expressed.

H. OTHER MATTERS OF CONCERN TO MOSST IN WHICH THE SENATE COMMITTEE HAS EXPRESSED A SPECIFIC INTEREST.

The Federal Government's relationship with scientific institutions.

106. Federal support of the activities of Canadian scientific and technical associations is not at present based on clearly defined objectives and guidelines.There is a tendency for departments and agencies to react on an individual basis to the needs and requests of associations. Furthermore, the Federal Government has often had to step in and perform a role that in other countries would be performed by some senior non-governmental agency in fields such as information and representation.

107. The Senate Committee recommended that the Royal Society of Canada and SCITEC become the main spokesmen of the scientific community, and that the Royal Society of Canada become overall co-ordinator of Canadian S&T representation at the international non-governmental level. These recommendations did not receive the general support of the scientific community and the Government has not acted on them. The Government has, however, decided to channel to the Royal Society of Canada, through the Department of Supply and Services, on an experimental basis, some departmental contracts for science and technology services in response to government needs. The Ministry of State for Science and Technology will be responsible for overseeing the effectiveness of this policy, the aim of which is to provide the RSC with some financial support and the opportunity to contribute to the solution of national problems.

108. The Senate Committee recommended that the name of the

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Institute for Research on Public Policy be changed to the Institute for Research on Social Policy, and that its financing and research priorities be approved by a Federal-Provincial Ministerial Committee on Science and Technology.

109. While the Government recognized the need for intensified research on social policy and for avoiding duplication, it nevertheless felt that this recommendation confused a number of different aims. Other possible avenues of cooperation need to be explored before resorting to a Federal-Provincial Committee at Ministerial level,and cooperation should not, in any case, be limited to the social aspects of public policy. The Government feels that the Institute's independence is its strength and should not be weakened by outside constraints.

S&T information.

110. It has been clear for some time that Canada needs a system for storing, retrieving and disseminating S&T information (STI). The Senate Committee placed considerable emphasis on the importance of a strong and coordinated STI organization and made a number of specific recommendations on the subject. The overall thrust of these recommendations was towards the establishment of MOSST as the general focus of STI planning and operations.

111. The Ministry agreed with the importance of STI to Canada but did not accept the proposal that MOSST should itself become the primary agency responsible. The Ministry will certainly maintain an overview of the STI scene, but the prevailing opinion is that STI services have to be established in response to the needs of specific types of customer. Linkages between systems are being encouraged and the NRC is carrying out research on new techniques for storage and retrieval of S&T information. Emphasis will be placed on evolutionary improvements and cooperative use of information resources.

112. This philosophy was embodied in the direction given by the

Cabinet in 1969 that the NRC, under the general direction of the National Librarian, develop, in concert with existing information organizations, a national scientific and technical information system to encompass the natural sciences and engineering.

113. In 1974, the National Science Library and the Technical Information Services of the NRC were merged in the Canada Institute for Scientific and Technical Information.

Futures Research.

114. The Senate Committee made a number of recommendations concerning the study of Futures. They included enlarging the activities of the Economic Council to incorporate a Committee on the Future, sponsoring a conference on anticipatory institutions, and coordinating technological forecasting activities in the Federal Government. The Ministry has agreed with the general intent of these recommendations. The Economic Council is now exploring ways and means of extending the time horizons of its research and policy advisory functions. A leadership role in Canada in futures research has been assumed by the Institute for Research on Public Policy. The Institute will also serve as a catalyst and clearing house for futures studies. The Ministry agreed that some degree of overall coordination of the technological forecasting activities within government is also desirable. The Ministry chairs the ad hoc Interdepartmental Committee on Technological Forecasting which was created in late 1973 in answer to these needs. This committee acts as a focus for futures activities in the Canadian government. Through this committee, presentations on methodology by experienced professional groups, surveys and questionnaires on futures studies, discussions and information on conferences and seminars have been encouraged. The Senate Committee has asked for a separate report on futures studies and MOSST will be responding to this request at a later date.

MINISTRY OF STATE FOR SCIENCE AND TECHNOLOGY

TOTAL BUDGET 1971-1976

($ thousands)

1971-72	1,117
1972-73	2,918
1973-74	5,111
1974-75	4,603
1975-76	4,964

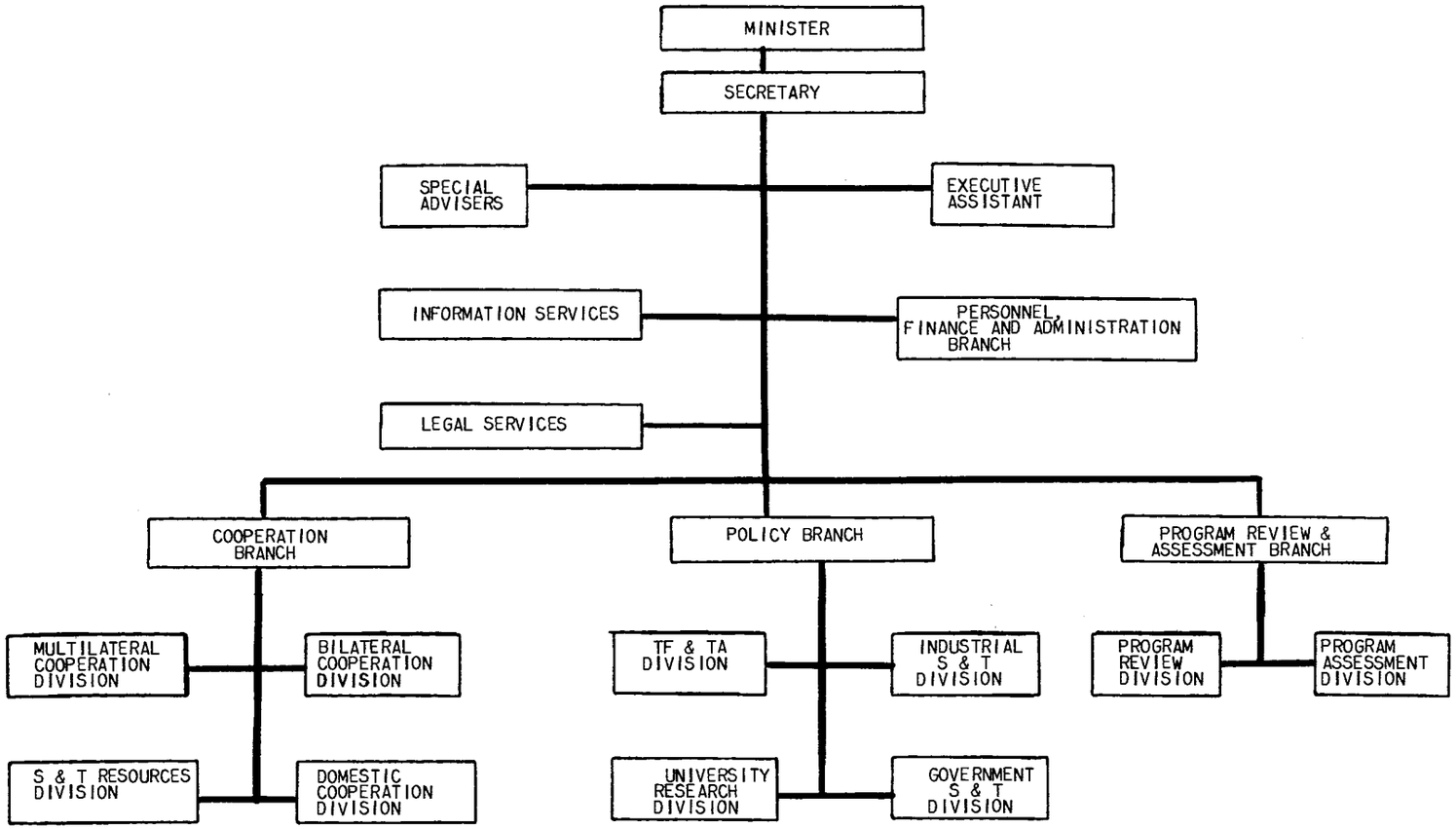
PLANNED CONTINUING EMPLOYEES 1971-1976

March 31, 1972	44 (23)[1]
March 31, 1973	90 (50)
March 31, 1974	112 (63)
March 31, 1975	160 (90)
March 31, 1976	169 (97)

Figures in these tables have been abstracted from the Blue Book for the fiscal year ending March 31, 1976

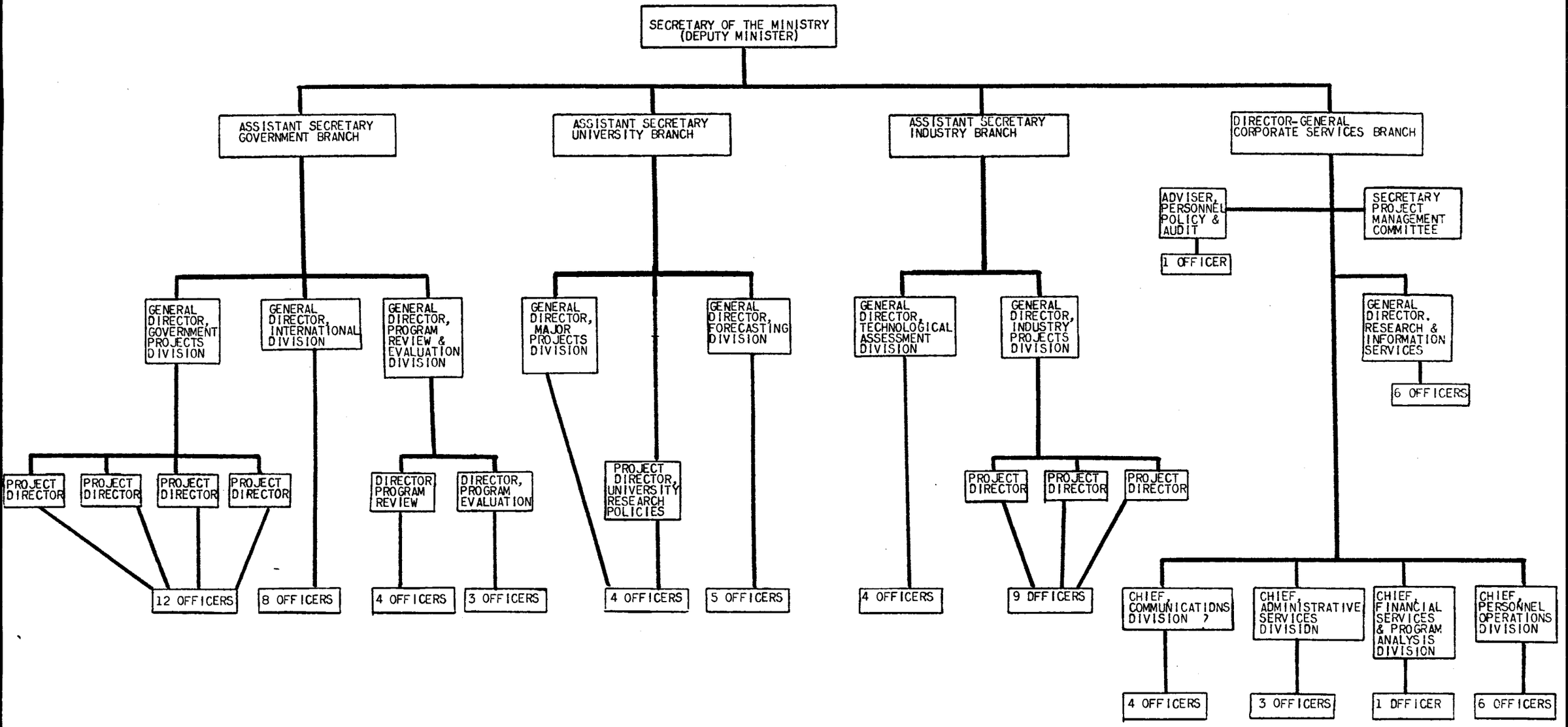
[1]Figures in brackets refer to executive scientific and professional, administrative and foreign services categories.

MOSST ORGANIZATION
1973



APPENDIX "B"

MINISTRY OF STATE FOR SCIENCE AND TECHNOLOGY



NOVEMBER 10, 1975

CASE HISTORIES OF MAJOR SCIENCE POLICY INITIATIVES

OCEANS POLICY

Policy Formulation

1. In September, 1972, Cabinet, in response to a memorandum from the Ministers of MOSST and Environment, decided that Canada's ocean policies needed review with particular emphasis on ocean science and technology and the development of ocean industry. Factors critical to this decision were the increased demands on both industry and government for the scientific and technical expertise necessary for management and exploitation of ocean resources coupled with the fact that there existed neither a pervasive policy nor overall guidelines to govern the actions of federal departments and agencies with maritime interests.

2. Responding to the Cabinet directive MOSST, in cooperation with the Privy Council Office, established the Task Force on Ocean Industry, Science and Technology with members from the federal departments and agencies having maritime responsibility. The objectives of the Task Force were:

(1) To bring to Cabinet's attention the strategic significance to Canada of the ocean and its resources.

(2) To identify areas of marine science and technology where federal policies are, or will be, inadequate to meet Canada's increasing responsibilities, commitments and opportunities.

(3) To recommend specific policies for ocean science, technology, and industry which could be implemented immediately.

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(4) To recommend structures and instruments for the formulation, coordination and implementation of Canada's policies for marine science and technology.

3. The Task Force, which was established under the Chairmanship of the Senior ADM of the Department of Energy, Mines and Resources and later the ADM (Ocean and Aquatic Affairs), Department of the Environment, had representation at the level of Director or above from all departments and agencies concerned in any major way with ocean matters. The day-to-day operations of the Task Force were delegated to a small working group to which MOSST provided a senior officer on a full-time basis.

4. The Task Force conducted a detailed study of five principal areas of concern relating to the oceans:

(1) Management of sub-ocean mineral and petroleum resources
(2) Management and protection of ocean biological resources
(3) Oceans as a medium for transport
(4) Oceans in relation to defence and security
(5) Measurement and maintenance of oceans quality.

These studies were reviewed individually by the interested departments and then combined to form a single report. This report stressed that Canada must develop and control, within areas under Canadian jurisdiction, the essential capacity to locate, manage, and exploit off-shore resources. To this end, it was urged that a policy be adopted which

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would, inter alia, stimulate the development of Canadian ocean industry and ensure that Canada possesses an adequate level of scientific and engineering expertise and knowledge to permit rational management and exploitation of our ocean resources. The government approved the policy on July 12, 1973.

Policy Implementation

5. The provisions of the policy and actions which have been taken towards their achievement are summarized as follows:

(1) MOSST and other concerned departments and agencies should ensure that Canada develop, within five years, an internationally recognized excellence in operating on and below ice-covered waters.

6. In response to this provision, an ad hoc interdepartmental advisory committee was established by the Minister of State for Science and Technology in November 1973 to discuss the requisite operating capabilities. At the same time, MOSST retained a consultant to assist in the identification of program requirements. After extensive consultation involving a broad survey of industrial and government expert opinion, a series of R&D programs were identified in September, 1974, as critical to development of the ice-covered waters operating capabilities. Further extensive interdepartmental discussion resulted in the determination of relative priority ratings for the various proposed programs and the preparation for Cabinet consideration of proposals designed to achieve Canadian

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ice-covered waters operating expertise.

(2) The Minister of Industry, Trade and Commerce, in consultation with the Ministers of other concerned departments and agencies should bring forward proposals for the development and support of Canadian ocean industry.

7. In response to this directive, the Department of Industry, Trade and Commerce has developed proposals to encourage greater research and development of ocean technology in Canada, efficient production of ocean related products, development of internationally competitive service contractors, higher degree of Canadian ownership and control, regional expansion of industrial activities, and an increased level of professional and technical personnel with ocean related capabilities.

8. Of further relevance to the Ocean Policy provisions in support of ocean industry has been the establishment by the Department of Indian and Northern Affairs of the Advisory Committee on Canadian Content in Oil and Gas Operations on Canada Lands, recently given a broader mandate and renamed the Advisory Committee on Industrial Benefits from Natural Resource Development. This sub-committee of the Advisory Committee on Northern Development was established in March 1974, in light of concerns expressed by MOSST, that Canadian ocean industry was not being given adequate opportunity to participate in northern resource development projects. Since its inception, the Advisory Committee has been instru-

mental in bringing about an increased Canadian content in certain of these projects. The government's intention to promote increased sourcing in Canada of equipment and services used in resource exploitation projects has recently been stressed by the Minister of Indian and Northern Affairs.

(3) Special emphasis should be given to national marine science and technology programs which support various oceans related objectives such as the development and management of Canada's ocean resources, the management of estuarian, coastal and nearshore zones and improved capabilities to predict marine atmospheric and oceanic factors (weather, sea state, currents, ice, etc.)

9. The Ocean Resource Management Program of DOE represents one response to this directive. This is a major 6-year scientific program to carry out the scientific research necessary for sound resource management in two of Canada's most crucial coastal areas: the Strait of Georgia and the Gulf of St. Lawrence. The significance of this program goes beyond research per se. In both of the study areas there are a multiplicity of interests, often overlapping and sometimes competing, originating in both the private and government sectors, all legitimately concerned regarding the management of the ocean resources in the region. In order that all the potential "customers" for the research results stemming from the Ocean Resource Management Program could participate in the overall planning and design of the research, MOSST proposed that Program Requirements Boards be established for both the Strait of Georgia and Gulf of St. Lawrence sub-programs.

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These Boards are made up of representatives from the federal and provincial governments, private industry, public utilities and the universities. The purpose of the Boards is to review proposed research to ensure that it does, in fact, support the management objectives of the ocean resources as viewed from the perspectives of the various "customers". MOSST is represented on these Requirements Boards.

10. The Beaufort Sea Project is a further illustration of a response to this directive. Conducted as a joint undertaking by the government and the Arctic Petroleum Operators Association, this concerted scientific program is aimed at establishing a sufficiently sound scientific understanding of the Beaufort Sea environment to allow safe oil and gas operations. The program constitutes a total environmental approach and includes detailed investigation of wildlife, fish, oceanographic and geological parameters, and the interaction between oil, ice, and sea water. It is anticipated that the program will result in significant improvement in the government's ice and weather forecasting capabilities in the area and will lead to a marked upgrading of the abilities of both government and industry with regard to the detection, containment and clean-up of oilspills in ice-infested waters.

11. Numerous other activities, both ongoing and planned, can be considered as responding to the directive to develop marine science and technology in support of broad national objectives. Among these are included the ice-covered waters proposals, the Ministry of Transport's decision to assist in construction and operation of an ice-breaking bulk carrier,

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and a proposed 18 million dollar expansion of the Bedford Institute of Oceanography.

Policy Evaluation

12. The Cabinet decision of July 12, 1973, assigned responsibility for evaluation of the Oceans Policy and its implementation to two agencies, the Canadian Committee on Oceanography and MOSST.

13. The Canadian Committee on Oceanography (CCO) is an association of universities, industries and federal government agencies that are directly involved in marine research and its applications. Because of its multisectoral perspective, the CCO was directed by Cabinet to advise the government on the general state of Canada's ocean science and technology, on possible opportunities for participation of Canadian industry in oceans-related programs and on opportunities for new Canadian initiatives in the development and use of ocean science and technology.

14. The CCO has reviewed and commented upon the proposed program for ice-covered waters operating excellence and, through its various subcommittees, has been involved in review of the Ocean Resource Management Program proposals from the early stages. With regard to international concerns, the CCO is the interface agency through which Canadian participation in a growing number of joint multilateral oceanographic undertakings is being co-ordinated.

15. MOSST's position with regard to evaluation of the Oceans Policy is one of overview and catalysis. The Cabinet

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directed that MOSST conduct a continuing review of policy on ocean industry, science and technology and, in consultation with concerned departments, develop appropriate policies and guidelines as needs arise.

16. In order to keep informed, MOSST is represented at meetings of the CCO, on the various committees and boards which have already been mentioned as having been established to ensure effective implementation of various Oceans Policy provisions, and on various other oceans-related groups, such as the Interdepartmental Committee on the Law of the Sea. Moreover, MOSST receives information on programs through its budgetary review process in association with the Treasury Board Secretariat.

"MAKE OR BUY"

Policy Formulation

17. Briefs and letters to Ministers and reports from outside government on the subject of the decline of industrial R&D in Canada during the early 1970's led, in 1971, to consideration of the use of the Government's procurement in science and technology fields as a means of enhancing the country's industrial technology base.

18. Although the "Make or Buy" approach for handling such requirements had been considered several years earlier, it was proposed to give it a more positive definition based on current conditions. The objective of the policy is to increase the usefulness of government science by having industry and other non-government performers carry out the necessary science and technology, thereby, enhancing the level of industrial technological capability in Canada.

19. All interested departments and agencies were consulted during the preparation of three Cabinet Memoranda which defined the principles of the policy, the criteria governing which scientific activities would be contracted out, and the restrictions and limitations for initial implementation. The Memoranda were prepared during the first half of 1972. MOSST prepared the first two and acted as the focus for the associated interdepartmental discussions. The third Memorandum was prepared by DSS with a major input by MOSST.

Policy Implementation

20. The policy embraced research, development and feasibility

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studies in the natural sciences with the preferred performer being industry. While other performers from the universities and non-profit institutions were not covered by this policy, there has been no change in the practice of placing R&D contracts with them whenever it is the most effective way to do so.

21. The policy was announced in August 1972 and implemented in early 1973. Implementation was based on the premise that the onus should be on the departments and agencies, to show why new mission-oriented research and development could or should not be conducted in industry. The criteria for permitting "in-house" R&D were:

1. Where questions of security prohibit industrial involvement;
2. Where the R&D required is inappropriate to industry or a suitable industrial capability does not exist and it would not be of benefit to Canada to create one;
3. Where the R&D is essential to a regulatory function and no private establishment independent of the firms being regulated can be found or created;
4. Where the R&D is essential to the development and maintenance of a set of national primary standards and of certain secondary and consumer standards;
5. Where conduct of the R&D is essential to establish and maintain the requisite level of expertise within Government; and

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6. Where the conduct of R&D is necessary to the effective support and operation of intramural capital facilities which provide central testing and research services which are agreed to be necessary to Canadian industry.

22. The Department of Supply and Services was assigned the central contracting responsibility under the policy. However, the policy did not create special funding and requirements for mission-oriented R&D have been funded through normal budgetary mechanisms and procedures.

23. To date, contracts with industry for R&D and feasibility studies under the Make or Buy policy have totalled $72 million. Various funded programs (e.g. those of the Canada Committee on Agricultural Engineering and the Canada Committee on Meats) have been established in accordance with the policy. In addition, policies for Space and the Oceans, prepared since the Make or Buy policy came into effect, have incorporated the principles of that policy.

Policy Evaluation

24. MOSST is undertaking an evaluation of the policy for the period 1973-1975. Preliminary results of this evaluation indicate that the results have been in accordance with the policy objectives, but that only a few industry sectors have been reached by the policy.

UNSOLICITED PROPOSALS PROGRAM

(An Adjunct to Make or Buy)

Policy Formulation

25. The increasing involvement of the industrial sector in the Government's requirements of science and technology as a result of the Make or Buy policy has led to a large number of unsolicited research proposals from the private sector. A mechanism to handle such proposals was developed as an adjunct to the Make or Buy policy and was thus the initial phase in extending its scope.

26. The objective of this adjunct is to permit Government departments and agencies to take advantage of good ideas from outside Government.

27. The policy adjunct was defined in two Memoranda to Cabinet: the first identified the principle of the policy, and the second the mechanism for its implementation including the establishment of a fund to provide bridge financing to support accepted proposals until the sponsoring department could incorporate on-going work arising from the proposals into its budget.

28. All interested departments and agencies were consulted during the development of the policy. MOSST prepared both Cabinet Memoranda. The first received approval in July, 1973 and the second in February, 1974. For preparation of the second Memorandum, a senior officer from the Department of Industry, Trade and Commerce was seconded to the Ministry.

Policy Implementation

29. The Department of Supply and Services was given the

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central role in administring the policy adjunct and the associated Fund. The policy was implemented in June 1974, when establishment of the Fund was approved in the Main Estimates of the Department of Supply and Services. An announcement was then circulated to all departments and agencies and to the public shortly thereafter.

30. The principal criteria established for acceptance of unsolicited proposals from Canadian sources are that the work to be undertaken is within the mission and priorities of the sponsoring department and that the proposal is sufficiently unique to warrant a non-competitive contract.

31. Funding for FY 1974/75 was designated at $3 million, which was increased to $10 million for FY 1975/76. Since implementation of this policy, 130 contracts with a total value of $12.7 million have been placed as of September 15, 1975.

32. MOSST has participated on a continuing basis in the interdepartmental evaluation of each unsolicited proposal to assess the relevance and priority of the work to be performed within the overall program of scientific activities of the sponsoring department.

Policy Evaluation

33. DSS has provided monthly reports on the status of the Unsolicited Proposals program and has reviewed the results of the initial 16 contracts which have been completed. This initial evaluation indicates that the results of the initial contracts have been of commercial and technological significance while contributing to the science mission of the

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sponsoring departments. A good example of this dual achievement would be the $375,000 contract to Huntec-70 Ltd. for the development of a new seismic system to map the geology of the ocean floor. Not only was the project a success technically, it also contributed to the science mission of the Bedford Institute of Oceanography and gave further strength to the scientific and technological capabilities of the company.

SPACE POLICY

Policy Formulation

34. Canadian space activities, which date back to the 1950's, have included satellites for research, technology development and operational purposes and have involved significant bilateral and multilateral cooperation with other nations and agencies. Canada's primary interest in space is to use it for applications that contribute directly to the achievement of established national goals.

35. The development of a definitive space policy began in the early 1970's with the establishment of an Interdepartmental Committee on Space. This committee, which had membership from those departments and agencies with responsibilities or interests in space science, reported to a Cabinet Committee.

36. Almost from its inception the committee found itself involved in the issue of Canada's possible participation in the U.S. Space Shuttle Program. The complexity of this issue tended to overshadow the more general but nevertheless pressing problem of establishing a national space policy. Lack of such a policy, in turn, made it difficult to reach a decision regarding the shuttle program.

37. When the Ministry of State for Science and Technology was formed the secretarial responsibilities for the Interdepartmental Committee on Space (ICS) were accepted by the Ministry as part of its inheritance from the Science Secretariat. The Ministry considered the development of a space policy to be an important matter and, through its membership

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on the ICS initiated studies and discussions that led up to the presentation to Cabinet in April 1974, by the Minister of State for Science and Technology of a proposed Canadian Policy for Space. This policy, which was accepted by Cabinet was based on the principle that, to make effective use of space application systems, Canada requires:

(a) appropriate knowledge of space science and technology

(b) the ability to acquire and operate effective and economic space systems; and

(c) the ability to have space hardware (e.g. satellites) launched when required.

38. The policy emphasized the need for Canada to take part in international space activities, to build up the capabilities of Canadian industry and, in particular, to aim towards a high level of Canadian content in the design, construction and program management of satellite systems. It was agreed that Canada will continue to rely on purchasing foreign launch vehicles and launching services for her satellites but will enhance access to such services by participating in the supplying nation's space program.

Policy Implementation

39. The Interdepartmental Committee on Space has the responsibility for coordinating the government's space effort. The government has been pursuing procurement policies and procedures aimed at progressively increasing the Canadian content in our satellite systems. The government's

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objective has been to create areas of specialization in Canadian space industry and to develop a vertical integration of activities from research through to the marketing of space products in those areas. Examples include the remote manipulator system for the U.S. space shuttle program which was developed and will be supplied by a consortium of Canadian companies headed by SPAR Aerospace; major subsystems of the Communications Technology Satellite have been designed and built in Canada as have certain subsystems for U.S. spacecraft; further, a Canadian company, MacDonald, Dettwiler and Associates, has developed with government assistance a portable ERTS station to acquire data from earth resource satellites. The station will be used in Canada and is being successfully marketed in other countries.

Policy Evaluation

40. The Ministry, through the ICS, will continue to maintain a general overview of space activities, assess the results of the new space policy and, when appropriate, advise the government on any needed changes.

ENERGY RESEARCH AND DEVELOPMENT POLICY

Policy Formulation

41. The focus for the development of this policy has been the Department of Energy, Mines and Resources. MOSST has played a supporting role.

42. On 15 January, 1974, the Cabinet accepted a proposal put forward by the Minister of Energy, Mines and Resources that a Task Force be established to review, develop and implement a coordinated federal program on Energy R&D.

43. The Task Force which reported to the Minister of EMR was composed of Deputy Ministers or senior officials of sixteen departments and agencies having responsibilities or interest in energy matters and was chaired by the Deputy Minister of EMR.

44. The objectives of the Task Force were to:

1) review federal energy R&D activities;
2) develop and implement a coordinated federal program on energy R&D;
3) advise Treasury Board on the allocation of funds for energy R&D;
4) coordinate energy research and development activities in the federal government, including the federal approach to major international and federal-provincial initiatives;
5) provide for the exchange of information on energy policy and strategies which would affect the direction of federal energy research and development programs.

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45. The work of the Task Force was divided between a number of working groups each of which was allotted a specific area of the subject for study. MOSST accepted the responsibility for organizing the preparation of a working paper on the various forms of financial incentive available to the Government for the encouragement and support of Energy R&D.

46. In April 1975, the Task Force reported to the Cabinet recommending a number of Energy R&D programs that it considered should be initiated on a high priority basis. It also recommended an ongoing structure to develop and implement these programs. The Cabinet accepted the recommendations in principle but called on the Task Force to make a further study and come forward with a proposal for allocating relative priorities to the programs.

47. Work on developing these priorities has continued and recommendations will be presented to Cabinet in the near future.

Policy Implementation

48. The policy will be implemented by an organizational structure made up of:

(a) The Task Force on Energy R&D;

(b) A Panel on Energy R&D reporting to the Minister of EMR, composed of senior representatives from federal lead departments and MOSST;

(c) The Office of Energy R&D in EMR;

(d) Lead departments and agencies identified in the Task Force Report as being appropriate to each program;

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Policy Evaluation

49. The responsibility for reviewing and evaluating the policy will rest with the Minister of Energy, Mines and Resources.

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