

**PROGRAM AND STRATEGIC PLAN**  
**EVALUATION OF THE**  
**ONTARIO CENTRE FOR REMOTE SENSING**

**SUBMITTED TO:**

**ONTARIO CENTRE FOR REMOTE SENSING**  
**SURVEYS, MAPPING AND REMOTE SENSING BRANCH**  
**ONTARIO MINISTRY OF NATURAL RESOURCES**

**Prepared by:**

**Philip A. Lapp Ltd.**

**November 27, 1989**



**Philip A. Lapp Limited**

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Telephone (416) 920-1994

November 27, 1989

Mr. David Phipps  
Acting Coordinator  
Purchasing Services Unit  
Administrative Management Branch  
Ministry of Natural Resources  
Room 5533  
Whitney Block  
Queens Park  
Toronto M7A 1W3

**Proposal: To Conduct a Program and Strategic Plan Evaluation of  
the Ontario Centre for Remote Sensing**

Dear Mr. Phipps:

We are pleased to submit this proposal to undertake the above referenced evaluation.

Philip A. Lapp Ltd. brings to this study world class knowledge in the remote sensing field. We have assembled a strong team of consultants with specific expertise in remote sensing as well as relevant knowledge and experience in conducting program evaluations and strategic planning for high technology organizations.

We believe that this expertise makes us the best team to complete the proposed work successfully and on schedule.

Our proposal is complete in addressing your terms of reference for this study; however, should you have any questions, please do not hesitate to contact us.

We look forward to working on this challenging and important study.

Yours sincerely,

Peter G. Mueller  
Vice President

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## 1.0 INTRODUCTION

Philip A. Lapp Ltd. is pleased to offer its services in response to the Request for Proposal, issued by the Ministry of Natural Resources, for a Program and Strategic Plan Evaluation of the Ontario Centre for Remote Sensing.

We have assembled a strong team with wide and deep experience in all aspects of your requirements, including specific expertise in remote sensing as well as relevant knowledge and experience in conducting program evaluations and strategic planning for high technology organizations. We therefore are confident that we can provide you with a quality product, within the allotted time and at the stated price.

We have structured our response to conform to the requirements of the Request for Proposal. Our proposal begins with a brief description of our understanding of the requirement, followed by our proposed methodology and approach. We then offer a project management plan, including a schedule and a set of tasks, each with a leader, objective and deliverables. Our corporate and individual experience and qualifications are also demonstrated. Finally, our detailed price proposal is provided.

We offer to complete this assignment for a firm fixed price of **\$52,565.**

We state now that, with the exception of the performance bond, we can comply with the terms and conditions of the draft legal agreement, including mandatory compliance with any conflict of interest clauses.

## 2.0 UNDERSTANDING OF THE TASK

The Ontario Centre for Remote Sensing is currently mandated to:

1. Develop remote sensing applications to meet the need for resource information and environmental protection in Ontario.
2. Promote the application of remote sensing technology in government and private sector programs for sustainable development and management of land and water resources.
3. Conduct joint ventures in remote sensing application and technology development with private Ontario companies.

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#### 4. Conduct training in applied remote sensing.

In general, the evaluation is to review and assess the current mandate, role and objectives of OCRS. It will consider the program rationale, impacts and effects, achievement of objectives, and identify critical success factors influencing the Centre's ability to achieve its objectives.

After examining external factors and the trends in user requirements for remote sensing data, a SWOT analysis is to be conducted (strengths, weaknesses, opportunities and threats) in relation to other national and international Centres. The analysis would lead to appropriate recommendations concerning the strategic direction of the Centre, and the means by which it can help to provide future information products needed for resource management and environmental monitoring.

### 3.0 PROPOSED METHODOLOGY AND APPROACH

Simply stated, the approach consists of five separate phases:

1. Information Gathering
2. Development of Findings
3. Analysis
4. Drawing of Conclusions
5. Generation of Recommendations

#### 3.1 Information Gathering

Information will be collected using three techniques:

- review of documentation;
- personal interviews and expert opinion; and
- mail survey.

Documentation will include relevant reports and documents that can be made available not only by OCRS, but also by those agencies and organizations that will be interviewed or surveyed.

Past studies on the costs and benefits of remote sensing will be reviewed. They will be valuable in identifying some of the main issues and details that would be covered in the interviews and analysis.

The main effort involved in information gathering centres on personal interviews and expert opinion. We estimate that

approximately 40 interviews will be required involving the following groups:

- MNR Management
  - 2 persons
- OCRS Management
  - 6 persons
- OCRS Client Groups
  - MNR head office and field units
    - Toronto
    - Thunder Bay = *Thunder District & Region*
    - Sault Ste Marie = *Thunder & Lake*
    - Sudbury - *OGS* *Superior*
    - Timmins - *Northern Region (and for Ontario)*
  - Other Ministries
    - Environment
    - Agriculture (Guelph) *numbers - - - -*
    - Northern Development and Mines (Sudbury, Timmins) *OGS*
    - ~~Energy~~ *Ontario Hydro: John Sinclair - info name*
    - Industry, Trade and Technology *Rock's ADM Trade Industry*
    - Transportation? *Northumberland*
    - Municipal Affairs
  - Ontario Remote Sensing Value-Added Industries
    - sample of 6 companies including Intera *Big Red, Jerald*
    - Technologies Ltd. *RC Group, Dunbar - W. Zetter*
  - Ontario Remote Sensing Manufacturing Industries
    - Moniteq Limited
    - Dipix Technologies Limited
    - Tydac Technologies Inc.
    - ~~Rem/Sens Mapping Technologies Inc.~~ *IRCI Nancy Stone*
  - Canada Centre for Remote Sensing
  - Educational Institutions
    - University of Waterloo, Department of Geography
    - ~~Sir Sanford Fleming College, Lindsay~~ *GIS*
    - ~~Ryerson Polytechnical Institute~~ *GIS*
    - Guelph - Dick Metz*
    - ISTS - for Jack?*

*Especially ADM North (Thunder, etc. etc.)*

*Budget ADM South (Thunder, etc.)*

*Area/Hydro - each quarter*

*Circle Toronto Area*

*- Ontario Mining - reports for projects (interviews) - Group from*

*Workshop - discuss from K. Stone - Sand/Comms, etc.*

*Supply aerial photos*

In order to evaluate the effectiveness of OCRS's educational programs, we would conduct a brief mail survey of a sampling of

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students who have attended past courses. The purpose would be to assess student satisfaction, suitability of material covered, quality of instruction and instructional materials. Such data, coupled with university and college interviews would permit us to draw conclusions on present and future initiatives by OCRS to further remote sensing education in Ontario.

### **3.2 Development of Findings**

The findings from the review of documentation, interviews and mail survey will be summarized such that each of the OCRS objectives can be evaluated as to its rationale, impacts and effects, level of achievement and critical success factors. The findings also will be used to conduct a SWOT analysis (strengths/weaknesses/opportunities/threats) in connection with developing conclusions on the strategic direction of the Centre.

### **3.3 Analysis**

Analysis of the findings will be necessary to deal with the fundamental evaluation issues:

- rationale;
- impacts and effects;
- achievement of objectives; and
- alternative approaches.

Particular emphasis will be placed on identifying economic benefits using studies available in other jurisdictions (for example, the CCRS work, whose methodologies were used in Radarsat studies) and brief case studies derived from the information gathering phase. While time and resources will limit the depth of such analyses and case studies, we believe that useful economic insights can be obtained, given the 15 year time baseline that is available, and the likelihood that economic benefits from early remote sensing investments can now be measured.

An analysis of the mail survey may reveal ways to improve OCRS's educational program. Opportunities for joint activities with colleges and universities are likely to widen. As remote sensing comes into its own as a market-driven rather than a technology-driven activity, the demand for trained young people at both the para-professional and professional level is likely to expand, thus leading to the possibility of intensifying OCRS's role in education.

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### 3.4 Conclusions and Recommendations

The analysis of findings will lead to a set of conclusions on the main issues of the study. They will follow the statement of work under two headings: Performance and Strategy.

Performance conclusions will cover:

- current mandate, role and achievement of objectives to determine continued relevancy to government priorities and the remote sensing industry in Ontario;
- results and impacts of the Centre to date, especially economic benefits;
- critical success factors; and
- status of OCRS in relation to other national and international remote sensing activities.

Strategic conclusions will cover:

- existing and possibly modified objectives;
- the future provincial, national and international environment in which OCRS will operate;
- strengths, weaknesses, opportunities and threats; and
- present and planned strategic directions.

Flowing from the conclusions, recommendations will be generated that will help to ensure OCRS will successfully meet the challenges of the future. Recommendations will be discussed with senior MNR officials in respect of the ability to implement them. In this fashion, we would hope to avoid putting forth impractical proposals or suggesting unrealistic objectives. However, as remote sensing becomes more business-like in its character, it can be expected that centres such as OCRS will have to alter their positioning within the remote sensing community. Thus, it is to be expected that objectives and mandate may have to evolve in character and emphasis as we proceed into the 1990s and beyond.



## 4.0 THE TASK STRUCTURE

### 4.1 Our Approach

We have structured our proposed approach to conform to the specific requirements detailed in the Request for Proposal.

Each task has an objective, a number of activities and identified deliverables. The Consultant responsible for the task is identified and the qualifications to perform the work summarized.

Certain tasks can be undertaken simultaneously and this is reflected in the scheduling of the work.

### 4.2 Schedule

Weeks from Start

Task	1	2	3	4	5	6	7	8	9	10	11	12	13
1	=====												
2		=====											
3			=====										
4			=====										
5							=====						
6											=====		

### 4.3 Management

We have assembled a team with the breadth of background and experience necessary to carry out this assignment. The team comprises:

Dr. Philip A. Lapp, President, Philip A. Lapp Limited  
 Mr. Peter G. Mueller, Vice-President, Philip A. Lapp Ltd.  
 Dr. John D. Keys, Associate, Philip A. Lapp Limited  
 Dr. Roger A. Stacey, Associate, Philip A. Lapp Limited  
 Dr. W. Russel McNeil, Associate, Philip A. Lapp Limited  
 Mr. David J. Lapp, Associate, Philip A. Lapp Limited

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The project will be managed by Dr. Philip A. Lapp. Control will be exercised through the task leaders, each of whom have specific deliverables for which they are responsible. Progress will be monitored at regular intervals, and corrective action will be taken if required.

The final report will be based on the individual task reports, discussion with team members and observations from the client.

#### **4.4 Risk Assessment**

We believe we can deliver a quality report to match the required deadlines, provided the project starts in early December. We foresee approximately 40 interviews, few if any of which can take place over the Christmas period. Since this is the critical data gathering phase, any delay will place the March 1, 1990 deadline for a draft report in jeopardy.

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#### 4.5 Tasks

##### Task 1

Title : Work Plan

Objective : To obtain agreement on study methodology, including initial interview list, proposed interview guide, roles and responsibilities.

Activities :  
1. Prepare interview list.  
2. Prepare interview guide.  
3. Prepare expected schedule.  
4. Specify deliverables.  
5. Propose progress review schedule.  
6. Propose progress payment schedule.

Deliverables :  
1. List of interviewees.  
2. Draft interview guide.  
3. Proposed schedules.

Client Responsibility : Provide advice regarding interviews and schedules.

Responsible Consultant : Dr. Philip A. Lapp

Qualifications : Dr. Lapp has carried out many assignments in the field of Remote Sensing. He acted as chairman of the Sensor Working Group of the Canadian Advisory Committee on Remote Sensing, the advisory body to the Canada Centre for Remote Sensing. He is currently a member of the team evaluating this federal agency in accordance with the requirements of the Comptroller General.

Participating Consultants : Mr. Peter G. Mueller  
Dr. John D. Keys

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**Task 2**

**Title** : Data Gathering - National

**Objective** : To collect information from users and potential users of remote sensing data on the breadth, quality and timeliness of the information provided by OCRS. An assessment of the present technology employed by OCRS will also be made.

**Activities** :  
1. Interview Ontario Government agencies, crown corporations and university users of OCRS data.  
2. Interview private sector users.  
3. Interview federal agencies.  
4. Summarize findings.

**Deliverables** : A summary report giving results of interviews segmented by user group.

**Client Responsibility** : Consultation during process to review progress.

**Responsible Consultant** : Dr. J. D. Keys

**Qualifications** : Dr. Keys has considerable experience in organizing the collection and analysis of information from identified user communities.  
  
He has recently completed an assignment in which he structured data collection involving federal, provincial, industrial and university representatives in both Canada and the United States, to determine the cost-effectiveness of establishing an Active Control System for positioning based on the U.S. Global Positioning System.

**Participating Consultants** : Dr. Philip A. Lapp  
Mr. Peter G. Mueller  
Dr. W. Russ McNeil (interviewer)  
Mr. David J. Lapp (interviewer)

**Task 3**

**Title** : Data Gathering - International

**Objective** : To assess the strengths and weaknesses of the OCRS program in relation to international remote sensing centres.

**Activities** : Collect and collate information on the performance of selected international remote sensing centres.

**Deliverables** : An assessment of the performance of OCRS relative to these centres. This will become a chapter in the final report.

**Client** : Provide information held on international centres

**Responsibility** and contacts between OCRS and these centres.

**Responsible Consultant** : Dr. Roger A. Stacey

**Qualifications** : Dr. Stacey has extensive experience with remote sensing activities in foreign countries. He has worked in Africa, China and Peru and has led teams engaged to provide mapping and remote sensing technologies for land management purposes. He has also worked with federal agencies who support international activities in the subject area.

He also has access to relevant information through his position as Executive Director of the Canadian Remote Sensing Institute.

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Deficiencies?

1st  
2nd  
3rd

2003 1/13/03  
1/13/03  
1/13/03

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**Task 4**

- Title : OCRS Strategic Direction
- Objective : To review and assess the current mandate, role and objectives of the OCRS and to make recommendations, as appropriate, regarding the Centre's future strategic direction in light of critical success factors.
- Activities :
  1. Review the basis for the present mandate with senior officials in MNR.
  2. Review the information gathered in Task 2 for relevance to this task.
  3. Conduct a working session with officials from OCRS and MNR to reach a common understanding of objectives, strategies and key actions that will determine the directions for OCRS.
  4. Carry out a SWOT analysis.
- Deliverables : A report summarizing the results of the working session. This will be included as a chapter in the final report.
- Client Responsibility : Ensure that appropriate officials are available to participate.
- Responsible Consultant : Mr. Peter G. Mueller
- Qualifications : Mr. Mueller has extensive experience as a strategic planner for industry and government. He has held senior strategic planning positions with major Canadian companies, and has recently completed assignments with a federal government agency and a provincial Centre of Excellence.
- Participating Consultants : Dr. J. D. Keys  
Dr. Philip A. Lapp

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**Task 5**

Title : Analysis of Performance

Objective : To evaluate the results/impacts and economic benefits attributable to OCRS.

Activities :  
1. Summarize and provide an analysis of the findings from Task 2.  
2. Identify economic impacts and benefits.  
3. Assess the degree to which OCRS has achieved its objectives.  
4. Identify critical success factors.  
5. Assess the status of OCRS in relation to other national and international remote sensing activities.

Deliverables : A report summarizing the economic impacts of OCRS activities and an assessment of its strengths and weaknesses.

Client Responsibility : Provide on-going comments on results of the activities as they become available.

Responsible Consultant : Dr. Philip A. Lapp

Qualifications : Dr. Lapp has led a number of program assessments and evaluations dealing with remote sensing and related activities. He is familiar with the requirements for an evaluation and has the appropriate experience to ensure that the proper information is abstracted and analyzed.

Participating: Mr. Peter G. Mueller  
Consultants Dr. W. Russ McNeil  
Mr. David J. Lapp  
Dr. Roger A. Stacey  
Dr. J. D. Keys

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**Task 6**

Title : Report

Objective : To provide a comprehensive report of findings, together with conclusions and recommendation that are capable of implementation.

Activities :  
1. Prepare draft report for discussion with the client.  
2. Prepare final report based on discussions with the client.  
3. Prepare presentation as required.

Deliverables :  
1. Draft report.  
2. Final report.  
3. Presentation of findings, conclusions and recommendations.

Client Responsibility : Critically review draft report.

Responsible Consultant : Dr. Philip A. Lapp

Qualifications : Dr. Lapp has provided a number of penetrating reports in this and related subject areas, and has the experience necessary to ensure that recommendations are capable of implementation. His past work has earned him a reputation for concise and innovative conclusions and recommendations, and his knowledge of the subject area make him an ideal author for a report in this field.

Participating Consultants : Mr. Peter G. Mueller  
Dr. John D. Keys



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## 5.0 CORPORATE EXPERIENCE

Philip A. Lapp Ltd. has been involved in the design, development and application of technologies associated with remote sensing since its inception in 1969, and in the evaluation of such technologies for applications and commercialization over the past 16 years.

In 1969-70 Philip A. Lapp Ltd. assisted Dr. L. W. Morley in creating the Canada Centre for Remote Sensing. Dr. Lapp chaired the Canadian Advisory Committee on Remote Sensing (CACRS) Working Group on Sensors for the next six years.

Subsequent consulting assignments spanned many remote sensing applications areas including agriculture, air and water quality, ice and oceans information systems, forestry and cartography. This work entailed evaluation and commercialization exercises.

Dr. Lapp also was involved in the establishment of OCRS.

The company has been involved in several task forces chaired by Dr. Lapp where remote sensing played either a central or supporting role:

- Operations On and Below Ice-covered Waters;
- Interdepartmental Task Force on Surveillance Satellites;
- National Task Force on Surveying & Mapping;
- Interdepartmental Study Group on Ocean Information Systems; and
- Strategic Planning Group on Geodetic Surveying and Topographic Mapping.

Dr. Lapp is a member of the Board of Directors of Spar Aerospace and MacDonalD Dettwiler Associates, which keeps him abreast of developments in the field. He has been closely associated with the evolution of remote sensing in Ontario industry and some OCRS activities.

Dr. Lapp is a founder and chairman of Real Data Ontario, a company established in 1988 to exploit Ontario's POLARIS program and dedicated to the creation of a world-class GIS facility.

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More recently, Philip A. Lapp Ltd., teamed with James F. Hickling Management Consultants Ltd. in conducting the Program Evaluation of the Canada Centre for Remote Sensing (CCRS). This contract was won in October, 1989 and is currently in progress. It is a full-scale, rigorous, Comptroller General program evaluation of all CCRS activities, including the Radar Data Development Program that has been established to support provincial users of Radarsat.

In November, 1989, Dr. Lapp became Chairman of Radarsat International, a company established by four Canadian remote sensing companies (Spar, MDA, COMDEV and Intera) to exploit the sale of Radarsat data world-wide, and to market SPOT and Landsat data across Canada.

**Other projects demonstrating relevant Philip A. Lapp Ltd. expertise:**

Title: Market Evaluation Study for Computerized Map Data Base for Ontario

Client: Ontario Ministry of Natural Resources

Year: 1987

Description: An evaluation of the market for a computerized map data base of Ontario was undertaken to examine the case for replacing the current conventional OBM program with a computerized OBM mapping program.

The study determined the use of computerized topographic data in resource management, land use and administration. The anticipated demand and benefits were assessed. The issues of standards, research and development, systems architecture, and the supply and demand for expertise and services were also addressed.

Responsibility: Dr. Lapp was the Program Director and conducted interviews.

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Title: RADARSAT: A Commercially Financed Government Program

Client: Spar Aerospace (for Energy, Mines and Resources Canada)

Year: 1986

Description: The purpose of the study was to determine the extent to which commercial financing could be attracted to the Radarsat remote sensing satellite project.

The study involved a technical review aimed at simplifying and scaling down the spacecraft, and the commissioning of independent market assessments.

Responsibility: Dr. Lapp was retained to review available market data and to provide projections used to evaluate the commercial potential of the Radarsat programs.

Title: Radarsat Cost Recovery Options

Client: Price Waterhouse (for RADARSAT Project Office)

Year: 1986

Description: The study was commissioned to identify the ways and means of achieving full or partial cost recovery for the RADARSAT satellite, and to assess the feasibility and desirability of these ways and means.

The study was based on a review of existing assessment studies, and on interviews with officials of RADARSAT, EOSAT Corporation in the US, and potential users. It concluded that RADARSAT could achieve revenues of at least \$24 million annually, and recommend private sector involvement in the marketing and distribution of satellite data.

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Responsibility: Dr. Lapp supported Price Waterhouse (O. Kent) as technical backup and conducted appropriate interviews.

✓ Title: Investigation into the Requirements for the Supply and Demand for Satellite Microwave Radiometer Data for AES

Client: Atmospheric Environment Service, Environment Canada

Year: 1985

Description: This study examined the potential for microwave radiometry in terms of AES user requirements, sources of satellite microwave data and products, options for processing and distribution, regulatory and policy aspects, and financial implications.

The study involved interviews within several parts of AES, including CMC. The study recommended that AES move towards the integration of satellite radiometry data into the operational forecast system.

Responsibility: Dr. Lapp was project manager, Mr. D. Lapp conducted many of the interviews and the operational studies with AES Ice Branch.

✓ Title: Evaluation of EMR Remote Sensing Activities

Client: Energy, Mines and Resources Canada

Year: 1983

Description: The purpose of this study was to carry out an evaluation of the EMR Remote Sensing Activity by focusing on the LANDSAT program and the technology transfer process, which are the program responsibilities of the Canada Centre for Remote Sensing. The evaluation was carried out in accordance with the requirements of the Office of the Comptroller General.

The methodology involved the development of a survey questionnaire followed by structured interviews. The questionnaire was tested in a pilot study, following which 2400 copies were mailed to addresses in Canada. A total of 84 interviews were conducted. Observations and recommendations were presented.

Responsibility: Dr. Lapp managed and conducted the evaluation.

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**6.0 EXPERIENCE PROFILE OF PROPOSED STAFF****Dr. Philip A. Lapp**

**Present Position :** President and founder of Philip A. Lapp Limited, a Company incorporated in 1969 to provide consulting services to organizations whose operations have a scientific and technological component. Clients include Canadian and foreign groups, manufacturers, governments, professional organizations and academic institutions. The Company is wholly Canadian owned and it is registered with the Association of Professional Engineers of Ontario. It is a member of the Association of Consulting Engineers of Canada and a Member of the Consulting Engineers of Ontario. Dr. Lapp is Chairperson the York University Development Corporation and Past President of the Canadian Council of Professional Engineers and the Canadian Academy of Engineering.

**Experience :** Dr. Lapp has carried out numerous consulting assignments involving user surveys, feasibility studies and program evaluations.

He holds directorships in a number of companies and is affiliated with several professional societies.

**Assignments:** Program Evaluation of the Canada Centre for Remote Sensing (in progress).

Cost-effectiveness of an Active Control System for the Geodetic Survey Division, Canada Centre for Surveying, Energy, Mines and Resources Canada.

**References :** Dr. W. D. Bennett, former Director of Program Evaluation Group  
Energy, Mines and Resources Canada

Dr. Robin Steeves, Assistant Director  
Geodetic Survey Division

Mr. R. E. Moore, former Director General S&M  
Energy, Mines and Resources Canada

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**Peter G. Mueller**

Present : Vice-President, Philip A. Lapp Limited.  
Position Areas of specialization include strategy development and implementation for high technology organizations.

Experience : Mr. Mueller holds an M.A. in Political Economy from the University of Toronto. He has over fifteen years' experience in consulting and management across a broad range of markets and businesses in both the public and private sectors. Mr. Mueller was Senior Advisor and Research Director of Ontario's Royal Commission on Electric Power Planning, whose mandate included an in-depth inquiry into Ontario Hydro's nuclear program and recommendations to the Government of Ontario with respect to Ontario Hydro's strategic direction. He has held senior management positions with a number of Canada's largest corporations where his responsibilities focused on strategic planning and where he was involved in management decisions related to capital investments, technology, and new product development.

Assignments: Strategic planning for the embryonic Canadian Space Agency.

Feasibility study for a Canadian Space Control Centre.

Strategy development for the Institute for Space and Terrestrial Science.

Advice to an organization developing a proposal for an environmental monitoring satellite.

References : Dr. Fred Christie, Manager Technology Development  
Canadian Space Agency

George McFarlane, Executive Director  
Institute for Space and Terrestrial Science

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**John D. Keys**

**Present Position :** Consultant, associated with Philip A. Lapp Limited. Areas of specialization include programming, program evaluation, strategy development and organizational evaluation. Fields of application include energy, outer space, remote sensing and mapping, and advice on government science and technology programs.

**Experience :** Dr. Keys has participated in studies involving user surveys, analysis of the resulting information and presentation conclusions and recommendations. He is experienced in developing interview guides and scheduling interview activities.

As a former Assistant Deputy Minister for Science and Technology in Energy, Mines and Resources Canada, he was responsible for the Canada Centre for Remote Sensing of that department.

**Assignments:** Cost-effectiveness of an Active Control System for the Geodetic Survey Division, Canada Centre for Surveying, Energy, Mines and Resources Canada.

Strategic planning for the embryonic Canadian Space Agency.

**References :** Dr. Robin Steeves, Assistant Director  
Geodetic Survey Division

Dr. Fred Christie, Manager Technology Development  
Canadian Space Agency



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**Roger A. Stacey**

Present : President and founder of Roger A. Stacey  
Position Consultants Ltd., a company incorporated in 1986 to provide strategic planning services to organizations involved with remote sensing and geographic information systems. Clients have included the Canadian International Development Agency, Agriculture Canada, the Department of Energy, Mines and Resources and the Canadian Space Agency. Dr. Stacey was the Executive Director of the Canadian Remote Sensing Training Institute.

Experience: Dr. Stacey has been responsible for establishing remote sensing facilities for the Province of Newfoundland, for assessing remote sensing and GIS capabilities and needs in number of developing countries, and for evaluating the impact of computer-based mapping systems on "traditional" government mapping operations.

Assignments: Assessment of remote sensing and GIS programs in China and Peru for CIDA.

Feasibility of using remote sensing to improve resource management in Africa for MDA/CIDA.

Business plan for the National Atlas of Canada.

References: Randy Trenholm  
College of Geographic Sciences

John MacDonald  
MacDonald Dettwiler Associates

John Thompson  
National Atlas Information Services  
Energy Mines and Resources.

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**W. Russell McNeil**

**Present Position :** President, Science and Technology Information Systems Inc. and Associate, Philip A. Lapp Ltd.  
Dr. McNeil's areas of specialization include remote sensing systems development, the assessment of remote sensing and energy technologies, science journalism and interviewing.

**Experience :** Dr. McNeil holds a PhD from York University, where he designed one of Canada's first LIDAR systems. His subsequent activities with Environment Canada, the University of Nevada, and Philip A. Lapp Ltd. focused on applications of remote sensing to water and air quality. With 13 years of concurrent experience as a science journalist, Dr. McNeil has developed considerable skills in writing, interviewing, and identifying key issues in science and technology.

**Assignments:** Ontario Ministry of Energy, Evaluation of Ontario Government EnerSearch Energy Program.

National study on Requirements for the Canadian Ocean Data System, Hermes Electronics.

The Role of Remote Sensing in the Monitoring of Water & Effluent Quality, Environment Canada.

An Investigation of Remote Sensing Systems for the Surveillance and Monitoring of Oil Spills in the Beaufort Sea, Canada Centre for Remote Sensing, August.

**References :** Dr. A.I. Carswell  
President, Optech Inc.  
Downsview, Ontario

Dr. R.W. Nichols  
Director, CRESS  
York University

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**David J. Lapp**

**Present Position :** President and Senior Engineer, Norland Science and Engineering Ltd. and Associate, Philip A. Lapp Ltd. Areas of specialization include the application of airborne and satellite remote sensing technology to sea ice, oceanographic and scientific studies, environmental information systems, program evaluation and user requirement studies.

**Experience :** Mr. Lapp is an experienced interviewer, having carried out over 250 interviews related to remote sensing hardware/software as well as remote sensing application disciplines, space science, marine operations, ice and ocean environmental information systems and hydrography. He is also an active researcher in the application of remote sensing systems for marine operations and ice reconnaissance.

**Assignments:** Program Evaluation of the Canada Centre for Remote Sensing (in progress).

Cost-effectiveness of an Active Control System for the Geodetic Survey Division, Canada Centre for Surveying, Energy, Mines and Resources Canada.

Evaluation of CCRS LANDSAT and Technology Transfer Programs for the Program Evaluation Branch of Energy, Mines and Resources.

Program Evaluation Study of the Technology Development Programs of the Canadian Hydrographic Service for Program Evaluation Branch, Fisheries and Oceans

**References :** Dr. R.O. Ramseier, Senior Research Scientist  
Ice Branch, Atmospheric Environment Service

Mr. A. Sneyd, Manager  
Operations Development  
Canarctic Shipping Company Limited

Mr. D. Pollock, Chief  
Ice Centre, Environment Canada

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**7.0 PRICE PROPOSAL****7.1 Offer and Make-up of Costs**

Philip A. Lapp Limited undertakes to carry out the work detailed in this proposal for a firm fixed price of **\$52,565**.

This figure is based upon estimates of time to be spent on each activity by each consultant at firm time rates.

Also included in the total figure are materials, long distance telephone, and travel and living for specifically identified visits required for completion of the work.

**7.2 Labour**

The Company will employ the following personnel on this assignment:

<u>Consultant</u>		<u>Daily Rate</u>
Dr. Philip A. Lapp	(PAL)	\$800
Mr. Peter G. Mueller	(PGM)	800
Dr. John D. Keys	(JDK)	750
Dr. Roger A. Stacey	(RAS)	550
Dr. Russel McNeil	(WRM)	475
Mr. David J. Lapp	(DJL)	420

**Consultant Labour Allocation by Task  
(Working Days)**

Task	PAL	PGM	JDK	RAS	WRM	DJL	Total
1	1	1	1				3
2	2	3	4		8	10	27
3				5			5
4	1	8	2				11
5	3	3	2	2	2	2	14
6	5	5	1	1	1	1	14
<b>TOTALS</b>	<b>12</b>	<b>20</b>	<b>10</b>	<b>8</b>	<b>11</b>	<b>13</b>	<b>74</b>

Labour cost by consultant are as follows:

<u>Consultant</u>	<u>Rate</u>	<u>Days</u>	<u>Cost</u>
PAL	\$800	12	\$9,600
PGM	800	20	16,000
JDK	750	10	7,500
RAS	550	8	4,400
WRM	475	11	5,225
DJL	420	13	5,460
			<b>\$48,185</b>

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### 7.3 Travel and Living

Travel and living costs are estimated by Task as follows:

<u>Task</u>	<u>Trip</u>	<u>Travel</u>	<u>Living</u>	<u>Total</u>
2	Thunder Bay	\$572	\$250	\$822
	Sudbury/Timmins	489	250	739
	S. Ste. Marie	369	250	619
	Local	400		400
4	Toronto	500	300	800
				<u>\$3,380</u>

### 7.4 Materials and Supplies

Costs for telephone, courier and office supplies are estimated to total \$1,000.

### 7.5 Summary of Cost

Labour 74 days	\$48,185
Travel and Living	3,380
Materials and Supplies	1,000
<b>Total</b>	<u>\$52,565</u>

### 7.6 Proposal Validity Period

We hereby certify that this proposal is valid for a period of thirty (30) days after the Proposal Due Date, November 28, 1989.

### 7.7 Contracting Party

The registered legal name of this bidder is:

Philip A. Lapp Limited

The Company is federally incorporated in Canada.

The Consultant Representative is:

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Dr. Philip A. Lapp, President  
Philip A. Lapp Limited  
14A Hazelton Ave., Suite 302  
Toronto, Ontario  
M5R 2E2

Telephone (416) 920-1994 FAX (416) 920-1996

**7.8 Canadian Content**

Canadian content is 100%.

**7.9 Method of Payment**

We propose progress payments according to the following schedule:

<u>Milestone</u>	<u>Date</u>	<u>Amount</u>
Acceptance of Work Plan	December 31, 1989	\$ 3,565
Progress Report	January 31, 1990	21,500
Submission of Draft Report	March 1, 1990	21,500
Acceptance of Final Report	March 31, 1990	6,000
		<u>\$52,565</u>

**APPENDIX A**

**EXPERIENCE OF DR. LAPP  
IN REMOTE SENSING**



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Philip A. Lapp graduated in Engineering Physics from the University of Toronto in 1950, X-Rays and Spectroscopy option. He went on to Massachusetts Institute of Technology and studied optics under George Russell Harrison from 1950-52.

He joined de Havilland Aircraft of Canada in 1954 and was responsible for establishing the infrared group in Canada. He gained early experience in technology transfer through transferring infrared guidance and fusing technology from de Havilland Propellor Company and the Royal Radar Establishment in the United Kingdom from 1954-59. He led the de Havilland Canada team in infrared guidance and fusing throughout the 1960s.

He became a consultant in 1969, and in 1970-71 he helped Dr. L. W. Morley establish CCRS, and was chairman of the CACRS Working Group on Sensors for the first six years (1970-76). His consulting work relating to remote sensing has been as follows:

- conducted a market assessment of the remote sensing Laser Fluorosensor system developed by DOE, 1973.
- conducted early studies for CCRS on remote sensing applications including the needs for an airborne program with associated flight facilities, and developed plans and policies for industrial involvement in the program, 1974.
- conducted a feasibility study for a Crop Information System including a market assessment, 1974.
- directed and conducted studies leading toward Canadian achievement of excellence in operations on and below ice-infested waters, including the extensive use of space and airborne remote sensing of ice conditions in support of arctic shipping, 1974.
- industrial remote sensing survey to establish capabilities in support of a planned Ontario Centre for Remote Sensing (O CRS); also helped to establish O CRS.
- studied the use of remote sensing for the surveillance and monitoring of oil spills in the Beaufort Sea, including the development of contingency plans, 1975.

- 
- conducted for DOE a study and survey to assess the application of remote sensing to water and effluent quality, proposed relevant R and D and recommended options for integration of remote sensing into operational systems, 1975.
  - chaired the Interdepartmental Task Force on Surveillance Satellites leading to the report "Satellites and Sovereignty" which he authored; it proposed the creation of Radarsat.
  - conducted pilot studies on the use of thermography as a remote sensing tool for detecting heat loss from buildings, 1977.
  - chaired the National Task Force on Surveying and Mapping to review S and M activities across Canada including the use of remote sensing for cartographic applications, 1977.
  - chaired the Interdepartmental Study Group on Ocean Information Systems for MOSST leading to a plan to employ remote sensing technology to meet the needs for the ocean community, 1978.
  - conducted a study for the Shipping and Marine Technology Requirements Board, Department of Industry, United Kingdom, in water pollution sensor development.
  - applied remote sensing technology to shallow-water hydrography; developed a demonstration system 1979-81.
  - updated the remote sensing industrial survey for OCRS, and conducted detailed forecasts of the prospects for industrial development in Ontario, 1981.
  - program evaluation of the EMR Surveying and Mapping activity, an OCG-style evaluation.
  - conducted the Radarsat User Requirements Study, including determination of user needs, development of data presentation products, economic and technical trade-off analyses, sensor and communication mixes, policy alternatives as to level and types of service, benefit/cost analysis and an operational plan, 1981-82.

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- conducted for NRC a space station user study including remote sensing candidates involving a major, cross-Canada industrial survey, 1983.
  - for the Department of External Affairs studied the application of remote sensing technologies for the verification of weapon systems for use in outer space (Paxsats 1 and 2), 1983-84.
  - conducted an OCG evaluation of CCRS's satellite and technology transfer programs, 1983.
  - chaired the EMR Strategic Planning Group on geodetic surveying and topographic mapping core programs.
  - reviewed remote sensing technology and sensors, and their application in terms of state-of-the-art and development trends, 1983.
  - conducted a user survey of microwave imagery data products from satellites (SSMI) and aircraft (AIMR) for AES, 1984-85.
  - conducted commercialization studies and related technological studies of Radarsat for Spar Aerospace leading to simplification of the spacecraft and the creation of Radarsat Inc., 1986.
  - conducted analyses for Price Waterhouse to find ways and means of achieving cost recoveries for Radarsat, 1986.
  - conducted a market evaluation for computerized map data bases for the Ontario Ministry of Natural Resources, a major user needs and cost/benefit study to support the digitizing of Ontario base maps, 1987.
  - performed a user requirements study for the Geodetic Survey of Canada on the establishment of an Active Control System for Canada using the Global Positioning Satellite (GPS), 1988.

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- helped to create and now chairs a geographical information system (GIS) company, Real Data Corporation, initially to commercialize Ontario's POLARIS system (land registry and titles), and ultimately to become a world-class company that utilizes surveying and remotely-sensed data in providing GIS services world-wide, 1989.
  - Office of the Comptroller General evaluation of CCRS, 1989-
  - Chairman, Radarsat International, 1989-

**APPENDIX B**  
**CURRICULUM VITAE**

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**PHILIP A. LAPP****PRESENT POSITION**

President and founder of Philip A. Lapp Limited, a Company incorporated in 1969 to provide consulting services to organizations whose operations have a scientific and technological component. Clients include Canadian and foreign groups, manufacturers, governments, professional organizations and academic institutions.

The company is wholly Canadian owned and it is registered with the Association of Professional Engineers of Ontario. It is a member of the Association of Consulting Engineers of Canada, a Member of the Consulting Engineers of Ontario.

Chairman, York University Development Corporation.

Past-President, Canadian Academy of Engineering (1988).

Chairman, Institute for Space & Terrestrial Sciences, York University, 1988-89.

Chairman, Radarsat International, 1989-

**RECENTLY COMPLETED ASSIGNMENTS**

Member, National Marine Council 1988.

Project Leader for a market evaluation study for a computerized map data base for Ontario.

Project Leader of a study to assess platform sensor and communications trade-offs as part of an Ice and Ocean User requirement Definition Study for a public sector client.

Project Leader of a study to determine information products required for ice and ocean operations as part of an Ice and Ocean User Requirements Definition Study for a public sector client.

Project Leader of a survey of user requirements for ice and ocean information as part of an Ice and Ocean User Requirements Definition Study for a public sector client.

Team member in a study to assess user readiness in Canada to participate in the next generation of international space programs for a private sector client.

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Participated in a study to assess the need for the establishment of an Electrochemical Technology Centre for a public sector client.

Chairman of a task force established to develop a national program for Uranium Mine Tailings Research for a public sector client.

### **Feasibility Studies**

Project Leader of a study to assess the feasibility of establishing a new organization to execute a public sector mapping program.

Participated in a technology, applications and user study of Aerial Hydrography and associated techniques for a public sector client.

Leader of a project to assess the feasibility of performing a study of the stock and flow of engineering personnel in Canada for a private sector client.

Leader of a project to determine the market factors affecting the future of a private sector surveying and mapping organization.

### **Evaluations**

Project Leader of an evaluation of effectiveness of program delivery in respect of data products and technology transfer in the field of remote sensing for a public sector client.

Participated in a project to evaluate the effectiveness of program delivery of a provincial R&D organization on behalf of a public sector client.

Project Leader of an evaluation of the effectiveness of program delivery of a surveying and mapping organization for a public sector client.

Project Leader of a study to report on performance measurement and evaluation in the Research and Development Branch of a Federal government department.

Project Leader of a study of the operation and future role of a provincial research organization.

Project Leader of a study to evaluate the S&T information service for a public sector client.

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Project Leader of a study to assess the ocean industry sector in the Province of Newfoundland and Labrador for a public sector client.

### PAST EXPERIENCE

Senior Vice President and Director, SPAR Aerospace Limited.  
Responsible for all engineering and technical programs. Established and developed entry into the medical and technological markets.

Director of Technical Operations, de Havilland Aircraft of Canada Ltd.  
Responsible for engineering marketing and sales of the Special Products and Research Division.

Chief Engineer, de Havilland Aircraft of Canada Ltd. Guided entry of de Havilland into the space field, STEM devices, infrared systems and power systems.

Research Associate, Massachusetts Institute of Technology. Instructor in Aeronautical Engineering (automatic control, navigation and fire control systems) and research on ICBM guidance systems.

### EDUCATION

1950 University of Toronto - Engineering Physics B.A. Sc.

1951 Massachusetts Institute of Technology - Aeronautical Engineering S.M.

1955 Massachusetts Institute of Technology Sc.D.

1987 McMaster University, Honourary Degree LL.D.

### PROFESSIONAL AFFILIATION

Fellow of the Royal Society of Canada

Fellow of the Canadian Academy of Engineering

Member of the Association of Professional Engineers of Ontario

Senior Member of the Institute of Electrical and Electronics Engineers

Fellow of Canadian Aeronautics and Space Institute

Member of Canadian Remote Sensing Society



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Member of American Institute of Aeronautics and Astronautics

**RELATED ACTIVITIES**

1972 Chairman, Saskatchewan Engineering Review Commission  
1972-73 Chairman, Nuclear Power Study for Task Force Hydro  
1974-76 Chairman, Ontario Engineering Advisory Council  
1972-77 Chairman, NRC Advisory Board on Scientific and Technological Information  
1976 Chairman, Interdepartmental Task Force on Surveillance Satellites  
1977-78 Chairman, Task Force on National Surveying and Mapping, 1977-78  
1978-79 Chairman, Interdepartmental Study Group on Ocean Information Systems, 1978-79  
1980-81 Chairman, National Technical Planning Group on Uranium Tailings Research  
1986 Chairman, Ministers Ocean Group, Department of Fisheries and Oceans  
1987-88 President, Canadian Council of Professional Engineers  
1988 Member, National Marine Council, 1988

**DIRECTORSHIPS**

Board of Governors, York University  
Spar Aerospace Limited  
MacDonald, Dettwiler & Associates Ltd.  
General Technology Systems (UK)  
Frontiers Foundation  
Ortech International  
Kenneth Molson Foundation

**AWARDS**

Fellow, Royal Society of Canada  
Centennial Medal  
Honourary Member, Engineering Institute of Canada  
Fellow, Canadian Aeronautics and Space Institute  
Companion of the Order of Sons of Martha  
Engineering Alumni Medal 1984  
Fellow of Ryerson Polytechnical Institute, 1987  
C. D. Howe Award, 1987

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**PETER G. MUELLER****Executive Profile**

*Mr. Mueller holds an Honours B.A. in Political Science and Economics and an M.A. in Political Economy, both from the University of Toronto. He has over fifteen years' experience in consulting and management in both the private and public sectors and across a broad range of markets and businesses. He has held senior management positions with a number of Canada's largest corporations where his responsibilities focused on strategic planning and corporate development and where he was closely involved in strategic issues and decisions related to capital investments, technology, and new product development.*

**CURRENT  
POSITION**

**Vice President, Philip A. Lapp Limited, Toronto**

Areas of specialization include strategy development/implementation and business development.

**PROFESSIONAL  
SYNOPSIS**

**President, LaserScan Technologies Inc., Toronto**

Founded and operated a company offering microcomputer-based products and services to industry and government.

**Director, Corporate Development, Weston Foods, George Weston Limited, Toronto**

Designed, implemented and managed strategic and business planning systems for a portfolio of fifteen companies with sales of \$1.2 billion. With the President and Vice-President, Finance, assisted in the strategic management of this portfolio of businesses. Developed organizational and financial incentives to encourage operating companies to use corporate in-house research facility. Identified and facilitated the acquisition of new products, technologies, and business opportunities. Monitored and analyzed for their impact on the company, the social, economic, political, and business environments.

**General Planning Manager, Massey Ferguson Limited, Toronto**

Member of a small, international team selected by the President to develop a strategic turn-around plan. Prepared a global environmental analysis encompassing the economy, social values, technology, energy, and geopolitics, thereby providing critical input to Massey Ferguson's strategic and refinancing plans. Facilitated the business plan for the down-sizing of the company's U.S. operations.

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**Senior Advisor and Research Director, Royal Commission on Electric Power Planning, Toronto**

Played a key role in the accomplishment of the Commission's mandate, namely to inquire into and advise the Government of Ontario with respect to Ontario Hydro's long-range planning concepts and program implementation, including the broad political, socio-economic, technological and environmental impacts of the province's electrical and nuclear energy requirements to the year 2000. Directed and managed the Commission's background studies on socio-economic and technological issues. Prepared major portions of the Commission's Interim Report on Nuclear Energy and nine-volume Final Report.

**Consultant and Writer**

Commissioned by the Canadian Institute of International Affairs to write On Things Nuclear: The Canadian Debate.

Commissioned by the Swedish Institute of International Affairs to write Canada Today: A Social, Political and Economic Profile.

An independent, two-year journey of exploration across Europe, the Middle East, South and Southeast Asia.

Rapporteur and analyst to a series of cross-Canada public hearings on the population problem and related issues such as urban and industrial policy, resource and environmental policy and immigration policy. Wrote Public Consultation on Population Questions: A Report to the Government of Canada.

Associate, Peter Barnard Associates, Toronto. Areas of responsibility included housing policy development.

Consultant to the Defence Research Board. Prepared a study of Western and Canadian strategic, political and economic interests in the Pacific Rim region. This work provided the basis for the book China and Japan: Emerging Global Powers.

Consultant to the Committee on Government Productivity, which restructured Ontario's policy-making and program-delivery machinery.

**Officer, Office of Intergovernmental Affairs, Ontario Ministry of Treasury, Economics and Intergovernmental Affairs**

Responsibilities included policy development and the preparation of Ministerial briefings regarding provincial-municipal affairs.

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**Ontario Government Administrative Training Program**

Participated in this one-year program, which provided exposure to a number of departments, usually at the deputy-minister level.

**EDUCATION**

Honours B.A. in Political Science & Economics, University of Toronto, 1970

M.A. in Political Economy, University of Toronto, 1972.

**PUBLICATIONS**

"Uranium Supply and Demand: Prospects and Dilemmas". Remarks to the Financial Post Conference, Mining in the 1980s, Vancouver, April 3-5, 1979.

On Things Nuclear: The Canadian Debate (Toronto: Canadian Institute of International Affairs, 1977).

"The CANDU Snafu", Financial Times of Canada, May 9, 1977.

"The Future Role of Nuclear Power: Notes on a Seminar", Royal Commission on Electric Power Planning, 1977.

Canada Today: A Social, Economic and Political Profile (Stockholm: Swedish Institute of International Affairs, 1976). Co-authored with D. A. Ross.

China and Japan: Emerging Global Powers (New York: Praeger, 1975). Co-authored with D. A. Ross.

Public Consultation on Population Questions: A Report to the Government of Canada (Toronto: Canadian Institute of International Affairs, 1974).

"The Phenomenon of Continental Defence: The Dilemma of Canadian Contiguity to the United States", Canadian Institute of International Affairs, 1972.

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**JOHN D. KEYS****Executive Profile**

Dr. Keys holds a Ph.D. in Nuclear Physics, an M.Sc. in Atmospheric Physics, and an Honours Degree in Mathematics and Physics, all from McGill University. He has eight years consulting experience in technology fields with clients in private and public sectors. He has also held senior management positions in the Public Service of Canada and a crown corporation, where he managed a broad range of science and technology programs for major government departments. His responsibilities focused on strategic planning, allocation of resources and evaluation of program results. He also acted as chairman of a number of interdepartmental committees dealing with across-department issues.

**CURRENT  
POSITION****Associate, Philip A. Lapp Limited**

Areas of specialization include program development, program evaluation and strategic planning. Authored or co-authored over 30 reports in fields of space technology, energy, surveying and mapping technology, public policy and organizational planning.

**PROFESSIONAL  
SYNOPSIS****Assistant Deputy Minister (Science & Technology), Department of Energy, Mines and Resources**

Implemented a program planning and performance review process to link the scientific and technological activities of the department to national needs. Established a procedure for developing Federal Energy R&D priorities and an assessment system leading to annual recommendations to government on energy R&D expenditures.

**Vice-President (Program) National Research Council of Canada**

Developed program objectives that placed the role of the Council in the context of current governmental and national needs. Organized and implemented a program for the dissemination of scientific and technological information. Laid the groundwork for the establishment of a laboratory of Materials Research in Quebec.

**Assistant Vice-President (Laboratories), National Research Council of Canada**

Assisted in the introduction of management systems to conform with general public service principles and procedures.

**Science Advisor, Treasury Board Secretariat**

Provided advice on scientific and technological components of departmental spending proposals.

**Chief, Hydrologic Sciences Division, Department of Energy Mines and Resources**

Established the division; developed a program-activity structure; evolved and implemented a methodology for ranking projects and assigning priorities.

**Head, Mineral Physics Section, Department of Mines and Technical Surveys**

Assisted in developing a new focus for the division and redirected the work of the section to provide a major segment of the overall divisional program.

**Senior Scientific Officer, Department of Mines and Technical Surveys**

Undertook R&D projects in solid state physics and application of radioactive tracers to the investigation of industrial processes in the fields of mining and metallurgy.

**Head, Department of Physics, Canadian Services College, Royal Roads, Victoria, B.C.**

Selected the course requirements to meet the evolving needs in respect of the post-secondary education of officer candidates for the armed forces.

**Education**

Honours B.Sc. in Mathematics and Physics, McGill University, 1947

M.Sc. Atmospheric Physics, McGill University, 1948

Ph.D. Nuclear Physics, McGill University, 1951

**Professional Affiliation**

Member of the Association of Professional Engineers of Ontario

**Societies Affiliation**

American Association for the Advancement of Science  
 American Physical Society  
 Canadian Association of Physicists  
 Royal Astronomical Society  
 Sigma Xi

**Related Activities**

1953-56	Regular Office Training Plan Selection Boards, Academic Representative
1957	Regular Office Training Plan final selection committee, representing the Canadian Services College, Royal Roads

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1957	Canadian Association of Physicists, member of Council for B.C. (one of two)
1960-66	28th Alta Vista Scout Group Committee, treasurer 4 years, chairman 1 year
1966-67	United Appeal, Ottawa, deputy departmental organizer
1966-67	Public Service Commission interview teams, Physical Sciences representative
1967-69	Advisory Council of Faculty of Science, Bishop's University, Lennoxville, Quebec, chairman Physics Subcommittee
1966-67	Electronic Component Research and Development Committee, Defence Research Board, Chairman Materials Subcommittee
1971-75	Chairman, Interdepartmental Advisory Committee for the Scientific Research Group (advisory to Chairman, Public Service Commission and to Deputy Secretary, Treasury Board Secretariat)
1972-79	Chairman, Canadian Committee on Oceanography
1972-81	Member, Board of Trustees, Illuminating Engineering Research Institute
1973-78	Chairman, Committee on Science and Technology of the Advisory Committee on Northern Development
1976-81	Chairman, Interdepartmental Committee on Remote Sensing
1977-81	Chairman, Panel on Energy R&D
1980-84	National Research Council of Canada, member of Council and of the Executive Committee

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## ROGER ANTHONY STACEY

### Career Summary

Roger Stacey graduated as a Geologist from the University of Nottingham, England, in 1959 and obtained MSc and PhD degrees in Geophysics in 1961 and 1966 from the University of Durham, England. He moved to Canada in 1966 and worked as a Geophysicist with the federal Department of Energy Mines and Resources for nine years. The work involved planning and management of multi-disciplinary field surveys, and interpretation of results in terms of geological conditions, mineral deposition, earthquake distribution and volcanic activities.

From 1974 to 1982, Roger Stacey worked with the Department of Fisheries and Oceans as part of the oceanographic strategic planning group, with specific responsibilities for program development in the geosciences and new technology. The latter included automated data collection systems for ships and buoys, and the application of remote sensing techniques.

In 1982, Roger Stacey moved to the province of Newfoundland to take part in oil and gas developments off the east coast of Canada. He joined NORDCO Ltd., a provincial crown corporation that made the transition to employee ownership in 1985, as Vice President Research. During four years with NORDCO, Roger Stacey was responsible for development of the company's remote sensing program, and management of all environmental, oceanographic and marine engineering contracts.

In 1986, when it appeared offshore oil and gas activities off the east coast were coming to an end, Roger Stacey returned to Ottawa to establish Roger A. Stacey Consultants Ltd. (RASCL), offering consulting services to government and industry in R&D strategic planning, program development and management. Using his first-hand experience in the federal government and in industry, he also offers consulting services in technology transfer and regional development.

In the past two years, Roger Stacey has:

- (i) advised the Departments of Agriculture and Energy Mines and Resources on matters relating to the introduction of Geographic Information Systems (GIS).
- (ii) the Department of Fisheries and Oceans on planning for the management of scientific and administrative information for decision making over the next decade and
- (iii) on behalf of the Canadian International Development Agency (CIDA), he has spent two weeks in China, a similar period in Peru, and paid short visits to Kenya, Zimbabwe, Niger, Burkina Faso and the Ivory Coast. In each case, the objective was to determine the country's resource management information needs, the appropriate level of technology for data collection and analysis, and technical and management training needs.

He is currently:

- (i) an advisor to the Professional Services Branch of CIDA in the field of surveys, mapping, remote sensing and information management systems for resource and environmental problems.



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- (ii) assisting the Canadian Space Agency, Space Station Project Office, in the preparation of its Major Crown Project documentation required by Treasury Board and
  - (iii) assisting the Canadian Space Station Project Office, Strategic Technologies in Automation and Robotics (STEAR) program with the development of Terms of Reference for a request for proposals from industry on the protection of materials in space.

Education:            BSc Geology, University of Nottingham, 1959  
                               MSc Geophysics, University of Durham, 1961  
                               PhD Geophysics, University of Durham, 1966

#### Employment Summary

- 1986                    President, Roger A. Stacey Consultants Ltd.
- Strategic planning, program development and management, technology transfer and industry development. Primary fields of interest are program planning, environmental, renewable and non-renewable resource information management.
- 1982-86                Vice President Research, NORDCO Ltd. Consulting Engineers, Newfoundland
- Responsible for new business development with government and industry. Responsible for the company's remote sensing, oceanographic, environmental, marine engineering, and sea ice and iceberg research programs.
- 1974-82                Chief, Ocean Technology Division, Marine Sciences and Information Directorate, Department of Fisheries and Oceans
- Responsibilities included departmental representation on various policy, planning and program committees (including the Interdepartmental Committees on Space and Oceans Management), plus the initiation of new programs in ocean technology.
- 1966-74                Research Scientist, Geological Survey of Canada, Department of Energy, Mines and Resources
- Responsible for planning, implementation and analysis of gravity measurements in Alberta, British Columbia and the northeast Pacific. Published sixteen papers on the interpretation of geological and geophysical data in terms of crustal structure and plate tectonics for the Cordilleran region of Canada and the adjacent Pacific Ocean.
- 1965                    Hunting Surveys Ltd. (U.K.)
- Geophysicist responsible for quality control and interpretation of an airborne magnetic survey over Brunei, parts of Malaysia and the South China Sea.

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1963 Nature Conservancy Board (U.K.)

Geophysicist responsible for survey and interpretation of seismic and resistivity data relating to the post glacial history of the English Lake District.

Consulting Experience (1982-onwards)

1989 Advisor to Professional Services Branch of the Canadian International Development Agency (CIDA) on surveys, mapping, remote sensing and information management for resources and environmental applications.

Advisor to Department of Fisheries and Oceans on the development of a scientific and administrative information management plan to the year 2000.

Advisor to the Canadian Space Agency, Space Station Project, on the preparation of documentation for Treasury Board, and the development of Terms of Reference for bids on the protection of materials in space.

1988 Advisor on program and data base development for the National Atlas of Canada (Bureau of Management Consultants/Energy, Mines and Resources).

Feasibility phase for the establishment of a resource management information system for Africa (MacDonald Dettwiler/CIDA).

Co-organizer/participant in National Research Council of Canada workshop on small business opportunities in Canada and abroad in the field of Geographic Information Systems and Remote Sensing (with British Columbia Research Institute).

Advisor to the Outaouais Regional Development Board on the establishment of a Geographic Information Management and Remote Sensing Research Centre in the region.

Advisor on institutional adjustments needed to make best use of computer aided mapping and geographic information systems (Bureau of Management Consultants/Department of Agriculture).

1987 Executive Director, Canadian Remote Sensing Training Institute, responsible for developing and running the Institute's programs.

Prepared a catalogue of training programs in remote sensing for CIDA.

Report on organization and status of remote sensing applications in China (prepared for CIDA).

Report on remote sensing applications in Peru (prepared for CIDA).

Scientific advisor in the fields of hydrology, geophysics and mining engineering (Revenue Canada).

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- 1986            Theoretical and experimental investigation of various target detection technologies for use in search and rescue at sea (Department of Transport).
- 1985            Development of a High Frequency radar research capability in NORDCO Ltd (Department of National Defence).
- 1984            Calculation of ship passage times for crossing the Labrador pack ice off Lake Melville (Newfoundland Department of Development).
- Multi-sensor airborne experiments for seal detection off Labrador (Department of Fisheries and Oceans).
- Established a digital image analysis capability in NORDCO Ltd on behalf of the Newfoundland provincial government for use in environmental and resource management tasks.
- East coast marine radio communications study (Ocean Ranger Commission)
- Review and evaluation of sea ice and iceberg information for the east coast (Ocean Ranger Commission).
- 1983            Experimental evaluation of an escape module for use on fixed offshore platforms (Mobile Oil Canada Ltd).
- Theoretical and experimental investigation of the behaviour of icebergs in the vicinity of fixed offshore platforms (National Research Council of Canada).
- 1982            Review of radar research in Canada (Department of Transport).

Government Experience (1966-82)

Policy and Planning

- 1979-82            Marine Advisory Board, Ice Management and Navigation Aid Committees: mandate of the Board was to provide advice to the Department of Transport on R&D priorities for marine transportation (Department of Fisheries and Oceans (DFO) representative).
- 1979-81            Member of the Board of Governors for the Centre for Cold Ocean Resources Engineering (C-CORE), St. John's, Newfoundland.
- 1978            Ocean Information Systems: a plan to meet future data handling requirements in support of the government's ocean related responsibilities, including an assessment of the impact of new technology on data collection, analysis and communications. DFO representative on Ministry of Science and Technology study.

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- 1977-82      Satellite Program Committees: Fisheries and Oceans representative on policy level committees for Surveillance Satellite Program (SURSAT): Multi-purpose UHF Communications Satellite (MSAT): and involved in the start-up of the RADARSAT program.
- 1976-82      Advisory Committee on Industrial Benefits: as DFO representative, was involved in the monitoring of "Canadian content" in major resource related developments in industry.
- 1976-80      Panel on Ocean Management: as Secretary, responsible for organizing meetings and agenda for the government's senior policy development committee for ocean matters.
- 1976          Marine Contingency Centre Study: DFO representative for a review and assessment of the adequacy of contingency plans for marine incidents carried out for the Privy Council Office.
- 1976          Ocean Management Functions of the Government: a review of the government's ocean related responsibilities for the Privy Council Office at the time of the Law of the Sea negotiations with technical and organizational scenarios for the future. Seconded to the Ministry of Science and Technology for the preparation of the report and its presentation to Deputy Ministers. This work led to the formation of the deputy Ministers' Panel on Ocean Management.
- 1975          Technology Development and Ocean Management: an assessment of the impact of new technology on the government's ocean related responsibilities. This study led the secondment to the Ministry of Science and Technology noted above.

#### Program Development

- 1981          Energy Related Ocean Engineering R&D: responsible for consultant's activities in defining R&D requirements for marine and Arctic oil and gas production systems, and for recommending criteria for government involvement.
- 1979-82      Radar Research Program: responsible for development of the MOU between National Defence and Fisheries and Oceans for joint High Frequency radar research, and for development of a shipboard ice radar research program for winter navigation in the Arctic in cooperation with the Department of Transport.
- 1979-82      Canadian Ice Research Programs responsible for Fisheries and Oceans plans to establish an Ice Research Centre to provide a focus for ice research in Canada.
- 1979-80      Surveillance Satellite Program: responsible for the "oceans" aspects of a review of possible applications of satellite and other remote sensing technologies to Canada's offshore and Arctic environmental, shipping and regulatory surveillance requirements.
- 1977          De Havilland DHC-7 Ranger Development: responsible for advice to Transport Canada on requirements for environmental surveillance, particularly ice and pollution at sea.

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- 1976 Offshore Fisheries Surveillance: development of a plan for "policing" offshore activities prior to the extension of Canada's fisheries jurisdiction to 200 miles, responsible for airborne surveillance aspects and evaluation of advanced technologies, such as satellites.
- 1975-80 Data Buoy Development Program: secretary to the interdepartmental steering committee set up for the Hermes Electronics Ltd. contract, provided advice to scientific and contract managers in areas of policy and program direction, responsible for assembling funds from various departments for each fiscal year.
- 1975 Gulf of St. Lawrence Research Program: assisted regional laboratory scientists in the development of a physical, chemical, biological and socio-economic study of the Gulf region.
- 1975 UNESCO Man and the Biosphere (MAB) Program: Fisheries and Oceans representative on Canada MAB Committee, and member of the working group defining priorities for coastal zone ecosystem research.
- 1966-74 Geophysical Survey of Western Canada: responsible for the gravity survey aspects of the Geological Survey's planning for geophysical surveys in the Cordilleran and adjacent Pacific regions of Canada.

#### Project Management

- 1981-82 Natural Science and Engineering Research Council (NSERC), Program for Research Applicable to Industry (PRAI): manager for development of an iceberg profiling system (Memorial University and ICE Engineering Ltd.).
- 1979-82 National Research Council Program for Industry-Laboratory Projects (PILP), manager for the following technology transfer projects:
- (a) High Frequency transceiver for ocean data - Hermes Electronics Ltd. (1980-81).
  - (b) Use of NRC accelerometers for ocean wave measurements - Hermes Electronics Ltd. (1981-82).
  - (c) Vessel motion monitoring system - NORDCO Ltd. (1979-82):
  - (d) Sidescan sonar - Hunttec '70 Ltd. (1979-82):
  - (e) Magnetic bubble memory applications - Targa Electronics Ltd. (1981-82): and
  - (f) Iceberg dynamics - MARTEC LTD. (1981-82).

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- 1979-82            Office of Energy R&D
- (a) Viscount Melville Sound Ice Survey (1978): scientific manager for a joint government-industry (Arctic Pilot Project) survey of ice thickness and ridge structure between Melville Island and Resolute, North West Territories, and the evaluation of airborne ice sensing techniques (Melville Shipping Ltd. and Arctec Canada Ltd):
  - (b) Bylot Island (N.W.T.) Ice Monitoring Radar (1979): study of dynamics and microwave characteristics of sea ice and icebergs in Lancaster Sound (Remotec Applications Ltd. and the Arctic Research Establishment).
  - (c) Analysis of Laser Profilometer Data over Ice (1979): scientific manager for follow-on study to Viscount Melville sea ice survey (Intera Consultants Ltd): and
  - (d) Evaluation of High Frequency Radar for Sea Ice and Iceberg detection (1979-82): sky wave and ground wave experiments carried out in co-operation with the Departments of National Defence and Communications (C-CORE).
- 1977                "Sea Ice in Canadian Waters": provided advice on production requirements for a film based on satellite (NIMBUS) data portraying changes in sea ice areas around Canada over a two year period (Crawley Films Ltd).
- 1976                Fisheries Surveillance Satellite: provided advice on fisheries and ocean sciences requirements (Canadian Astronautics Ltd).
- 1966-74            Gravity Survey of Western Canada and the Northeast Pacific managed annual land, sea and airborne gravity surveys in the regions. The marine surveys included establishment of navigation aids and the collection of seismic, magnetic and bathometric data. The results were used to interpret the geological history of the region in terms of crustal plate inter-actions over time.

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**W. RUSSELL MCNEIL**

Dr. McNeil holds a PhD in Experimental Space Science from York University, where he designed one of Canada's first LIDAR (laser radar) systems for remote sensing of the Earth's atmosphere. His subsequent research, teaching and consulting activities with Environment Canada, the University of Nevada, and Philip A. Lapp Ltd. focused on various aspects of remote sensing as applied to water and air quality. Dr. McNeil also has 13 years experience as a science journalist for major media in both Canada and the U.S., where he produced two nationally aired television documentaries for U.S. Public Television. He has also produced or written for CTV, CBC (TV and Radio), Global Television, and TV Ontario. Specializing in Canadian Science and Technology, he currently contributes weekly science columns to the Toronto Star, CBC Radio and Broadcast News.

**CURRENT  
POSITION**

**Associate, Philip A. Lapp Ltd., Toronto, and President, Science and Technology Information Systems (STIS) Inc., Toronto**

STIS is involved in communications consulting and science journalism (writing, research, production and broadcast activities) on areas in which science and technology play a key role. STIS is associated with Philip A. Lapp Ltd. on a variety of consulting studies in remote sensing, energy, and communications.

**RECENT  
ACTIVITIES**

CBC Radio, weekly national radio column on Canadian Science and Technology (since 1981)

Couchiching Institute on Public Affairs, Writing and production of 1989 Couchiching Conference Proceedings

National Research Council, Production of a weekly private radio column

Connaught Laboratories, Executive Producer of Educational Video

Centre for Occupational Research and Development [Dallas, Texas], Coordination and production of 25 part educational video series on Applied Mathematics used in 48 States.

Toronto Star, Sunday Star Science columnist (since 1986)

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Association of Professional Engineers of Ontario, Research and production of print materials

Broadcast News [Canadian Press], Production of National Radio Series on Science and Technology syndicated to 265 English language radio stations since 1986)

Bell Canada, communications consultant and video director/writer on various projects

Canadian Geographic Magazine and Canadian Research Magazine, features contributor

Ontario Ministry of Energy, Evaluation of EnerSearch Energy Program

#### **PROFESSIONAL SYNOPSIS**

**Journalist (writer, broadcaster, producer), PBS, CBC, CTV, Global, Toronto Star**

Research, production and writing for various media on issues in which science, technology and environment play a key role.

**Assistant Professor, University of Nevada, Las Vegas**

Taught undergraduate physics and graduate physics (optics) for two years.

**Researcher, York University, Environment Canada**

Design and application of active (laser radars) and passive (photometers) remote sensing devices for air and water quality research.

**Consultant, Philip A. Lapp Ltd. & STIS Inc., Toronto**

Involved in consulting studies on the evaluation of government energy programs and appraisal of active and passive airborne and satellite remote sensing technologies for air and water quality measurements; communications consulting and production of educational/promotional video materials for various clients.

**Director of Communications, Institute for Hydrogen Systems, University of Toronto**

Responsible for management of Division and production of technical materials on electrochemical research programs

#### **EDUCATION**

St. Francis Xavier University, Antigonish, N.S., BSc (cum laude)







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Institute for Hydrogen Systems; Industrial film, "Transitions to Hydrogen," on Institute for Hydrogen Systems, 1985

Wilfred Laurier University; Series of four technical stories on WLU research for Communications Department at WLU, 1989

Association of Professional Engineers of Ontario, Series of ten press releases on 1989 APEO Engineering Award winners, 1989

York University Development Corporation, Series of 15 articles on academic excellence at York University, 1988

## PUBLICATIONS

Evaluation of the Ministry of Energy EnerSearch Program, Prepared for the Ontario Minister of Energy in Association with Philip A. Lapp Ltd., September, 1988

Energy Efficient Lighting, Brochure for Ontario Ministry of Energy, Fall, 1987

Dealing with Canada's Technology Challenge by Changing Corporate Culture, Business Quarterly, Vol. 52, No. 2, pp 40-44, Fall, 1987

Energy Futures: Hydrogen, Deep Gas and Bluer Skies, Impact of Science on Society, UNESCO Publication, No. 143, pp 321-333, October, 1986

Assessment of Hydrogen Related Combustion and Engine Technologies, IHS Report IHS-85-45, 1985

Annual Reports, Quarterly reports, Business Plans, and a variety of technical and non-technical publications for the Institute for Hydrogen Systems, 1984-1986

Airborne Spectroscopic Reflectance Study, Prepared for Environment Canada by W.R. McNeil & Assoc. Inc., 1976

Optical Techniques for Remote Detection and Mapping of Oil in the Beaufort Sea, Proc., 3rd Cdn. Symp. on Remote Sensing, 1976

Polarization Properties of Lidar Signals Backscattered from the Atmosphere, Applied Optics, March, 1975

User Requirements for Data Products for the Canadian Ocean Data System, Prepared for Hermes Electronics in Assoc. with P.A. Lapp Ltd., May, 1976

The Utilization of Scientific and Technical Information Systems for Fisheries in Canada, Prepared for the Fisheries Research Board in assoc. with P.A. Lapp Ltd., 1976

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The Role of Remote Sensing in the Monitoring of Water & Effluent Quality, Prepared for Environment Canada in assoc. with P.A. Lapp Ltd., Feb. 1976

An Investigation of Systems for the Surveillance and Monitoring of Oil Spills in the Beaufort Sea, Prepared in assoc. with P.A. Lapp Ltd., for the Canada Centre for Remote Sensing, August 1975

Study and Evaluation of Remote Spectroscopic Measurements in Water Quality Surveillance, Final Report, Environment Canada contract, March 1974

Remote Measurement of Water Colour and its Application to Water Quality Surveillance, Vol. 3, Proc. Remote Sensing of Earth Resources, University of Tennessee Space Institute, March, 1974

PhD Thesis, Lidar Atmospheric Polarization Diagnostics, York U., April, 1973

Remote Probing by Lidar, Canadian Aeronautics & Space J., 10, 419-21, Oct, 1971

MSc Thesis, Form Factors, Dalhousie University, 1969





