CANADA/GERMANY S&T AGREEMENT

Fifth Consultative Meeting

Ottawa, 2-4 May, 1979

Ministry of State
Science and Technology Canada

Ministère d'État
Sciences et Technologie Canada

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P R E F A C E

It was agreed at the meeting that the report of the Working Group on Marine Science would form part of the report of the Fifth Consultative Meeting. As the Working Group report is bulky and is not of direct interest to all participants, it is being issued as a supplement to this report. For the sake of completeness, however, an abbreviated version is included as Annex F to the main report.

C O N T E N T S

CANADA/GERMANY S&T AGREEMENT

FIFTH CONSULTATIVE MEETING

Ottawa, 2-4 May, 1979

SUMMARY

The Fifth Consultative Meeting to be held under the aegis of the Agreement on Scientific and Technical Cooperation between Canada and the Federal Republic of Germany took place in Ottawa from 2-4 May, 1979. The purpose of the meeting was to review progress in the main areas of cooperation, discuss proposals from either side for new projects and extensions to existing projects, decide which joint projects should be regarded as completed or cancelled and arrive at an assessment of the cooperative program. The delegations were led by Mr. R. Loosch for the German side and Mr. J. Mullin for the Canadian side.

At the formal opening session, which was attended by the German Ambassador, Graf Podewils-Dürniz, a short speech of welcome was delivered by Mr. Denis Hudon, the Secretary of the Ministry of State for Science and Technology, and was replied to by Mr. Loosch. Both stressed the value of cooperation to the two countries and the need to benefit from each other's expertise and experience. It was emphasized that, although the Canadian side particularly was experiencing some degree of budgetary constraint, this was an incentive to take full advantage of the pooling of the common effort, and pursue technological solutions to some of the problems of present-day society. It was also

underlined that, if the full benefit of cooperation was to be realized, it was essential to bring industry into the cooperative effort wherever possible and as early as possible in the course of each project.

The formal opening was followed by a plenary session devoted to administrative matters and reviews by Mr. Mullin and Mr. Loosch of recent developments in science policy in the two countries. Mr. Mullin noted a number of changes in the structure and responsibilities of federal science-based departments as well as ministerial changes since the last meeting. He mentioned the current financial stringency as well as cut-backs in personnel as having an inhibiting effect on the cooperative program. On the other hand, he was able to describe some recent Canadian initiatives aimed at increased support for research and innovation in general as well as expansion of the effort devoted to renewable energy resources and electronics. He concluded by emphasizing the need for selectivity and continuity in order to derive maximum benefit from the joint program.

Mr. Loosch described ministerial changes affecting science in the Federal Republic of Germany, and drew attention to the increasing importance of sound policies for science and technology in the development of the economy, and in the public attitudes to such issues as nuclear energy. He added, however, that there was less emphasis on fiscal restraint in his country than in Canada and that science and technology had re-entered a phase of expansion, with particular emphasis on non-nuclear energy, assistance to developing countries, materials, marine technology, protection of the environment, improved work-

ing conditions, transportation and electronics. In the computer field, the stress was being switched to applications with no further governmental effort being devoted to hardware development. As regards the transfer of technology to industry, emphasis was now being placed on direct and indirect programs aimed at helping small and medium-sized firms. The full texts of Mr. Mullin's and Mr. Loosch's remarks are given in Annexes B and C respectively.

Following this plenary session, working groups met separately to review the current program and new proposals in marine science, non-nuclear energy, and geoscience, and to formulate proposals for the Consultative Meeting.

Following consideration of the report of the working group on marine science, the meeting agreed to commend and to encourage joint efforts to define further substantive collaborative projects. In addition, the Consultative Meeting recognized that the medium-scale project under discussion had significant possibilities for both countries in terms of meeting national objectives in marine science. Accordingly, appropriate authorities in both countries were invited to conclude, if possible by October 1979, the arrangements necessary to implement the medium-scale project as described in its report.

The working group on non-nuclear energy reviewed ongoing cooperative activities and proposals for cooperation in wind energy, wood gasification and coal technology. Since these proposals were still in the discussion stage, firm decisions were not yet possible; however, it was agreed that workshops and status seminars were an excellent way of exchanging information and exploring the possibilities for cooperation. The working group on geoscience agreed that cooperation was mutually beneficial and should continue with the emphasis on applied research and industrial participation. It was recommended that the four new proposals in

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geoscience be approved and that nine existing projects be regarded as completed or cancelled. All three working group reports were presented to the Consultative Committee at the closing plenary session and were approved with minor changes. The full texts are attached as Appendices F, G and H.

The second plenary session reviewed new proposals in those areas not dealt with separately by working groups, namely, data-processing and communications, marine technology, nuclear energy, space science and transportation. This was followed by consideration of brief status reports on all areas of cooperation, which had been prepared in advance of the meeting. Details are given in the body of the report.

At the closing plenary session, plans for an innovation workshop to be held in Germany in September 1979 were reviewed. It was agreed that specific issues should be addressed, such as innovation in small enterprises, technology transfer, use of public funds, taxation measures and foreign ownership. This was followed by an exchange of views on the value of the cooperative program. It was agreed that, in spite of financial restraints, the program was very valuable to both sides, and that stress should be placed on consolidation of effort along the lines of the medium-scale experiment in marine science. The importance of seeking early industrial involvement was also emphasized as well as the usefulness of workshops and seminars as a means of identifying opportunities for collaboration.

The Canadian Co-Chairman accepted with pleasure the German Co-Chairman's invitation to hold the next Consultative Meeting in Bonn, at the latest in the spring of 1981, at a date to be decided after further consultation.

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CANADA/GERMANY S&T AGREEMENT

Fifth Consultative Meeting

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Reports of Plenary Sessions

Plenary Session, 3 May 1979

Review of New Proposals

Mr. Mullin proposed that, as Working Groups had discussed new proposals on Oceanography, Geoscience and Non-Nuclear Energy yesterday and were preparing reports, these items would not be discussed in this session. The following comments should be read in conjunction with the proposals themselves, which are given in Annex E.

Nuclear Energy

Mr. Atchison outlined AECB's proposal for using the GKSS quarter-scale pressure-suppression facility for determining interaction between hot and cold fluids. He would be visiting GKSS on 18 May to discuss details.

Dr. Schroeder pointed out that present programs would occupy GKSS's facility until 1983. Availability after this would depend on proposals for reactivating a project on nuclear ship propulsion.

Mr. Loosch noted that the approach to the AECB proposal would depend on whether it was a simple contract for use of the GKSS facility or part of a joint program. For example, if the nuclear ship safety program became a joint effort the approach would be different from a simple contract. This would also apply if design studies for the propulsion machinery for a Canadian nuclear icebreaker were being undertaken by a German company. Thus Canadian decisions on whether to proceed with a nuclear icebreaker and who provides the nuclear plant would affect the implementation of this proposal, and an immediate decision could not be taken at this meeting.

It was agreed that the project entitled Safety Aspects of Nuclear Ships (2.1.1.0) should be retained and that in this case also, further activity would depend on Canadian decisions on the nuclear Polar-class icebreaker.

Communications

Mr. J. Smirle introduced the proposal for cooperation on an Interactive Visual Communications System, and indicated that the Canadian TELIDON system shows several advantages over competing systems, especially in the area of graphic displays. He added that he understood the German Bundespost was acquiring a Prestel system and suggested that they would be interested in being made aware of the characteristics of the Canadian system. He therefore suggested an initial phase of information exchange to identify common interests. Mr. Loosch expressed strong interest in

cooperation in this area. The Activity Sheet should be redrafted to take into account the work done in Germany in this area.

Marine Technology

Mr. J. Heseltine gave the background to the SPAR proposal for a research platform, which was in accordance with the general thrust of the recommendations in a report entitled "Steering a Course to Excellence" prepared for the National Research Council by Pallister Resource Management Ltd. of Calgary, Alberta.

Mr. Loosch stressed Germany's general interest in offshore technology and mentioned that they now had an operational research platform in the North Sea. He believed discussions were already underway which could lead to a joint program sponsored by BMFT and the NRC, and added that BMFT would be glad to receive a copy of the Pallister report. He suggested that SPAR and IMS be encouraged to continue their discussions and, if appropriate, to submit a proposal for a joint project to their respective national authorities.

Mr. Mullin noted that there were two distinct aspects to the proposal, namely, joint development of a research platform followed by its application in a joint program of research. Mr. Heseltine pointed out that the proposal was still at a preliminary stage, and that other agencies on both sides would have to be canvassed for their ideas on the kind of research program that might be undertaken. This was agreed.

Mr. Loosch asked whether there was still any Canadian governmental involvement in the development of ice-breaking ship technology. The FRG had interests in this but did not know whether the Canadian effort was purely in the private sector or whether government was also interested. Mr. Mullin offered to follow this up and provide the necessary information. Mr. Loosch suggested that Project 1.4.5.1 entitled Waas Icebreaker be retained in the meantime. This was agreed.

Space Science

Mr. Mullin observed that the work described in the Firewheel Subsatellite Program, of the Max Planck Institut Für Astrophysik and the Herzberg Institute of Astrophysics, was well underway and launching was expected later this year. Mr. Loosch expressed his pleasure at this example of mutually-beneficial cooperation.

Mr. Loosch asked when there might be an opportunity to discuss Canadian thoughts on the utilization of Spacelab.

Mr. L. Giroux replied that the German proposals for German/Canadian cooperation in this area were still under study by the Interdepartmental Committee on Space and that a decision could be expected by the fall of this year. Mr. Mullin noted that Canada's program of space research would be influenced by its new status as an associate member of ESA and that some redistribution of funds between domestic and multi-lateral programs might be necessary. Mr. Loosch said the BMFT would be happy to have detailed discussions at any convenient time. Mr. Heseltine suggested that contacts could be developed at a users' conference on the Shuttle Remote Manipulator System to be held in Toronto from May 30 to June 1 and invited German participation. Mr. Loosch undertook to follow this up.

Transportation

Mlle Gaétane Laplante discussed the joint project of Berlin Transport and the Urban Transport Development Corporation for a rotary-motor-powered steerable railway truck and said that initial discussions had been held to determine details of the involvement of both parties.

Mr. Mueller-Helle stated that the BMFT was mainly interested in linear motors in connection with the development of a maglev rapid transit system or M-Bahn. He therefore wished to propose a comparative study of Canadian and German work on linear propulsion, for which a draft Activity Sheet had been prepared.

Mr. Mullin asked Mlle Laplante to ascertain Canadian interest in this proposal as soon as possible. Mr. Loosch said that members of the Transport Development Centre would visit Germany in June and hoped they could attend the International Transport Exposition in Hamburg, 8 June to 1 July as this would provide useful background as well as an opportunity for further discussions.

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Plenary Session, 3 May 1979

Review of Status Reports not otherwise covered

(Brief Status Reports in each general subject area were prepared in advance of the meeting; they are attached as Annex D. The following comments should be read in conjunction with these reports.)

Telecommunications

Dr. M.J. Eric reviewed Canadian work on spectrum management, which was aimed at obtaining information as a basis for licensing regulations. He issued an invitation for German experts to visit Canada in June 1979 in order to see the SMS Pilot #3 system in operation in Montreal. In response to a question from Mr. Loosch, he undertook to provide system data and information on the operational effectiveness in advance of this visit. Mr. Loosch said he would pass this to the appropriate people as soon as he received it and try to get an early decision on the visit.

Data-processing in Education

Mr. Loosch explained that BMFT support for computer-aided learning was being terminated at the end of this year so that he could not commit the German side to an annual, formalized, exchange of information. He proposed instead that information be exchanged on an ad hoc basis when available. This was accpeted.

Data-processing in Health

Mr. Loosch referred to the imminent visit of Dr. Blask to McMaster University and Western Canada and said he hoped this would give rise to collaborative activity. Dr. D.M. Smith explained that cooperation in this area was basically concerned only with software and procedures since the hardware used in the two countries was not the same. There could, however, be a series of coordinated activities on both sides leading to an exchange of experience and comparison of results.

Data-processing in Industry

Mr. Loosch referred to a letter from Mr. Bertuleit to Mr. Scrimgeour concerning a proposed exchange of experts in industrial computer applications, and asked if there had been further developments. Dr. Pomfret replied that the letter had just been received, but that a reply would be given as soon as possible. Mr. Loosch noted that a new R&D program in this field was in preparation in his country and that it might suggest new avenues of cooperation.

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Marine Technology

Mr. Loosch observed that the project entitled the Waas Icebreaker should be omitted from the list of terminated projects in the meantime until the possibility of cooperation in ice-breaking tankers or bulk carriers had been explored more thoroughly. This was agreed.

Environment

Mr. Loosch noted that joint activities in this area had been continuing at a relatively modest level for several years. It was agreed, however, that the workshop on new technologies in waste-water treatment scheduled for October 1979 reflected the desire of both sides to continue the cooperation and could give rise to new joint projects.

Health Protection

Mr. Mullin noted with regret the relatively low level of activity in this field but pointed out that senior-level discussions and exchange of views had taken place. Mr. Korn observed that State Secretary Professor Wolters had had a most successful visit to Ottawa as well as to universities in both Ontario and Quebec. One area of common interest was the effort to influence lifestyles by means of advertising, etc. This area would also be discussed during a return visit to Germany by the Canadian Deputy Minister of Health, Mr. Rawson, which was currently in progress. Mr. Loosch pointed out that most of these discussions had dealt with health policies rather than research as such. He drew attention to the projects on the development of an artificial endocrine pancreas and instruments for the blind and said that BMFT still supported work in these areas and would welcome cooperation if this became possible at some future date. This was noted by the Canadian side.

Biotechnology

Mr. Mullin noted that industrial fermentation was receiving increased federal uspport in Canada and that opportunities for cooperation might present themselves once this activity got properly under way. Mr. Loosch said that several German experts would attend the VIth International Symposium on Fermentation in London, Ontario, in June 1980 and would be ready to visit Canadian research activities at the same time, with a view to discussing the possibility of cooperative efforts. Professor Kuersten drew attention to the fact that one aspect of biotechnology, viz the bacterial leaching of ores, was already included in the cooperative activities as part of the geoscience program.

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Space Research

Mr. Mullin noted that Mr.J.R. Marchand had now succeeded Dr. Langille as Secretary of the Interdepartmental Committee on Space and would be the new Canadian contact in this area.

ARCUS Project

Mr. Heseltine gave a brief account of the current situation. He stated that the results of the market study by Adkins Planning suggested a potential market of up to 94 ARCUS systems at a cost of about $2.5 million each plus spares. The projected cost of a full-scale development program to build two prototypes by 1983 was approximately $18 million shared equally.

Phase B1:	design definition	- 7 months
Phase B2:	detailed design	- 11 months
Phase C:	construction	- 18 months
Phase D:	test and evaluation	- 12 months

Mr. Heseltine stated that the SPAR proposal for Phase B1 leading to the Preliminary Design Review had been received and was being considered. Should approval be given for this interim phase, it would be appropriate to seek funding for the design and construction of prototypes with a view to a start date in early 1980. Mr. Loosch expressed his approval and said this was encouraging progress.

Natural Resources (Ontario)

In reply to a question from Miss Junke, Mr. Loosch said that the proposed participation by Professor Weischet in the remote-sensing field experiment in Ontario wetlands lay outside the BMFT remote-sensing program and that Prof. Weischet would seek alternative sources of funding. As regards the proposal that a German delegation visit Ontario to discuss methods of forest fire control, there was interest in an information exchange in the Federal Ministry of Agriculture, and Mr. Loosch would take this up on his return.

The Status Reports as modified and amplified by the foregoing comments were accepted by the Consultative Committee.

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Plenary Session, 4 May 1979

Proposed Innovation Workshop

Mr. Mullin explained that the idea for this workshop had arisen during an informal meeting with Dr. Schroeder in September 1978 in Ottawa. He wanted to reaffirm Canadian interest and discuss the general structure and possible timing. He recalled that initial plans to have a 2½-day meeting in conjunction with the Hannover Fair had been dropped, but that the German side had extended an invitation to hold the workshop in the Federal Republic possibly in September 1979 which he was glad to accept. He added that several provincial authorities had already affirmed their interest in participating; it was also hoped that some industrial participation would be possible. One way of finding the appropriate people in industry might be through the Canadian Advanced Technology Association, the Canadian Research Managers Association or the 22 sectoral task forces set up by the Department of Industry, Trade and Commerce.

Mr. Loosch agreed with this approach and suggested that topics could include such issues as innovation in small and medium-sized companies; transfers of technology from the public to the private sector; conditions governing use of public funds to support industrial innovation; special problems of foreign-owned subsidiaries; special taxation measures; and possibly others. As regards participation by other agencies, Mr. Loosch said the German side might include people from the large research institutions; they could also approach the Association of Industrial Research Associations (AIF), the Risk Financing Corporation, the Federal Association of German Industries, the ISI headed by Professor Krupp and possibly the Federal Patent Office. He added the thought that not only would the proposed seminar lead to a better understanding of the innovation process in the two countries but that it might also help to stimulate interest in new industrial cooperative projects.

It was agreed that the German side would draw up a program for the seminar taking into account the points made in the foregoing discussion, and submit to the Canadian side for comment.

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Plenary Session, 4 May 1979

Review of Working Group Reports

Marine Science

Mr. Macaulay presented the draft report of the Marine Science Working Group. He pointed out that the "medium-scale experiment" described in the report comprised both oceanographic and biological aspects. There were also a number of individual projects not included in the medium-scale experiment. Professor Walden asked that special note be taken of the "recommended actions" in the report; he requested that the Consultative Meeting give specific approval to the course of action outlined and encourage both sides to pursue vigorously their efforts to develop and define a medium-scale experiment which would consolidate and extend ongoing experiments related to marine pollution. This was agreed. Mr. Loosch drew particular attention to the recommendation that implementation proceed "without delay" and suggested that the final draft should specify October 1979 as a target date for completion of the necessary arrangements. He added that this medium-scale experiment, in which a number of parallel projects were coordinated and consolidated, could well serve as a model for work in other areas. Dr. Pritchard informed the meeting that there was considerable agreement among the marine biologists on a future coordinated research program on fish diseases; there was therefore the possibility that a "medium-scale experiment" would be organized in this field also once funds became available. The Consultative Meeting approved the Working Group's report and agreed that it would be incorporated in the overall meeting report.

Non-nuclear Energy

Mr. Loosch suggested that the Working Group's report be reformulated as a list of agreed actions. In response to a comment by Mr. Garrard that Canada's preferred mechanism for international cooperation in this field was to work through the IEA, Mr. Loosch observed that both sides are involved in IEA programs but that German experts find bilateral discussion useful even when cooperation is carried out under IEA auspices. Mr. Garrard referred to the exchange of solar energy components mentioned in the report; Mr. Aldwinckle of NRC requires further information on the type of equipment and testing envisaged. The German side stated that the contact is Dr. H. Talarek at Jülich.

Geoscience

The Working Group's report was presented by Professor Kuersten. Mr. Mullin and Mr. Loosch welcomed the expression of interest in extending cooperation into the fields of mineral processing and metallurgy and the intention to seek greater industrial involvement. The report was approved by the Consultative Meeting.

Assessment of Cooperation

The Canadian Co-chairman pointed out that any assessment of the cooperative program should consider both the volume and the nature of joint activities. The volume had remained relatively stable since the last Consultative Meeting; however, on the Canadian side there had in fact been little or no real growth in R&D expenditures since the early 1970s, in spite of government efforts to pass more R&D to the industrial sector.

As regards the qualitative aspect, the emphasis in some fields was now changing from a program comprising many small, independent joint projects to a much more integrated approach in which many sub-projects were being consolidated into a broad, coordinated attack on a major problem area of interest to both countries. The best example was the proposed medium-scale project in oceanography. Mr. Mullin was of the opinion that this approach was potentially more productive; he realized, however, that this had not yet been possible in all fields. For example, in marine biology, there had been a real meeting of the minds on the best course to follow but implementation was hampered by a lack of funds on both sides; however, the planning which had already been accomplished would permit the joint program in this field to expand rapidly when funding became available.

Mr. Mullin observed that, initially, it had been easier to promote cooperation at the research end of the R&D spectrum and in government labs rather than in industry. The aim of the program, however, was to increase the contribution of science and technology to the economic and social well-being of the two countries, and the previous approach entailed the risk of excluding sectors such as the chemical industry that traditionally kept their distance from government. Nevertheless, he was encouraged that, in addition to the ARCUS project, several of the new proposals could lead to industrial participation. Summing up, he said that, first, a conscious effort was required by government scientists in both countries to ensure that initial contacts led to consolidated programs; second, that a continuing effort must be made to identify areas suitable for industrial participation; third, that ways must be sought to promote direct contacts between companies not directly involved in government-sponsored work; and finally that advantage should be taken of the planned innovation workshop to explore these ideas further.

The German Co-chairman expressed his agreement with Mr. Mullin's assessment and went on to underline two points. First, the consolidation of the oceanographic effort into the medium-scale experiment did not imply any reduction in the effort devoted to this area and could, in fact, involve more scientists indirectly than had previously been involved directly, while at the same time achieving a more focused effort. Second, industrial involvement should be sought as early as possible in the life of a project, otherwise many government initiatives

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would lead nowhere. As well as direct contracts with industry as in the ARCUS project, there could be indirect involvement and he hoped that industrial participation in the program could be broadened.

Mr. Loosch stated he was not unduly concerned that the volume of cooperative activity had remained stable, since he believed cooperation should only be promoted where there was mutual benefit. Volume by itself should not be a major preoccupation. As regards ways of improving the cooperative program, he believed the workshop approach was promising, and thought it might be used to shorten the decision time required for adoption of a joint project; however, careful advance preparation to identify potential cooperative activities was essential rather than engaging in a simple exchange of views. He referred to the status seminars held periodically by the BMFT for different fields and suggested they could provide a good opportunity to influence national programs by inviting participation by scientists from the other side. He undertook to notify Canada when these seminars took place and suggested the Canadians might take similar action.

Mr. Loosch then raised the question of whether some companies might be inhibited from participating in cooperative projects by a reluctance to reveal proprietary information with no guarantee that a joint activity would result. He saw the need to educate companies by emphasizing that such information exchange was an essential step in the process and that proprietary information was protected and could not be used for other purposes nor passed to a third party. He hoped that news of successful joint ventures would spread and convince other companies of the potential benefits.

On the question of seed money for exchanges, Mr. Loosch observed that, while funding for initial contacts was more readily available on the German side, follow-up visits generally required the existence of a joint project. He referred to the imminent visit to Germany of Mr. MacNabb, Chairman of the Canadian Natural Sciences and Engineering Research Council, and expressed the hope that the planned discussions would clarify the situation and possibly suggest ways in which such support for exchanges could be increased.

Dr. Schroeder suggested that marine technology was one field in which cooperation could be expanded and which also offered good potential for bringing industry in at the start. Other areas which offered potential in the medium term were biotechnology and non-nuclear energy.

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Professor Kuersten noted that, in the geoscience area, cooperation had initially involved many fairly small research projects, with industry being brought in where appropriate; examples were airborne geophysical exploration from helicopters and projects dealing with geotechnical safety. He referred to discussions he had had with Mr. Haw, Deputy Director-General of the Canada Centre for Mineral and Energy Technology, and said he hoped that cooperative activity could be established in metallurgy and mineral processing; however, he would have to locate industrial partners in Germany since the government agencies are not involved in these fields. Referring to the innovation workshop, he suggested the Canadian Geoscience Council as a potential participant.

Professor Walden pointed out that, in the marine sciences field, industry would be involved on both sides in the medium-scale experiment. He suggested that coordinators should constantly be on the look-out for opportunities for industrial participation, for example in aquaculture and fisheries projects.

Mr. Macaulay underlined the fact that definition of the medium-scale experiment had taken several years of close association and dedication to a common purpose. He added that there could well be follow-on medium-scale work in related areas.

Summing up the discussion, Mr. Mullin referred again to the question of seed money and said he hoped new initiatives might be possible on the Canadian side. On the question of industrial property, he pointed out that contract law already protects the confidentiality of information revealed during exploratory discussions. As regards Mr. Loosch's suggestion concerning status seminars, he explained that these were not normally arranged by central agencies in Canada but by various other groups; however, he was happy to accept Mr. Loosch's invitation and expressed the hope that the Canadian side would be able to stimulate a reciprocal activity. He underlined the usefulness of workshops both for the exchange of information and as a place to make contacts, and suggested that the innovation workshop might be followed by one on modes of industrial cooperation, possibly using a sectoral approach. Finally, he thanked all participants for the extremely useful discussion and exchange of views.

ANNEX A

CANADA/FRG S&T AGREEMENT

FIFTH CONSULTATIVE MEETING

Ottawa, 2-4 May, 1979

Agenda

Wednesday 2 May	10:00 - 10:30	Formal opening and welcoming address.
	10:30 - 11:00	Coffee
	11:00 - 12:00	Procedural session and overview of developments in both countries.
	12:00 - 13:30	Lunch
	13:30 - 17:00	Parallel working groups on: - Marine Science - Non-nuclear Energy - Geoscience
Thursday 3 May	10:00 - 12:30	Discussion of new proposals in areas not covered by working groups: - data-processing - transportation - marine technology - space science - innovation workshop Review of Status Reports
	14:00 - 17:00	Visits: CRC for Mr. Loosch, Mr. Mueller-Helle and Dr. Schroeder. Rapporteurs to write up report.
Friday 4 May	9:30 - 12:30	Discussion of innovation workshop Review of Working Group reports General assessment of cooperation under the Agreement
	13:00 - 15:00	Closing lunch.

CANADA/FRG FIFTH CONSULTATIVE MEETING

Canadian Co-Chairman's Remarks

There have been several important developments on the Canadian science scene since our last consultative meeting two years ago. To start with our own Ministry, Mr. Judd Buchanan replaced Mr. Hugh Faulkner as Minister of State for Science and Technology in September 1977, and was in turn replaced by Mr. Alistair Gillespie in November 1978. Mr. Gillespie was at that time the Minister for Energy, Mines and Resources and has continued to hold both portfolios. He was in fact, our first Minister, from creation of the Ministry in August 1971 to November 1972.

Two other recent changes which have a bearing on the scientific picture in Canada are the elimination of the Ministry of State for Urban Affairs and the creation of a new Department of Fisheries and Oceans by splitting off these responsibilities from the former Department of Fisheries and the Environment, which now reverts to Environment Canada.

The last few years have been marked by two conflicting trends. On the one hand, there has been increasing support within the Canadian government for the need for government action in drawing up a comprehensive technology policy and setting up appropriate programs to support innovation; on the other hand, financial pressure has led to cutbacks in all government expenditures, technology included. To take the latter point first, in an effort to curtail the growth of the public service and reduce the level of government spending, nearly all federal departments were requested to reduce staffing levels by the elimination of any positions that could be dispensed with. Although exact figures are open to question, middle management, particularly those levels charged with a coordination and liaison function, has been seriously affected, with a consequent reduction in the effort that departments feel they can devote to both bilateral and multilateral cooperation. I say this to explain in part whey some aspects of the collaborative program under the S&T Agreement between our two countries have not development and expanded as we would have wished. In particular, our Department of Health and Welfare has had to curtail all international activities in the medical research field, the Department of the Environment is limiting cooperation to existing projects and the Department of Fisheries and Oceans will only consider new projects if there are compensating reductions in ongoing projects so that the overall effort devoted to international cooperation remains unchanged.

On the positive side, the most important development in the federal science program since the last Consultative Meeting was a series of measures announced by the Honourable Judd Buchanan on 1st June 1978 aimed at strengthening and encouraging research and development. I will not go into these in detail, since information has already been supplied to our German colleagues; however, they included setting a target for R&D expenditures of 1.5 percent of GDP by 1983; the use of federal procurement to stimulate industrial R&D; new tax incentives to encourage research and the creation of jobs for scientists and technicians in the private sector; expansion of the "contracting out" policy whereby research formerly done in government laboratories is placed in industry; increased access by industry to federal laboratories; expansion of NRC's Technical Information Service; creation of up to 5 university-based industrial research and innovation centres aimed particularly at helping small businesses and private inventors; an increase in the funds available to the 3 "granting research councils" for the support of university science; and federal assistance for the development of regional centres of excellence in the fields of cold water engineering, materials, organic soils, coal, fermentation and food. It is too soon to assess the impact of this ambitious and comprehensive program. The recent financial stringency has undoubtedly affected some of these measures, and it may be that we shall not reach all of the goals set, or not reach them as soon as had been hoped.

Another important facet of the increased attention being paid to R&D and to industrial innovation in particular was a federal-provincial conference on industrial R&D held in Ottawa on 8th November 1978. This was presided over by Mr. Buchanan, at that time Minister of State for Science and Technology, and attended by the Provincial Ministers whose responsibilities encompassed industrial science and technology. The Ministers agreed that Canada's economic development was seriously hampered by inadequate investment in industrial R&D. Our Ministry prepared a series of 6 background papers which have already been supplied to BMFT. The conference agreed that special measures, including tax incentives and government procurement, should be devised to help stimulate innovation, with special consideration being given to the role of small companies. My Ministry has been assigned the responsibility of developing a program of action in consultation with the provinces. It was also agreed to hold similar meetings in the future as the need arises.

There is now some tangible evidence that these discussions are about to bear fruit. The most recent development was an announcement by the Prime Minister, just two weeks ago, of a new three-year program under which over $200 million will be used to create more high-technology jobs in Canada. Specific measures will include a $115 million product development fund to enable companies to supply high-technology items for government procurement which are not now manufactured in Canada;

$50 million to be allocated as grants to promote a Canadian microelectronics industry based on silicon chips; a $20 million grant to enable SPAR Aerospace Ltd., to supply 2 ANIK-D communications satellites in the 1980s rather than relying on U.S. industry; and $20 million in federal contracts to slow-growth regions where unemployment is high. The implementation of these measures will of course, hinge on the outcome of the federal election.

Another effort in which this Ministry has played a leading role is the establishment of a set of scientific and technical areas to which Canada should devote priority R&D effort, either because of a special need - for example arctic transportation and communications - or because of special opportunities - for example agricultural and food research. This has involved extensive consultation with other agencies, including federal departments and provincial agencies; this effort is still in progress and preliminary results will be subject to considerable refinement over the next few months. As well, priorities will have to be reviewed and revised in the light of changing circumstances.

There have been changes in the mechanisms for providing federal support to university research. The granting function has been taken from the National Research Council and made the responsibility of a newly-established Natural Sciences and Engineering Research Council. Similarly, the granting function in the social sciences and the humanities, formerly one of the functions of the Secretary of State, has been assigned to a new Social Sciences and Humanities Research Council, the Secretary of State's function now being restricted to the promotion of the arts. The Medical Research Council's function remains unchanged. Coordination of the policies of the three granting research councils will be assured by an Inter-Council Coordinating Committee. The National Research Council will continue to operate its own laboratories; it will also continue to provide financial support to research projects in industry and be responsible for the operation of the Canadian Institute for Scientific and Technical Information as well as the Technical Information Service to industry.

To turn to some specific fields, the government announced a special program last July to support the development of renewable energy. Under this program, the federal government will spend $380 million over the next 5 years aimed at developing a domestic solar industry, and also at doubling, to 7 percent, the contribution of wood and urban wastes to the national primary energy budget. These general objectives will be supported by a number of specific programs designed around different aspects with special funding assigned to each. Also in the energy field, there has been an expansion of the research effort devoted to fusion, with coordination being assigned to the National Research Council. There has also been some discussion in the press and elsewhere of locating a large-

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scale TOKAMAK fusion facility in the province of Quebec as part of an international R&D program supported by the United States and the USSR. This is still highly speculative, however.

In the field of space technology, Canada has recently been admitted to the European Space Agency as an associate member, and this can be expected to facilitate our participation in both the scientific and applications aspects of the ESA program. I understand Dr. Franklin of the Department of Communications was in Germany quite recently to discuss possible cooperation in remote sensing and communications satellites.

Another field in which we have had some success is the development of interactive, television-linked information systems for both domestic and business use. We believe the Canadian system, known as TELIDON, shows a number of important advantages over competing systems developed elsewhere, and we are proposing this as an area of possible cooperation under the Agreement. I understand some members of the German delegation will be visiting the Communications Research Centre at Shirley Bay tomorrow to see a demonstration of this and other developments in the communications field.

One other area which I might mention since it has already been the subject of discussion at these consultations is the construction of a polar-class icebreaker for the Canadian Coast Guard. Specifications for this vessel have now been changed and present plans are to employ a mixed propulsion unit with a nuclear reactor providing the basic power of 90,000HP and a gas turbine unit supplying an additional 60,000HP to satisfy peak power requirements. This has involved an increase in the overall dimensions, with the possiblity of installing a larger nuclear reactor than previously envisaged. The four countries originally invited to bid on the nuclear propulsion unit - Britain, France, the United States and Germany - have been invited to submit revised bids in accordance with the new specifications. However, it is not expected that this project will move along very fast in view of the prevailing financial climate.

It will be apparent from what I have said that we shall have to be very selective in choosing projects for joint effort, in order to extract the maximum mutual benefit from bilateral cooperation. However, this should also be regarded as an opportunity to demonstrate to our political masters the benefits to be reaped from combining the scientific expertise of our two countries and benefiting from each other's experience.

CANADA/FEDERAL REPUBLIC OF GERMANY FIFTH CONSULTATIVE MEETING

German Co-Chairman's Remarks

1) In 1977 we reported to Canada on a restrictive budget development. In contrast to that, the research budget for 1978 and 1979 is one of the appropriation titles with the highest rate of increase (1978 17%, 1979 18%). We hope that these rates will allow not only to maintain the present extent of R&D efforts, but also to make a medium-term contribution to the assurance of economic growth.

The main growth areas include:

a) Non-nuclear energy research (533 million)

In this area we plan to increase our expenditure by DM 100 m to DM 533 m in this year. By 1980 we will have reached a ratio of 2:1 of the funds allocated for nuclear and non-nuclear energy research. Among other projects, there are plans for district heat demonstration and for a prototype plant for coal gas utilization in power stations.

b) Marine technology/Antarctic research (144 million)

Also major marine technology projects are to be promoted in the future, e.g. a methanol liquefaction plant for the utilization of accompanying gases from minor natural gas fields near the coast.

c) Raw material assurance (153 million)

Here intensification of steel research is an important issue.

d) Ecology, environment (195 million)

In this area the rate of increase is 46% and is to

permit the future testing of environmental technologies also on a large scale.

e) Humanization of the working environment, health (140 million)

f) Electronics/communication engineering (153 million)

Considering that as recently as 1977 about 90% of all microcomponents were of foreign origin, we aim of bringing the German electronics industry back to a leading position in the field of micro-electronics.

g) Transport technology (366 million)

Efforts here are focussing on the testing of alternative automobile power systems, experimental plants for rapid train systems and a program for action to abate traffic noise.

2) Since 1977 further research programs with several years' duration have been passed, e.g. in the areas of health, technical communication, steel research. A program for production engineering is in the process of being prepared; the same is true of a program for information technologies, which later is to comprise the fields of technical communication, electronics and perhaps informatics. However, there will be no successor of the Third Data Processing Program which will be terminated this year; in the future the BMFT will no longer promote computer development as such, but in principle only further projects for the application of data processing.

3) In addition to these new programs it is above all the general scheme of the Federal Governments's R&D policy for small and medium-sized enterprises adopted in 1978 which should be mentioned. MOSST has already received its English version. The provisions for R&D labour cost subsidies for small and medium-sized firms have to be added. Already in

the first year the Federal Budget allocates DM 300 m for this purpose. The German-Canadian seminar on questions of innovation and technology transfer in autumn 1979 will provide the opportunity for an in-depth discussion of these measures.

ANNEX "D"

CANADA/GERMANY S&T AGREEMENT

REPORT ON

FIFTH CONSULTATIVE MEETING

Ottawa, May 2-4, 1979

STATUS REPORTS

CANADA/GERMANY S&T AGREEMENT

Fifth Consultative Meeting

Ottawa May, 1979

Status Report on Data-processing in Telecommunications

Automated spectrum management was suggested by Canada as an area for cooperation at the Fourth Consultative Meeting. Although there has been no marked activity since then, it is thought that developments in both countries have reached the stage that closer cooperation could be mutually-beneficial. The Canadian SMS Pilot #3 system will be undergoing testing in DOC's Montreal District Office in the spring of 1979 and significant data will be available for evaluation by early June. It is therefore proposed that a German delegation make a visit to Canada in June 1979 for discussions and an exchange of specific technical and developmental information. This could be followed by a return visit by a Canadian delegation to FRG in July or August to study German management of the VHF/UHF spectrum.

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ANNEX D

CANADA/GERMANY S&T AGREEMENT

Fifth Consultative Meeting
Ottawa, May 1979

Status Report on Data-processing in Education

There have been no major initiatives in this area since the Fourth Consultative Meeting. Dr. Schroeder and Mr. Bianchi of GKSS visited NRC in September 1978 and were given a demonstration of the latest Canadian developments in computer-aided learning using interactive terminals. Although there are no proposals for new joint activities, the Canadian side values the cooperation and would like to maintain contact with their German colleagues. It is proposed that the information exchange be formalized by the production of a summary of CAL-related developments in the two countries once a year, until the opportunity for some form of closer cooperation presents itself.

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CANADA/GERMANY S&T AGREEMENT

Fifth Consultative Meeting

Ottawa, May 1979

Status Report on Data-Processing in Health

As reported at the Fourth Consultative Meeting a German delegation visited Eastern and Central Canada in 1976. This survey of Canadian activities is now to be completed by a two-week visit to those centres west of Toronto which has been tentatively scheduled for May 1979. Approval for this visit has still to be obtained from the German authorities.

The visit of Dr. Rautaharju to Mr. Zywietz of the Hannover Medical School took place in November 1977 as planned, and proved to be very useful. Other visits included: Dr. Giesecke of the GSU in Munich; Professors Halhuber, Hoffman and Poeple of the Klinik Hoehenried in Bavaria; Professor Michaelis of the Mainz Medical School; and the Department of Biometry and Medical Informatics of the Hannover Medical School. As a result of these valuable discussions the following topics have been identified as possible main themes for joint working parties in the ECG field:

- Optimization of ECG acquisition for computer analysis;
- Data reduction strategies;
- Optimal feature extraction;
- Classification strategies;
- Optimization of total ECG processing systems.

It has been tentatively suggested that further discussions be held at a working conference in Halifax in the spring of 1979, co-sponsored by the International Federation of Information Processing.

Mr. Werner and Dr. Mendler of the Deutsches Herzzentrum in Munich visited the Toronto General Hospital and the Hospital for Sick Children for two weeks in April and May 1978 as planned to discuss general computer applications in health. However, the planned visit by Mr. Horne of the Toronto Hospital for Sick Children to Professor Faust at the University of Tübingen could not take place owing to the lack of a suitable source of travel funds. Mr. Bleicher of the Institut fur Biomedizinische Technik, Stuttgart visited the hospital in 1978. The Institute is interested in joint projects, which could be defined after Mr. Horne has visited similar institutes in Germany.

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CANADA/GERMANY S&T AGREEMENT

Fifth Consultative Meeting

Ottawa, May 1979

Status Report on Data-Processing in Industry

As a follow-up to the 1976 visit of a Canadian delegation of experts in CAD/CAM to Germany, a delegation of seven German experts visited Canada in May 1978 for an extensive series of visits and discussions. The group spent three days each in Ottawa, and Montreal, two days in Hamilton and two in Toronto/London universities and industry, followed by a final discussion and summing-up.

As of April, 1979 an exchange of two Canadian and two German experts for periods of 4-6 weeks is under discussion.

It may be noted that arrangements have been made for Dr. T. Martin of the FRG to present a paper on the PEARL language at a special session on programming languages to be held as part of the Canadian automatic control conference at McGill University May 23-25, 1979.

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ANNEX D

CANADA/GERMANY S&T AGREEMENT

Fifth Consultative Meeting

Ottawa, May 1979

Status Report on Physical and Chemical Oceanography

Discussions have proceeded since the Fourth Consultative Meeting, by correspondence and during visits, in an attempt to define a collaborative program comprising fewer, more comprehensive projects which preferably are directly related to problems and issues of national importance in both countries as basically stated on the occasion of Professor Walden's visit to Canada in October 1977. Areas agreed to be of common interest were: interpretation of remote sensing data; boundary concentrations of pollutants in sea-water, sediments and marine organisms at which they show toxic effects; and marine technology.

These discussions have centred around the following possible projects, of which the first is of special importance:

- Physical, chemical and biological interactions of environmental contaminants within natural and artificially-enclosed coastal sediment-/seawater systems;

- Methods of tracing the transport of particulate material in coastal waters;

- Fate of radionuclides from coastal nuclear power stations.

Medium-scale Experiment

It is generally agreed by both sides that research in a number of areas of marine science has reached a stage where studies should now logically be conducted on a scale somewhere between laboratory research and open-sea experiments. Considerable effort has therefore been devoted since the Fourth Consultative Meeting to defining the parameters of a "medium-scale" experiment for investigating various interactions, both chemical and biological, between pollutants such as heavy metals, organic compounds, etc., and the marine environment, including both sediments and marine biota. As part of this effort, a team of four Canadian chemical oceanographers visited several German research agencies in February 1978, visits by individual scientists took place in both directions, and a workshop was held in Hamburg in March 1979. Possible approaches include the use of a segregated section of beach, a carefully-selected estuarine system or a modified approach to CEPEX-type experiments. The aim of the discussions is to decide which system(s) to use and which priorities to assign to the various experiments.

Canada has suggested that many of these "medium-scale" experiments could be conducted in a larger and more-sophisticated version of the CEPEX system known as CESSEX (controlled exosystem seawater sediment experiment).

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Particulate transport and pollution in estuarine waters.

As a result of a series of visits in December 1978 by Dr. Carl Amos of the Bedford Institute to several agencies in the FRG, and a return visit by a German scientist to the Atlantic Geoscience Center in Halifax, a draft proposal has been made for the coordinated application of remote sensing and geochemical techniques to the analysis of water quality in the estuary of the Elbe River. Consideration has been given to conducting similar studies in the Bay of Fundy. This would involve exchanges of scientists in both directions for extended periods between March 1979 and April 1982.

Fate of radionuclides from coastal power stations

There is Canadian interest in establishing a joint project oriented toward marine radionuclide chemistry, based on cooperation with both GKSS and the University of Heidelberg. Ways of assigning man-years to this study are under discussion.

Year of the German Bight

The Nova Scotia Research Foundation has offered to supply an oil spill tracking buoy and, if possible, to participate scientifically in a large-scale program of oceanographic investigation by the Deutsches Hydrographisches Institut aimed at developing an improved knowledge of currents and general circulation in the German Bight, leading to development of a combined storm surge/surface wave model.

Along with these discussions and planning related to future work and extension of present programs, cooperation has continued on existing projects. This has included both visits to laboratories and participation in oceanographic cruises, particularly as related to the CEPEX experiments, tidal models, sensor development, and chemical oceanography. Good progress has been made in all of those areas, and it is gratifying that the S&T Agreement has done much to facilitate cooperation on both the scientist-to-scientist and agency-to-agency levels. However, it is only realistic to acknowledge that the current restraints on the funding available mean that expansion of the research program in one area requires cut-backs in another, especially in the short-term, and no overall increase can be envisaged at the present time. It will be necessary to compensate for this by re-allocating resources so that a smooth transition to medium-scale cooperative work is possible, while continuing only those aspects of the collaborative program agreed by both sides to be the most valuable.

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CANADA/GERMANY S&T AGREEMENT

Fifth Consultative Meeting

Ottawa, May 1979

Status Report on Marine Biology

A sustained effort has been made since the Fourth Consultative Meeting to consolidate the many diverse cooperative projects in fisheries and aquatic biology and to define longer-term joint objectives leading to a coordinated program of cooperation comprising fewer but broader joint projects. To this end, Professor Lillelund, the German coordinator, visited Canada in September/October 1977 for discussions in Ottawa, Burlington, Calgary and various centres in British Columbia, in an attempt to identify research programs related to the problems associated with the health, survival and performance of fish and their supporting biota in both countries, and which present substantial opportunities for bilateral cooperation. In selecting topics, it was agreed that only those of national concern to both countries should be considered, and that those already subject to collaboration in other fora (e.g., ICES) should not be considered in this context. It was also agreed that "medium" or "pilot" scale experiments, intermediate between laboratory research and field trials, held a special interest for both sides. As a result of these discussions, the possible topics were narrowed down to three main choices:

1. Bio-accumulation of toxic substances in pilot-scale ecosystems;

2. Biological changes within tidal zones resulting from oil spills and the effects of these changes on the exposed ecosystem;

3. Methods of prevention, control and elimination of disease in aquatic organisms.

These topics all address hazards with adverse effects on the health and survival of living aquatic resources; they would also benefit from an injection of new scientific information and a broader understanding of basic scientific principles. However, it was realized that further planning meetings in each topic by small groups of experts would be required to define the next stage, and to provide the necessary impetus. This has so far proved difficult, partly because funding restrictions in both countries have

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required scientists to defend existing programs rather than propose new, large-scale initiatives, and partly because of disruption consequent on a major reorganization of the responsible Canadian federal agency.

As a partial solution to this dilemma, it now appears possible that the first topic, dealing with the bioaccumulation of toxic substances in pilot-scale ecosystems, can be accommodated in the CESSEX experiment proposed as a joint project by the chemical oceanographers. This is dealt with under Oceanography. No specific plans have evolved to date for the second topic, dealing with oil spills, nor have new proposals been formulated in the third area, the control of diseases in aquatic organisms.

In spite of this disappointing situation as regards the proposed medium-scale experiment, considerable cooperative activity continues under existing projects. In the fish disease area, considerable activity took place. Dr. Derick Shaw of Newfoundland spent a sabbatical year at the Max-Planck Institute for Immunobiology in Freiburg with Professor Dr. Luderitz. He reports a very satisfying year with significant scientific accomplishments. In addition to close relationships established, several papers will follow, one of which is now ready for presentation at the forthcoming "Conference on Bacterial Polysaccharides" in Sweden. Also Dr. Hans-Jurgen Schlotfeldt travelled extensively in Canada last autumn, accompanied for part of the time by Dr. Körting. The prime purpose of their visit was to examine fish health control mechanisms, but they also exchanged considerable information on production technologies and obtained a full package of the "Aquaculture Training Program" in New Brunswick. In addition, Drs. N. and Gabrielle Peters visited with Dr. Stick in Vancouver in September 1977.

On other topics, Dr. T.A. Gill of Halifax participated on the German research cruise aboard the vessel "Julius Fock" from February 22 to April 10, 1978 in the Antarctic. He had planned to spend further time in Professor Dr. Schreiber's laboratory in Hamburg, but this did not materialize due to a shortage of krill. Some material has been sent to Halifax for testing.

Also, Dr. Al Hourston of Nanaimo visited Hamburg in November 1978 to work up data from previous exchanges. Four papers are in preparation, and outstanding items should be cleared up in 1979. Interest has been expressed on undertaking herring larvae studies in CEPEX bags in 1980, but plans for this work have yet to materialize. Drs. Alderdice and Rosenthal also have 3 papers in preparation.

In summary, plans for comprehensive projects have not materialized as fast as had been hoped for, but the scientist-to-scientist interests have not diminished. It is hoped that the initiatives already established will not be lost. Benefits foreseen from such collaboration are numerous. Both Canada and the Federal Republic of Germany face diverse problems in the preservation, rehabilitation and culture of their living aquatic resources,

and both regional and micro-regional planning must be based upon a body of information established through research and upon operational experience, both of which are sadly deficient. Both countries have severe constraints on scientific budgets and on availability of manpower. Collaborative research efforts are seen as a cost-saving mechanism for both countries, and the range and depth of expertise available to either country can be extended through bilateral exchanges. Programs not necessarily top priority in the short-term can remain viable, and it is possible to exchange new information and interpretations of scientific findings much faster and more efficiently through the agreement than otherwise would be possible. Both countries have a core of high calibre scientists that respect one another, and opportunities could be lost if a familiarity with the scientific and technological developments were not shared.

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CANADA/GERMANY S&T AGREEMENT

Fifth Consultative Meeting

Ottawa, May 1979

Status Report on Marine Technology

Diving Technology

A specialist from GKSS visited the Defence and Civil Institute for Environmental Medicine, Toronto in July 1978 for discussions on DCIEM's deep-diving facility. Several possible areas of collaboration were discussed. Before cooperative activities can be defined, the decision on the GKSS underwater simulator and the relevant R&D program will have to be awaited.

Nuclear Analysis Methods

Information on the German work on X-ray fluorescence as applied to the continuous analysis of sludge and drilling muds was supplied to a number of Canadian companies active in drilling for oil and gas. These enquiries did not reveal any interest in joint development of the technique and this project should be cancelled.

Magnesium Chloride Process

This project has been cancelled owing to lack of common interests.

Advanced Unmanned Submersible

This work is reported separately under the ARCUS project of SPAR and ERNO.

Ice-breaking Technology

BMFT is supporting work on ice-breaking technology in the design phase. Both AG Weser and Thyssen Nordseewerke are interested in cooperation.

Research in Ice-covered Waters

Preliminary interest has been expressed by SPAR Aerospace Products Ltd. for joint development of a research platform (see separate sheet).

CANADA/GERMANY S&T AGREEMENT

Fifth Consultative Meeting

Ottawa, May 1979

Status Report on Environmental Research and Development

Discussion of research activities in the field of protection of the environment during the Fourth Consultative Meeting can be grouped under four general headings. These are: waste-water treatment, ground-water pollution, solid waste management and fresh-water research.

Waste-water Treatment

The specific research areas offering the potential for cooperative work in this area are: phosphate removal from waste water; treatment of effluents from pulp and paper plants; identification of organic compounds in treated waste waters; and sludge treatment by gamma-irradiation. These were discussed during visits to the Wastewater Technology Centre by Dr. Sontheimer in August 1977, by Dr. Pagga of BASF in October 1977 to participate in a workshop on industrial effluents, and by Dr. E. Schroeder and Mr. H. Bianchi of GKSS in October 1978. One possibility for accomplishing the proposed exchanges might be to use the various schemes available in both countries for post-graduate and post-doctoral fellowships; this is being looked into by both sides.

Another possibility would be for WTC to identify a specific research requirement for which they are having difficulty in recruiting suitably-qualified Canadian scientists, but for which a German might be available. The FRG would pay the individual's salary and travel funds while WTC would provide suitable facilities: the arrangement could be regarded in a professional training perspective. This option is being explored by Dr. Schmidtke and Dr. Eberle.

Another initiative in this area is to hold a workshop on ne technologies in waste-water treatment; this was discussed with Drs. Eberle and Sontheimer by Dr. Schmidtke during a visit to Karlsruhe in November 1978. It now appears that the most appropriate course would be to schedule the workshop in conjunction with the Annual Meeting of the Water Pollution Control Federation to be held in Houston, Texas from 7-15 October 1979. This workshop is now scheduled for 3-5 October and will deal with water pollution control technologies of the 1980s.

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One ongoing cooperative activity which lies somewhat outside the S&T Agreement is a contract between WTC and BASF whereby the latter supplies wastes samples at various stages of their plant effluent treatment process for assessment for toxicity to fish at WTC. This will be used as input in the drawing-up of Canadian regulations for the treatment of toxic industrial effluents from complex chemical plant.

Ground-Water Pollution

Dr. Jackson and Mr. Grisak of the Hydrology Research Division of Environment Canada carried out exploratory visits to various centres in FRG in January 1978 including Professor Matthess at the University of Kiel, Dr. Rottgardt at BEB GmbH in Hannover, Dr. Jakubick of the Nuclear Research Centre in Karlsruhe, Dr. Finkenwirth of the Hessen Geological Survey in Wiesbaden, Dr. Moser of the Institute for Radiohydrology in Munich and Drs. Schwille and Bertsch at the Federal Institute of Hydrology in Koblenz. Subjects discussed included the mobility of radionuclides, deep-well disposal of brines, ground-water flow measurements and the disposal of toxic wastes in salt mines. In return a five-week working visit was made by Professor Matthess to Waterloo and Chalk River in September. It is anticipated that the following working visits (of 1-3 months) will be proposed in the near future:

- Dr. F. Schwille, Vice-President and Chief Hydrogeologist of the Federal Institute of Hydrology, Koblenz, to visit Chalk River in the summer of 1979 for about one month to obtain background information for a report on radionuclides in the aquatic environment;

- For two weeks in the second half of 1979, the German project leader, Prof. Dr. Näring will visit various Canadian centres for an exchange of information;

- Dr. Albertsen of Prof. Matthess' group to visit Chalk River and the University of Waterloo for 2 months in 1979 to study gamma spectrometry and the measurement of radionuclide distribution coefficients;

- One of Prof. Matthess' group at Kiel to visit White-shell Nuclear Research Establishment (Manitoba) to study actinide geochemistry (sometime in 1979);

- J.F. Pickens of the Contaminant Hydrogeology Section, 562 Booth St., to visit the Institute of Radiohydrometry near Munich to study tracer techniques in ground water (sometime in 1979 or 1980);

- Other members of the Contaminant Hydrogeology Unit to visit Kiel or Munich for cooperative work on their nuclear-waste repository study.

Solid Waste Management

At the Fourth Consultative Meeting, the German side expressed interest in Canadian work on setting up a municipal solid-waste data-base; background information was provided by Mr. Rattray of Environment Canada. The German Federal Ministry of the Interior remains interested in an exchange of information.

Fresh-water Research

There appears to be no present interest in the use of the Canadian Robot Analyser in Lake Constance.

Summary

There is therefore seen to be a satisfactory level of continuing collaboration in the field of environmental research and technology, particularly in waste-water treatment and ground-water pollution. Contacts are established and cooperation can probably be left to the experts on both sides.

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CANADA/GERMANY S&T AGREEMENT

Fifth Consultative Meeting

Ottawa, May 1979

Status Report on Geoscience

A useful level of cooperation has continued since the last Consultative Meeting, with emphasis on prospecting techniques, rock physics, the geochemistry of mineral deposits, offshore geophysical investigations, geotechnical safety and seismology. Of greatest value has been the exchange of ideas about problems of mutual interest and the interaction of scientists who have contributed different technical and theoretical expertise to the cooperative project. This produces the maximum amount of new data and makes the most efficient use of specialized laboratories which would otherwise be available only at great cost to Canada. Cooperation thus greatly accelerates the attainment of scientific objectives aimed at enhancing understanding of the earth's crust. Projects on remote sensing applied to geoscience and geological data-processing were completed. Efforts are continuing to increase the involvement of universities and industry.

A number of proposals for new projects have been generated which it is hoped will lead to cooperative activity in the application of remote sensing and geochemical techniques to the analysis of water quality in estuaries, the use of the tectonic index to the economic evaluation of coal deposits, hydraulic mining, the study of impactites, the development of a modern systems approach to the storage and management of bibliographic data in the geosciences, and participation in the 7th International Strata Control Conference. It is believed that these new joint activities will represent a useful and important contribution to the geoscience programs of both countries.

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ANNEX D

CANADA/GERMANY S&T AGREEMENT

Fifth Consultative Meeting

Ottawa, May 1979

Status Report on Nuclear Power

Mr. Atchison, Director of the Assessment Branch of the Atomic Energy Control Board, visited GKSS in March and September 1978 for discussions with Mr. Schafstall on the possibility of performing blowdown tests in the GKSS quarter section pressure-suppressing facility which would give information relevant to the possible consequences of a ruptured pressure tube or calandria tube in a CANDU reactor. These discussions are still under way but have not yet reached the stage of a definite proposal.

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CANADA/GERMANY S&T AGREEMENT

Fifth Consultative Meeting

Ottawa May, 1979

Status Report on Non-Nuclear Energy

Cooperation has continued at a satisfactory level since the Fourth Consultative Meeting in the following sub-fields.

Coal Technology

The seminar on coal conversion took place at the Alberta Research Council in Edmonton as planned, though the date had to be put back to April 1978. It was highly-successful, and provided the delegates with the opportunity to establish valuable personal contacts, as well as to visit the Syncrude tar sands plant, the Alberta Research Council labs and a coal mine. Subsequently, Dr. Ziegler of BMFT participated in the Fourth International Conference on Coal Research in Vancouver in October 1978. One outcome of these contacts is that EMR has made arrangements for Canadian sub-bituminous coals to be tested for liquefaction characteristics in a pilot plant at the Saarbergwerke in Saarbrücken. It is hoped this test-run will enable an assessment to be made of the technical and economic viability of producing coal-derived liquid fuels in Canada.

An exchange of information on the safety aspects of underground diesel machinery has been suggested by the EMR Mining Research Laboratories. Information is also being exchange on hydraulic coal mining and slurry transportation, via contacts established through the International Energy Agency.

Solar Energy

The Canadian Department of Agriculture and the Province of Ontario have started a joint project on solar heating of greenhouses, and an experimental facility will be operational in May 1979. This topic was mentioned as an area of possible cooperation by Mr. Loosch of BMFT during a visit by the Canadian Senior Coordinator to Bonn in March 1978. The Ontario Horticultural Research Institute has proposed that the information exchange already undertaken with German agencies be broadened to include an exchange of visits which it is hoped will lead to a joint project. Background information on climatic conditions in the two countries has been exchanged. A visit by a Canadian delegation to German solar energy installations is planned for May or June 1979.

Wind Energy

The planned workshop took place at the National Research Council in the fall of 1978. Two German experts from Dornier and two from ERNO participated, then visited the 200 KW installation in the Magdalen Islands. As a result of this visit, and a subsequent visit by three Canadian experts to the FRG, Dornier has proposed a joint study of the structural dynamics of the Magdalen Islands rotor using computer programs developed by Dornier. A reply to this proposal is in abeyance pending the completion of a review of the overall Canadian program in this area. A decision should be possible by the Fifth Consultative Meeting.

Gas

Since no appropriate centre of interest has been located in Canada, it is suggested that the proposed workshop on gas deposits in caverns be cancelled.

Biomass

It is proposed that Biomass be added as a new subfield under non-nuclear energy to cover a possible joint project on wood gasification. Negotiations are under way for a shared-cost demonstration of the use of a wood gasifier supplied by Imbert Energietechnik GmbH in conjunction with a 1 MW diesel/gas electric generator to supply both heat and electricity to the Elmsdale School of the Province of Prince Edward Island, as part of a comprehensive demonstration of the social and environmental benefits of using wood energy in PEI.

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CANADA/GERMANY S&T AGREEMENT

Fifth Consultative Meeting

Ottawa, May 1979

Status Report on Health Protection

Dr. de Villiers, Director-General of International Health Services of Health and Welfare Canada and Dr. Casselman, one of his program advisers, met Dr. von Manger-Koenig and Dr. Voigtlander of the International Relations Group of the German Federal Ministry of Youth, Family and Health at an international meeting in Geneva in the autumn of 1977. They discussed possible exchanges in Public Health and Health Sciences including (a) health care needs and economics and (b) drug policies and tried to define mutual interests. Shortly after this discussion, Mr. Klaus Bohr of the German Embassy in Ottawa had an informal discussion with Mr. P. Gravelle, the Assistant Deputy Minister for Health Programs in Health and Welfare Canada. Mr. Gravelle followed this up with a letter to Mr.Bohr on 26 October, 1977 inviting a visit by a German delegation in January, 1978 and asking what topics in the field of Health Programs they wished to discuss. This visit does not appear to have taken place.

Mr. Halstead, the Canadian Ambassador in Bonn, called on Frau Huber, the Federal Minister for Youth, Family and Health to discuss possible exchanges of personnel and information. Specific topics mentioned were (a) drug abuse and alcoholism, especially among the youth; (b) the increasing costs of medical care and of health insurance; and (c) preventive medicine. Frau Huber expressed satisfaction with the operation of the S&T Agreement and added that her Ministry was considering sending a mission to Canada in 1978. A German delegation headed by State Secretary Professor Wolters visited Canada in April 1979.

The proposed cooperation between Prof. Dr. Bayer and Prof. Dr. Hutten of the University of Mainz and Dr. Albisser of the University of Toronto on the development of an artificial endocrine pancreas (Project 5.1.1.1) did not take place, largely because of a shortage of Canadian travel funds and the project must be regarded as terminated, although BMFT continues to support the work of Professors Bayer and Hutten.

Cooperation between Dr. Hopps of the National Research Council of Canada and Dr. Kupper of the Stiftung Rehabilitation, Heidelberg, Dr. Schoenherr, Stuttgart and Professor Werner, University of Munster has also been inhibited by a lack of travel funds on the Canadian side. It is hoped that an opportunity for consultation will present itself at a future date; BMFT continues to support Dr. Kupper's work also, and there is no shortage of travel funds on the German side.

Other areas mentioned at the Fourth Consultative Meeting as offering the potential for cooperation were: therapeutic measures for disabled children; up-dating the medical knowledge of general practitioners and procedures for standardizing diagnosis and therapy. There appears to have been no follow-up so far in these topics.

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Ottawa, May 1979

Status Report on Historic Sites and National Parks

Proposed Canada-Germany Committee on Historic Conservation

Mr. Peter H. Bennett, former Coordinator, Liaison and Consultation, Parks Canada, held a series of meetings in Mainz in April 1977, just prior to the Fourth Consultative Meeting with Dr. Werner Bornheim, President of the German National ICOMOS Committee, and Dr. Lugge, Federal Ministry of the Interior. As a result, considerable exchange of information took place in 1977 and 1978.

One minor difficulty identified was the absence of any federal coordinating agency in this field in Germany. Exchanges of reports would have to take place with all the Lander. However, Dr. Bornheim graciously accepted to receive samples of Parks Canada material and to distribute it to other Lander as appropriate.

Unfortunately, little progress has been made with the suggestion that two or three senior officials visit Canada to look at historic conservation operations and to discuss the advisability of establishing a more formal structure to ensure effective and regular exchanges or specific projects.

The German side has proposed that this activity should become part of the consultations under the 1975 Canada/FRG Agreement on Cultural Cooperation.

Proposed Canada/Germany Committee on National Parks (Natural and Scenic as opposed to Historic)

At the same time (April 1977) as the meetings in Mainz, Mr. Bennett met in Bonn with three FRG officials, Dr. Gildmeister (BML), Dr. Mrass (BFANL), Mr. Hanno Henke and Dr. Baker, the Canadian Scientific Counsellor. Since then, a number of documents and reports have been exchanged. Both Dr. Mrass and Dr. Bornheim regularly receive the publication of "Conservation Canada" and Parks Canada receives "Natur und Landschaft" and "Dokumentation fur Umweltschutz and Landespfledge". The latter is a particularly good bibliographic source in this field.

Again, there is very little progress to report on the proposal for a visit of German officials to Canada to look at Canadian National Park activities and to determine whether further exchanges would be mutually desirable.

Although progress has been slow regarding possible visits of German officials to Canada or the establishment of more-formal arrangements for cooperation, the information exchanges and the contacts made are regarded as being useful on both the historic sites and the national parks aspects. Other than the above visits to Canada, no new activities are proposed for the near future.

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Ottawa, May 1979

Status Report on Biotechnology

A summary of Canadian activity in single-cell protein R&D was sent in April 1976 to Dr. Bauer of BMFT via Dr. C.H. Baker. This listed the work at eleven research centres including universities and industry. Similar information covering activities in the FRG was requested. In August 1976, ten research papers were received describing specific German projects on fermentation and single-cell protein.

In December 1977, several books and reports were received describing work in some major centres of R&D effort on fermentation and other biotechnology activities. No comprehensive summary is yet available, however.

A survey of fermentation technology in Canada is now in preparation and should be available by mid-1979. Fermentation R&D is now starting to receive increased support under the expanded S&T support program of the Federal Government. Further attempts to initiate technology exchanges in this area should probably await real progress in specific Canadian projects or the opportunity for a first-hand survey of German activities by a Canadian review team. This has so far been inhibited by a lack of travel funds. Another opportunity for discussion may occur during the VIth International Symposium on Fermentation, to be held in London, Ontario in June 1980.

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Status Report in Space Science

A Canadian point of contact has now been named; he is Dr. R. Langille,* Secretary of the Interdepartmental Committee on Space. His address is:

Dr. R.C. Langille,
ICS Secretary,
Journal Tower North Bldg.,
300 Slater Street,
Ottawa, Ontario,
K1A 0C8.

The German Senior Coordinator, Dr. Schroeder and Mr. Bianchi visited the David Florida Satellite Laboratory in September 1978 and saw the testing facilities and various exhibits connected with the Hermes experimental satellite for domestic telecommunications.

Canada was admitted as an Associate member of ESA in December 1978. While this opens up another formal channel for Canada/FRG cooperation, bilateral contacts under the S&T Agreement may still be useful for discussions and planning. Canadian federal agencies have been asked to state their interests for possible space lab experiments. The German interest in space-processing of materials formed in a zero-g environment has been noted. There is some interest in this area in Canada, which should increase as the date for the first space shuttle flight approaches. Chemists and crystallographers may be able to design useful experiments which do not require a large financial outlay. However, no specific proposals are put forward at the present time.

One new bilateral activity is a cooperative project between the Herzberg Institute of the National Research Council of Canada and the Max-Planck-Institut fur Physik and Astrophysik under which Canada will supply the instrumentation for one of four Firewheel subsatellites to be launched by an ARIANE rocket shortly after October 1, 1979 from Kourou, French Guayana. FRG is to supply the mechanical substructure, antennas, transmitter and batteries while Canada will supply the telemetry encoder, power distribution and experimental hardware such as particle detectors etc., as well as all physical and environmental testing.

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* Since replaced by Mr. J.R. Marchand.

No exchange of funds will take place and the results will be issued as a coordinated set of papers.

The Herzberg Institute is also cooperating with the University of Kiel to supply instrumentation for the co-spin experiment, one of six major experiments to be placed on the ESA satellite to be launched in 1983 under the NASA/ESA Solar Polar Mission.

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Ottawa, May 1979

Status Report on ARCUS Project

A joint progress review meeting was held in Bremen, Germany on 15 February 1979 between representatives from NRC, BMFT, SPAR and ERNO. Mr. H.G. Collins, DSS and Mr. W. Dechant, Canadian Embassy, Bonn, also attended.

At this meeting, the two companies gave a joint presentation on the results of the feasibility study. Using current project management terminology and in anticipation that this work will lead to the design, development, test and evaluation of an ARCUS, the current project is now referred to as Phase A - Requirements Definition and Specification Phase. Essentially, the presentation, which anticipates the final report due to be completed by 31 March 1979, confirms the concept and technical feasibility and establishes the requirements and approach to the preliminary design.

Some conclusions were also arrived at in relation to the market although the exact nature of this is not yet established. This latter work, however, is continuing and in February, some very positive interest was being expressed by Phillips Petroleum in Norway. A final presentation is to be made on the results of the market survey by Adkins Planning, who are under sub-contract to SPAR, at a meeting scheduled for 5 March 1979, in Toronto.

The presentation included an examination of possibilities for the overall DDT&E program and both companies are making proposals to their respective government agencies for follow-on work in what is termed Phase B1. As shown on the accompanying schedule chart, this would culminate in the Preliminary Design Review (PDR) and would be followed by the Critical Design Review (CDR) and the manufacturing and test and evaluation phases.

Two alternatives for these succeeding phases were proposed, although with a high degree of caution by both companies in committing themselves to a program schedule or identification of total program costs. For Phase B1 only, SPAR have estimated $365,800 with a corresponding figure for ERNO although the latter has not yet made a formal proposal to BMFT.

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The German Ministry representative Dr. F. Wilckens supported the proposed follow-on work of Phase B1 subject to:

a) a formal expression of interest by a potential user;

b) receipt by the Ministry of a formal proposal for the follow-on work by mid-March and;

c) a commitment by both companies to procuring, to the maximum extent possible, sub-systems and components from West German and Canadian suppliers.

The Canadian project officer supports this proposal in principle subject to:

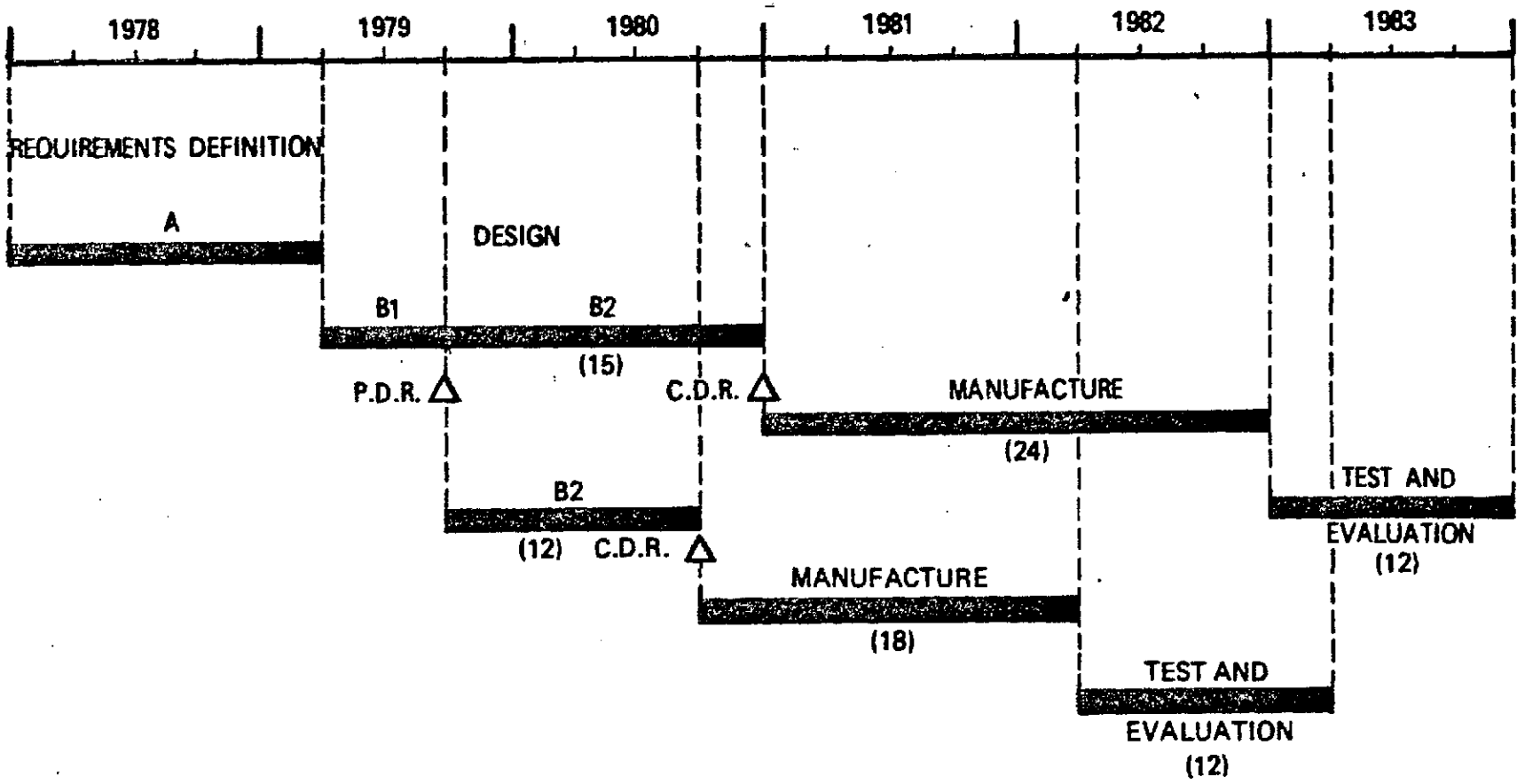
a) an overall estimate of program costs (this is required by the NRC contract with SPAR but is not a requirement in the contract between ERNO and BMFT);

b) an accelerated schedule and;

c) a commitment by a potential user in the form of an MOU or other binding agreement for the procurement of ARCUS production systems and involvement technically, financially or both in the DDT&E program.

No commitment to follow-on activities can yet be made although clearly, if the above conditions were met, there would be strong justification for giving support, now that the technical feasibility has been demonstrated and the market prospects appear to be developing.

ARCUS SCHEDULE – OVERALL PROGRAM POSSIBILITIES



CANADA/GERMANY S&T AGREEMENT

Fifth Consultative Meeting

Ottawa, May 1979

Status Report on Transportation

For a number of years there have been scientific information exchanges in the field of magnetically levitated transportation. In June 1978 representatives from NRC and TDC visited Vacuumschmelze GmbH and Siemens for discussions on this subject. The scientific information exchange has been beneficial to researchers in both countries, and represents an excellent example of useful cooperative activity of this type.

Due to differences in size and approach to maglev transportation R&D in the two countries, the information exchange has not matured into cooperative project work. During 1978 the BMFT decided to terminate the superconducting electrodynamic maglev development and concentrate all their efforts on the normal conducting electromagnetic system, which they consider more suitable for potential future application in FRG. Consequently Canada and FRG have now taken divergent technological paths in maglev transportation development, so the potential for continued useful scientific information exchange on this subject is considerably reduced. It is expected that some contact will be maintained with the FRG researchers but that this activity will decrease in frequency and importance through time.

There is interest on the part of Canadian transportation research organizations in the following technical areas:

- Superconducting magnets and cryostats (Related to maglev transportation).
- Mechanical continuously-variable transmissions.
- Composite flywheels (Particularly the work being done by MAN Daimler-Benz).
- Marine icebreaking (Development of special components such as propellers based upon FRG ship building experience).
- Coal-slurry pipelines.

These were discussed with Mr. Bianchi during his visit to TDC in October 1978. Representatives from TDC are planning to visit FRG for discussions on these subjects during June 1979.

A new proposal on rotary-motor-powered steerable trucks, involving cooperation between the Urban Transportation Development Corporation (UTDC) under contract to TDC and Berlin Transport is dependent on suitable sources of funding being located in Canada.

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Ten areas of interest were outlined by the Province of Ontario at the Fourth Consultative Meeting in May 1977. Information exchange has continued on a sporadic basis since then, but no proposals for specific cooperative activities have been put forward by either side. The Ontario authorities wish to continue the exchange of information but are unable to undertake joint projects at the present time.

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Status Report on Natural Resources Projects Proposed by the Province of Ontario

Land-use Planning for Leisure Activities

Information on park-planning policies has been exchanged. Ontario has no immediate plans for extending cooperation in this area at the present time.

Forest Fire Control

Although there has been no follow-up since the Fourth Consultative Meeting, the Ontario authorities have a continued interest in exchanging information in this field and in receiving a German delegation at the appropriate time.

Remote Sensing Applications

Dr. Pala of the Ontario Ministry of Natural Resources attended a symposium at the University of Freiburg in July 1978, and had useful discussions with Professors W. Weischet and G. Hildebrandt.

ANNEX "E"

CANADA/GERMANY S&T AGREEMENT

REPORT ON

FIFTH CONSULTATIVE MEETING

Ottawa, May 2-4, 1979

NEW PROPOSALS

CANADA/GERMANY S&T AGREEMENT

Fifth Consultative Meeting

Ottawa, May 1979

New Proposal in Communications

Extensive work has been carried out in Canada in recent years on the development of interactive, multipurpose, visual communications systems under the name VIDEOTEX. The practical demonstration stage has now been completed and the phase of exploring and developing new, practical applications has been reached. Canada wishes to propose this as an area for discussion of common interests with the participation of industry in both countries.

Att.

CANADA/GERMANY S&T AGREEMENT

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Ottawa, May 1979

New Proposals in Oceanography

Medium-scale Experiment

It has been agreed by both countries that the next logical step in the study of the chemical and biological interactions of sub-lethal concentrations of pollutants in marine atmosphere/water/sediment systems would be to conduct a series of "medium-scale" experiments, i.e., intermediate in scale between the laboratory and the field. As the result of a series of joint meetings and discussions, plans for two joint projects have been drawn up. The first involves the study of the interactions of sediment, sea-water and the marine ecosystem with respect to trace metals, hydrocarbons and eutrophication, using large, artificial enclosures containing a water/sediment interface. The principal participants in this project (SEAFLUXES) will be the IfM at the Universität Kiel using their Belljar technique and IOS, Patricia Bay, using the CHEMCELL system.

The second joint project will concentrate on the transport and behaviour of environmental contaminants in the coastal zone, and will employ a mix of techniques ranging from laboratory experiments, through a variety of medium-scale investigations, to field experiments. The principal participants will be the Bedford Institute of Oceanography for Canada, and on the German side, the IfHM at the University of Hamburg, the IfM Bremerhaven and the BfM Koblenz.

Both projects will include physical, chemical and biological aspects.

Application of Remote Sensing and Geochemical Techniques to the Analysis of Water Quality in the Elbe River Estuary and the Bay of Fundy

This proposal would involve the exchange of scientists for extended periods in both directions during the period March 1979 to April 1982, during which time they would be fully integrated members of the host research team.

Radionuclide Monitoring and Behaviour in the Vicinity of Coastal Nuclear Power Stations

The proposed cooperation would involve both GKSS and the University of Heidelberg on the German side, who would act as

host to a Canadian scientist for up to two years. This proposal is at a much more indefinite stage than the two previous ones: the details of the scientific program have still to be worked out and, while funds are available, the mechanism for assigning a staff position has not been resolved.

Year of the German Bight.

This is a coordinated program aimed at improving knowledge of the tidal and wind-induced currents and general circulation in the German Bight. The purpose is to improve prediction of storm surges and of the spread of pollution in the surface waters and at depth. Negotiations are under way for the supply by the Nova Scotia Research Foundation of one drifting buoy of a type developed by NSRF together with Orion Electronics Ltd. This would be first used in preliminary tests of the diffusion of the dyestuff Rhodamine B, followed later by tests with deliberate spills of 10 tonnes of oil. However, NSRF has also been invited to participate directly with scientific personnel.

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Ottawa, May 1979

New Proposal in Marine Technology

Research in Ice-Covered Waters

SPAR has expressed an interest in cooperating with the German company IMS (Ingeneurs Gemeinschafft für Meerestechnik and Schiffahrt). Jointly the companies would plan to build and operate a platform structure from which practical research could be performed.

This project would tie in closely with the recommendations of the Pallister report* and would enhance the capability for doing research and developing the technology applicable to the Canadian Arctic.

The modalities of collaboration and the agencies involved would have to be decided once the project is outlined in more detail.

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* "Steering a Course to Excellence"

- A study of the Canadian Oil and Gas Industries conducted for NRC by Pallister Resource Management Ltd., Calgary, Alberta, June 1977.

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Fifth Consultative Meeting

Ottawa, May 1979

New Proposals in Geoscience

Canadian proposals for new areas of cooperation are as follows:

Tectonic Index

Under this proposal a Canadian scientist would be posted to the FRG for a period of three months to learn something of German ideas on the principles, criteria and application of the tectonic index in coal assessment. Initial contact between the scientists involved has already taken place.

Crustal Evolution by Impact Processes

Although this is presented as a new project, samples and information have already been exchanged. The project involves the petrographic and chemical analysis of samples from Canadian impact structures to detect trace amounts of siderophile elements in meteorites. The analysis methods are highly specialized and are not widely accessible. The Canadian project officer, Dr. Grieve, hopes to visit the Max-Planck-Institut für Chemie for four weeks in 1979 to utilize their specialized facilities.

Geoscience Documentation

The possibility of exchanges in this area was mentioned during a visit by Dr. W.F. Cockburn to BMFT in March 1978. Both countries have programs and could benefit from the exchange of background information and discussions aimed at ensuring that the systems adopted are compatible both with each other and with national S&T information systems.

Strata Control

This project would cover contacts during the Seventh International Strata Control Conference due to be held in Canada in April 1979. Advantage will be taken of this meeting to exchange ideas and establish contacts which may lead to future cooperative projects.

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Ottawa, May 1979

New Proposal in Nuclear Energy

The Canadian Atomic Energy Control Board has entered into discussions with GKSS on the possible use of their quarter-section blowdown facility for tests related to pressure-tube or calandria-tube failure in the CANDU reactor. It is unlikely, however, that these negotiations will have reached a stage where discussion at the Fifth Consultative Meeting would be useful.

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Ottawa, May 1979

New Proposals in Non-nuclear Energy

Participation in the development of the Large Capacity Vertical-Axis Wind Turbo-Generator

ERNO Raumfahrttechnik GmbH of Bremen, has for some tine now been working on wind-energy conversion systems and is currently planning to build under contract to BMFT a 20KW gyromill - this is a vertical-axis windmill where the blades are mounted vertically. In addition, they have recently completed in collaboration with KMW, Sweden (AB Karlstadt Mekaniska Werkstad, Kristienhamn) a design study for a 2.3 megawatt horizontal-axis wind-turbine.

ERNO is interested in cooperating in the development of our 4 megawatt vertical-axis wind-turbine and it would be appropriate to explore this at the consultative meeting.

The nature of the cooperation in this case would be for ERNO or other German companies to act as the supplier for some major component of our machine, e.g., the blades, in return for access to the results and other information to be derived from this project.

The Canadian agency involved would be the National Research Council and its contractors.

Hydraulic Mining and Transport

Although this proposal is mentioned in the Status Report on Geoscience, it seems to belong more appropriately under Non-nuclear Energy.

The Canadian Department of Energy, Mines and Resources has initiated studies in the hydromechanical mining and transportation of coal and would like to evaluate the applicability of the technology developed in the Ruhr to conditions in Western Canada where there are thick, steeply-dipping seams. Initially, this would be limited to the exchange of information and a visit to Dortmund in October 1979, at which the possibility of closer cooperation might be explored.

Wood Gasification

Negotiations have commenced for a shared-cost demonstration activity under the Canada/FRG Agreement. Under discussion is the installation of a gasifier as one component of a comprehensive demonstration of the social and environmental benefits of using wood energy in P.E.I. The equipment is to generate heat and electricity at Elmsdale School at 1MW scale. Experts from Imbert GmbH were scheduled to visit Canada early in 1979 for detailed technical discussions.

Coal Liquefaction Technology

As an outcome of the seminar on coal conversion held in Edmonton in April 1978, arrangements have been made for samples of Canadian sub-bituminous coals to be tested at the pilot-plant scale for liquefaction characteristics using technology developed by the Saar group of companies. These tests could lead to larger-scale tests and the possible adaptation of the German technology for use in Canada.

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Ottawa, May 1979

New Proposal in Space Science

The Herzberg Institute for Astrophysics has been invited by the Max-Planck-Institut für Physik und Astrophysik to supply the instrumentation for one of four Firewheel subsatellites to be launched in late 1979 from Kourou, French Guyana. No exchange of funds will take place. Since arrangements are already well in hand, this is included for the record only.

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Ottawa, May 1979

New Proposals in Transportation

ROPOST Project

In February 1979 Morrison Renfrew of the Urban Transportation Development Corporation (UTDC) visited Berlin Transport for detailed discussions regarding the possible application of rotary-motor-powered steerable railway truck concepts (being developed by UTDC under contract with the Transportation Development Centre, Montreal) to the solution of noise and wheel-rail wear problems on the Berlin subway. A possible joint Canada/FRG cooperative project to complete development and testing of these advanced railway trucks was outlined.

At present the discussions have not progressed to the point where the participants are in a position to approach their respective governments, but proposals in this regard should be forthcoming within a few months. While TDC is interested in a cooperative project of this nature no source of funds has yet been identified to support the Canadian participation.

Linear Motors

At the Fifth Consultative Meeting, the German side submitted a proposal for a comparative assessment of Canadian work on linear motor-powered steerable truck systems and the German M-Bahn development. It was agreed further discussion was required, possibly at the International Traffic Exhibition at Hamburg in June, 1979.

ANNEX F

CANADA/GERMANY S&T AGREEMENT

Fifth Consultative Meeting

Ottawa, 2-4 May 1979

Working Group on Marine Science

Participants:	Mr. I.D. Macaulay	DFO
	Professor H. Walden	DHI
	Dr. G.I. Pritchard	DFO
	Dr. W.F. Cockburn	MOSST
	M. P. Côté	QUEBEC
	M. S. Jackson-Hughes	DEA
	Mr. E. Smith	MOSST

The Working Group was asked to review the present status of activities in the chemical, physical and biological marine sciences and to advise the Consultative Meeting on proposals for further collaborative work. They had for consideration a compilation of status reports, activity sheets and new proposals tabled at the Consultative Meeting as well as the report of a Joint Scientific Workshop convened in Hamburg February 28 to March 2, 1979.

The Working Group reviewed the Status Report on Physical and Chemical Oceanography presented to the Consultative Meeting. A number of suggestions were made, leading to clarification of the wording of the Status Report. The revised document is included along with the other Status Reports in Annex D.

The Status Report on Marine Biology was also reviewed. It was noted that both sides had supported the concept of pilot scale ecosystems, such as can be accommodated in the proposed medium-scale experiment. Work on oil spills has not received high priority but if a project were to develop, it probably should be separate from the medium-scale experiment. Also, numerous initiatives related to fish health have already been pursued, and the opportunity for establishing a major project on fish diseases and their control has been identified and supported by both parties. A draft proposal prepared by Federal Republic of Germany scientists, titled Methods of Prophylaxis, Control and Reduction of Fish Diseases in Aquaculture Systems, is attached as Appendix 1 for information, pending further discussions between the coordinators and scientists who might be involved.

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The Working Group reviewed the report of the Joint Scientific Workshop held in Hamburg which proposed that a medium-scale experiment be carried out in the field of marine pollution, entitled "Physical, Chemical and Biological Interactions of Environmental Contaminants within Natural and Artificially Enclosed Coastal Sediment-Seawater Systems". The aim of this experiment would be to investigate the behaviour of chemical substances and other contaminants in seawater and at the sediment-seawater interface, and their effects on organisms. A covering memorandum by GKSS to the workshop report points out that supplementary work and some discussions will be necessary before this major project can be finalized and presented to national authorities for approval and support. The Hamburg Workshop recommended that its conclusions be brought to the attention of the Consultative Meeting, to seek endorsement and further direction concerning the approach being taken by scientists of both countries.

The medium-scale project will relate to several existing and new projects in both oceanography and marine biology, will encompass field and laboratory experiments, but will give special emphasis to work within in situ enclosures. As a medium-scale experiment will also facilitate work in marine biology, biologists should be included in future planning sessions.

The Working Group gave detailed attention to the existing list of sub-projects of the medium-scale experiment described in Annex III of the Workshop Report. This list, as modified by inclusion of certain Canadian proposals and new proposals by the Federal Republic of Germany, is attached as Appendix 2.

Professor Walden stressed the importance of designating project coordinators on both sides (a German coordinator has been named), producing a plan for implementing the project, determining the interactions of the sub-projects, discussions on financial matters and fixing a time scale for various sub-projects. It was stressed that these arrangements should be completed by October 1979 if possible.

The Working Group concluded that some projects should be independent of the medium-scale experiment. These, and other projects expected to continue, are listed below.

1.1.2.4	"Estuarine Studies" (remote-sensing portion)*
1.1.3.1	"Analysis of Long-Period Fluctuations of Water Level"
1.1.3.2	"Barotropic Tidal Models..."
1.1.5.1	"Sensor Development/CTD Intercomparison"
1.1.7.0	"Physical Oceanography; Sea Ice, Remote Sensing"
1.1.8.0	"Drifting Buoys - North Atlantic"

* geochemical portion will proceed as sub-project 1.0.1.11 of the medium-scale experiment.

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1.1.4.3 "Year of the German Bight"

1.2.2.4 "Marine Biology - CEPEX",*

1.2.3.1 "Environmental Pollution and Fish Tumours"*

1.2.3.2 "Fish Disease in Aquaculture"

1.2.3.3 "Fish Health Control - Immunobiology of Fish"

1.2.5.6 "Nutrition of Herring Larvae"

1.2.6.1 "Krill Processing"

Recommendations

(a) The Consultative Meeting is invited to approve the inclusion of the Working Group Report in The Record of the Consultative Meeting.

(b) The Consultative Meeting is also invited to take note of the success that has been achieved in formulating a joint medium-scale experiment, as first proposed at the Fourth Consultative Meeting. The Consultative Meeting might wish to commend these efforts and suggest that they be used as a model in the development of additional medium-scale experiments.

(c) Accordingly, the Consultative Meeting could agree:

(i) to recognize that the medium-scale project now being discussed has significant possibilities for both the Federal Republic of Germany and Canada, in terms of meeting national objectives in marine science; and

(ii) to invite appropriate authorities in both countries to conclude, if possible by October 1979, the arrangements necessary to implement the medium-scale project described in the Report of the Marine Sciences Working Group.

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* These two biological projects will be incorporated in the medium-scale experiment under similar titles.

Draft Proposal on Methods of Prophylaxis, Control and Reduction of Fish Diseases in Aquaculture Systems

Fish diseases constitute a very old research field in Germany. Problems have increased during recent years, however; compared to research activities in foreign countries, e.g., in Canada, U.S.A., Japan, Israel, U.K., Denmark, France, The Netherlands and Jugoslavia, as judged by the number of excellent publications and the standard of results, there is a considerable difference noticeable in Germany. There are in fact only two research institutions dealing with fish diseases which are connected to German universities and the present status with regard to personnel and financial support unfortunately does not suggest that positive changes can be expected in the near future. In order to fill this gap, German research institutions are in general faced with the need to study fish diseases abroad, to acquire knowledge and techniques and then to develop their own research activities or participate in joint projects.

The above research title can be divided in at least five subtitles:

1. The production of disease-free stocks.

   Disease-free brood-stock, eggs, disease-free offspring, may be reared and cultivated under regular control, provided control facilities are available. This is the goal for German fish farms in the future.

2. The influence of stress upon the outbreak of fish diseases.

   Stress research with regard to fish is poorly developed and little is known. This project should only be started in cooperation with biochemists having a well-trained analytical background.

3. Vaccination of fishes.

   In the past, this procedure seemed to be promising but recent advances led to the conclusion that no real success could be obtained with vaccination against virus diseases. Positive results were obtained against bacterial diseases e.g., Vibriosis, Furunculosis, Enteric Redmouth Disease and Bacterial Kidney Disease.

4. The genetic selection of disease-resistant fish stocks.

   There are no details or positive result obtainable as yet.

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5. The early recognition of diseases, disease control, and diagnosis.

   The development of adequate and reliable diagnostic methods is still a principal need and a basic demand especially regarding viral and bacterial diseases.

It is fundamental to have specific and rapid methods of identifying disease agents prior to any other more far-reaching research projects.

Regarding joint research projects with Canadian scientists, we feel that in our situation as described above, item No. 5. should be the starting point.

We therefore propose:

1. The exchange of scientists, mainly Canadian scientists to Germany, to establish diagnostic facilities and to introduce scientists to adequate working methods. Basic information flow should be directed from Canada to Germany and Canadian scientists should be invited to work for reasonable periods of time in German laboratories.

2. Following this period, German institutions will be able to build up research facilities comparable to those in Canada and other countries abroad. This development of scientific efficiency will result in a level enabling German scientists to cooperate effectively with Canadian institutions.

3. Joint programs may be planned at this level ensuring useful results for both cooperating countries.

We think that this proposal of a stepwise (1-3) development of German potentialities is the only adequate way to reach and ensure useful cooperation between Canadian and German scientists in the field of fish diseases. This proposal is one of the results of our information tour of Canadian fish research institutions in 1978.

Hannover, April 25., 1979

(S I G N E D)

Prof. Dr. W. Korting & Dr. H.J. Schlotfeldt

FISH DISEASES RESEARCH UNIT
SCHOOL OF VETERINARY MEDICINE

STATE FISH DISEASES CONTROL AND HEALTH SERVICE OF LOWER SAXONY

APPENDIX 2

SUB-PROJECTS IN THE MEDIUM-SCALE EXPERIMENT

1.0.1.0 Physical, chemical and biological interactions of environmental contaminants within natural and artificially enclosed coastal sediment-seawater systems.

1.0.1.1 Trace metal transport in estuaries.

1.0.1.2 Investigation of the chemical speciation of selected trace elements and its variation by biological and geochemical processes.

1.0.1.3 Mechanisms of transport and rates of exchange of redox dependence trace elements between pore and bottom water.

1.0.1.4 Geochemical and biochemical transposition (mobilization and immobilization) of heavy metals and bioelements in the boundary area sediment/pore waters as well as pore water/free water in the Wadden Sea.

1.0.1.5 Standardization of sediments and bioindicator for monitoring of trace metals in coastal waters.

1.0.1.6 Production and remineralization by eutrophication processes, and the study of the phytoplancton, bacteria-interaction, nutrient regeneration.

1.0.1.7 Fate and effects of chlorinated hydrocarbons and heavy metals in a medium-scale experiment, using flatfish and shrimps as experimental organisms.

1.0.1.8 Effect of hydrographical factors on the seston in the turbidity cloud in the estuary of the St. Lawrence River.

1.0.1.9 Experiments with caissons in the Wadden Sea about the implications of animal activities to the interaction processes in the sediment/sea water system after enlargement of the lead and chromium concentrations in the sea water.

1.0.1.10 Technical development (design and construction) of caissons.

1.0.1.11 Input, distribution and possible sinks of heavy metal in a tidal influenced estuary.

1.0.1.12 Fluxes of hydrocarbons and other toxic compounds at the sediment water interface and their controlling chemical conditions, and biological effects.

1.0.1.13 Air sea exchange of pollutants and climatic gases.

1.0.1.14 Radio nuclide monitoring in the vicinity of coastal nuclear power stations.

1.0.1.15 The relationship of man-made and naturally occurring pollutants and fish diseases in the sediment and bordering water layers.

1.0.1.16 Methods of analysis and of sampling for monitoring hydrocarbons in seawater.

1.0.1.17 Transport and behaviour of environmental contaminants in the coastal zone.

ANNEX G

CANADA/GERMANY S&T AGREEMENT

Fifth Consultative Meeting

Ottawa, 2-4 May 1979

Working Group on Non-nuclear Energy

Participants:	Dr. Mueller-Helle	BMFT
	Dr. Jessenberger	BMFT
	Mr. Heseltine	NRC
	Dr. Overend	NRC
	Mr. Garrard	DEA
	Mr. Korn	DEA
	Dr. Charbonnier	EMR
	Dr. Read	EMR
	Ms Junke	ONTARIO
	Ms Seguin	ALBERTA
	Mr. Létourneau	QUEBEC

The working group discussed the more general aspects of cooperation and agreed that specialized workshops, with participants from industry playing the major role, constituted a good way of identifying opportunities for cooperation. Specific mention was made of a series of six workshops on wind-energy being organized by the US in which Canada already participated.

The German side noted that BMFT also arranges status seminars on its programs and invited Energy, Mines and Resources and the National Research Council to participate in a forthcoming seminar on solar energy. The Canadian side responded with an invitation to their opposite numbers to attend Canadian workshops and undertook to provide background information. Contact between Canadian and German scientists is also possible at international conferences; it was suggested that an informal meeting be arranged after the international meeting on biotechnology in London in September 1980. Another possibility was the 1980 world energy conference in Munich. German participation was also invited in the meeting of the Coal Association in Banff from 16-20 September 1979.

As regards the role of the International Energy Agency, the Canadian side stated that this was their preferred route for international cooperation in non-nuclear R&D. The German side agreed this is a good international forum for making contacts but stressed that many IEA projects are in fact of a bilateral or trilateral nature.

The following comments refer to specific ongoing or proposed activities.

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Solar Energy

Dr. Mueller-Helle praised the Canadian solar energy program and referred to a proposal made previously to Energy, Mines and Resources and the National Research Council for the exchange of developmental items of equipment for comparative testing. The Canadian side undertook to follow-up this enquiry. Ms Junke noted that an Ontario expert would visit Germany in June and that mutual interests would be explored.

Vertical Axis Wind Turbogenerator

Mr. Heseltine gave further background information on the proposed 4MW generator. Total cost is projected at $15 million evenly split between the Federal Government and Hydro Québec; Shawinigan Engineering has been asked by the National Research Council to draft a project definition. It is hoped to start work in January 1980 leading to an operational machine by 1983. If a cooperative project can be arranged, it would involve some form of agreement between ERNO Raumfahrttechnik GmbH and Shawinigan Engineering. In the meantime, NRC will seek to clarify Hydro Québec's interest in a cooperative project and will provide further information to the BMFT in the near future. Further action must await this clarification.

Hydraulic Mining and Transport

Discussion of this proposal revealed that, as a rule, coal seams in Western Canada tend to be substantially thicker than those in the Ruhr.

Clarification of the interest of the two sides in a joint project will only be possible as a result of a meeting in Dortmund planned for October 1979. The BMFT contact is Dr. Hauerstein.

Wood Gasification

Further action on this proposal is delayed for about two months pending decisions by the newly-elected provincial administration in Prince Edward Island. There is a good chance the Imbert proposal will be successful, however. Dr. Overend undertook to keep BMFT informed.

Coal Liquefaction Technology

Tests in Germany of Canadian sub-bituminous coal have shown unexpectedly high yields, and the next step is to carry out more detailed studies. Although the technical picture is promising, and Energy, Mines and Resources would like to puruse the cooperative effort, there has been no formal agreement with the Province of Ablerta and no federal funding has been assigned

to the project. Dr. Jessenberger mentioned the question of Federal-Provincial jurisdiction for this project. Ms. Seguin and Mr. Korn replied that the proposal under discussion was under the Federal Science and Technology Agreement, therefore his Canadian contact would remain Energy, Mines & Resources (Dr. Walsh).

The Consultative Committee is asked to note that action on all four proposals is proceeding normally via established channels and no specific action by the Committee is necessary.

ANNEX H

CANADA/GERMANY S&T AGREEMENT

Fifth Consultative Meeting

Ottawa, 2-4 May, 1979

Geosciences Working Group

Participants:	Prof. M.O.C. Kuersten	BGR
	Mr. G.D. Pearce	S&T/EMR
	Dr. C.F. Burk	CCGD/EMR
	Dr. G.B. Leech	GSC/EMR
	Dr. D.F. Sangster	GSC/EMR
	Dr. C. Goodfellow	GSC/EMR
	Mr. T.S. Cochrane	CANMET
	Mr. V. Haw	CANMET

The working group reviewed ongoing cooperative activities at a series of individual meetings involving the above participants. It was agreed that the long-term nature of scientific cooperation between Canada and the Federal Republic of Germany in the field of geosciences has enabled research institutes and universities in both countries to incorporate bilateral projects into their respective medium-term program plans. Both sides are of the opinion that the cooperative projects carried out so far have been of significant mutual benefit by enhancing the level of scientific methodology and knowledge and by increasing the efficiency of scientific work.

Major fields of geoscientific cooperation continue to be prospecting techniques, rock physics, the geochemistry of mineral deposits, offshore geophysical investigations, geotechnical safety and data-processing. In some cases successful industrial follow-up projects could be achieved. In other cases the results of cooperative projects have contributed to a better understanding of the scientific problems connected with such important economic and ecological issues as the final deposition of nuclear wastes and the underground storage of oil and gas.

Efforts are continuing to incorporate mining technology, ore processing and metallurgy into the cooperative program. These efforts at the same time are expected to increase the proportion of industrial research projects under the agreement. Due to the broad nature of geoscientific projects several federal and provincial departments will be involved.

The results of cooperation in the field of geosciences are judged as positive by both sides; they agree that cooperation should continue along the same lines with the emphasis on applied research and increased involvement of industrial research.

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The four new proposals entitled Tectonic Index, Crustal Evolution by Impact Processes, Geoscience Documentation and Strata Control Conference are recommended to the Consultative Meeting for approval. It was also agreed that nine projects were now either completed or cancelled, and should be deleted from the list of active projects: they are listed in Annex I.

ANNEX I

CANADA/GERMANY S&T AGREEMENT

Fifth Consultative Meeting

Ottawa, 2-4, May 1979

Projects Completed or Terminated Since Last Meeting

The following list includes a number of projects which were described as dormant or inactive in the Activity Sheets issued by the Canadian side for the Fifth Consultative Meeting, but which, as a result of discussion at the Consultative Meeting, can now be regarded as either completed, terminated or incorporated into other projects under a different Project No.

Marine Research

Physical and Chemical Oceanography

Physical Oceanography

1.1.0.0 Coordination voyage

1.1.1.1 Long-periodic fluctuations of currents in the Georgia Strait.

1.1.1.2 High-frequency tail of ocean wave spectrum.

1.1.1.3 Physical properties of seawater.

- Numerical models
- Fjord Studies

Chemical Oceanography

1.1.2.1 CEPEX study of cadmium (incorporated into 1.0.1.0)

1.1.2.2 Analysis of seawater

1.1.2.3 Effects and decomposition of oil spills

Atmosphere/Ocean Effects

1.1.3.3 Overflow experiment

Regional Oceanography

1.1.4.1 JONSWAP

1.1.4.2 Red Sea brines

Oceanographic Instruments and Measurements

1.1.5.2 Software for Battish/Delphine

Oceanographic Data

1.1.6.0 DBMS Information exchange

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Marine Biology

Aquaculture

1.2.1.1 Crayfish culture

1.2.1.2 Oyster culture

1.2.1.3 Stress research in fish

Water Pollutants

1.2.2.1 Influence of cadmium on herring

1.2.2.2 Cell test

1.2.2.3 Effect of domestic waste water on coastal flats

1.2.2.4 CEPEX (incorporated into 1.0.1.0)

Fish Disease

1.2.3.1 Environmental pollution and fish tumours (incorporated into 1.0.1.0)

Ecosystem

1.2.5.1 Behaviour of herring larvae

1.2.5.2 Mortality of fish larvae by carnivorous amphipods

1.2.5.3 Sea weed production
1.2.5.4 Ecosystem analysis
1.2.5.5 (no title)
1.2.5.7 Fish larvae behaviour

Marine Technology

Sensor Development

- (no specific projects)

Offshore Technology

1.4.2.1 Dynamics of offshore structures

Diving Technology

1.4.3.3 Deep-diving equipment

Deep-sea Towing System

- (No specific projects)

Nuclear Analysis Methods

2.3.1.0 Nuclear measurement techniques

Geoscience

Economic Geology Onshore

3.1.1.2 Uranium prospecting

3.1.1.4 Prospecting of asbestos

3.1.1.9 Geochemistry of uranium in Bow Lake

Marine Geosciences

3.2.1.1 Morphologic and sedimentologic investigations

3.2.1.2 Gravity measurements aboard ship

3.2.1.3 Uranium concentration in offshore basins

Remote Sensing

3.5.1.1 RS and geological interpretation of ERTS data

Geological Data-Processing

3.6.1.1 Methodology of raw material assessment and mineral statistics

3.6.1.2 Geocartography

Environment

Analysis Methods

4.1.1.0 Inductively-coupled plasma-optical emission spectroscopy

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Wastewater Technology

4.2.1.1 Phosphate removal from waste water

4.2.1.2 Treatment of pulp and paper effluents

4.2.1.3 Sludge treatment by gamma radiation

4.2.1.4 Organics in treated wastewater

4.2.1.5 Measuring techniques at wastewater treatment pilot plants

4.2.1.6 Toxicity removal

Monitoring

4.3.1.1 RS techniques for hydrological analysis

4.3.2.1 Emission/immission control program

4.3.3.1 Measuring system REX for Lake Constance

4.3.3.2 Dissolved oxygen sensor

Health Protection

Medical Technology

5.1.1.1 Artificial endocrine pancreas

5.1.1.2 Instruments for the blind

5.1.2.1 Therapeutic measures for disabled children

Process Engineering

6.1.1.0 Magnesium chloride process

Natural Resources

Conservation

7.2.1.0 National parks

7.2.2.0 Historic conservation

Transportation

9.1.1.0 Ship-building technology

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Data-processing

Health

10.1.1.2 Pediatric cardiology

10.1.1.3 Intensive care and monitoring

Non-nuclear Energy

Coal

11.1.1.1 Seminar on coal conversion

Wind Energy

11.4.1.1 Wind energy workshop

Gas

11.5.1.0 Workshop on gas deposits and caverns

ANNEX J

CANADA/FRG S&T AGREEMENT

Fifth Consultative Meeting
Ottawa, 2-4 May 1979

Canadian Delegation

Mr. J. Mullin	Delegation Leader, General Director, International Division, MOSST.
Dr. W.F. Cockburn	Canadian Senior Coordinator
Mr. C. Garrard	EBS Division, External Affairs
Mr. H. Korn	GEB Division, External Affairs
Dr. G.I. Pritchard	Department of Fisheries and Oceans
Mr. I.D. Macaulay	Department of Fisheries and Oceans
Dr. O.E. Hughes	National Research Council
Ms. K. Junke	Province of Ontario
Mr. Pierre Côté	Province of Québec
Ms. Carol Séguin	Province of Alberta

Other Canadian Participants

Mr. R.J. Atchison	Atomic Energy Control Board
Dr. C.F. Burk	Dept. of Energy, Mines and Resources
Dr. R.P. Charbonnier	Dept. of Energy, Mines and Resources
Mr. T.S. Cochrane	Dept. of Energy, Mines and Resources
Mr. H.C. Douglas	Dept. of Industry, Trade and Commerce
Mr. E.H. Dudgeon	National Research Council
Ms. E. Dugger	Dept. of Communications
Dr. M.J. Eric	Dept. of Communications
Mr. L. Giroux	Dept. of Communications
Dr. C. Goodfellow	Dept. of Energy, Mines and Resources
Mr. V. Haw	Dept. of Energy, Mines and Resources
Mr. J. Heseltine	National Research Council
Mr. S. Jackson-Hughes	Dept. of External Affairs
Mr. B. Johnson	Dept. of Transport
Ms. G. Laplante	Dept. of Transport
Dr. G.B. Leech	Dept. of Energy, Mines and Resources
Mr. G. Létourneau	Province of Québec
Mr. C. Martin	Environment Canada
Dr. R. Overend	National Research Council
Mr. G.D. Pearce	Dept. of Energy, Mines and Resources
Dr. R.E. Pomfret	Dept. of Industry, Trade and Commerce
Dr. J.S. Read	Dept. of Energy, Mines and Resources
Dr. D.F. Sangster	Dept. of Energy, Mines and Resources
Mr. J.C. Smirle	Dept. of Communications
Dr. D.M. Smith	Health and Welfare Canada
Mr. E. Smith	Ministry of State for Science and Technology

ANNEX K

CANADA/FRG S&T AGREEMENT

Fifth Consultative Meeting

Ottawa, 2-4 May 1979

German Delegation

Mr. R. Loosch	Delegation Leader and Director General of International Cooperation, Federal Research and Technology Ministry (BMFT)
Dr. Mueller-Helle	Cooperation with North American Region, BMFT
Dr. E. Schroeder	German Senior Coordinator; Director General of the Research Centre for the Application of Nuclear Energy to Ship Propulsion (GKSS)
Dr. Jessenberger	Non-nuclear energy, BMFT
Professor H. Walden	Director, German Hydrographical Institute, Hamburg (retired)
Professor M. Kuersten	Director, Federal Geoscience and Raw Materials Agency Hannover
Dr. A. von Rom	First Secretary, German Embassy

ANNEX L

CANADA/FRG S&T AGREEMENT

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Nuclear Energy	Mr. W.D. Carrothers, Head, International Affairs, Atomic Energy of Canada Ltd., 275 Slater Street, Ottawa, Ontario, K1A 0S4. Tel: (613) 237-3270
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ANNEX "M"

CANADA/GERMANY SCIENCE and TECHNOLOGY AGREEMENT

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Dataprocessing	Herr Treidel BMFT, Ref. 413 Bonn
Environment	Dr. Abel BMFT, Ref. 323 Bonn
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Marine Biology	Prof. Dr. K. Lillelund Institute für Hydrobiologie und Fischereiwissenschaft (IHF) Olbersweg 24 2000 Hamburg 50
Non-nuclear Energy (except Coal and Oil)	Dr. Klein BMFT, Ref. 316 Bonn
Coal and Oil Technology	Dr. Holighaus Kernsforschungsanlage Jülich GmbH (KFA) Postfach 1913 5170 Jülich 1
Spacelab Utilization	Dr. Greger BMFT, Ref. 512 Bonn
Transportation	Dr. Frenzel BMFT, Ref. 522 Bonn
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