



**JOURNAL
OF THE
CANADIAN SOCIETY
OF
EXPLORATION
GEOPHYSICISTS**

TABLE OF CONTENTS

Papers

An Overview of Exploration Geophysics — recent breakthroughs in Geophysics and recognition of challenging new problems B. S. Flowers 7

Application of seismic modelling to velocity studies J. Merland 16

Gravity Gradiometry — a rebirth J. Hopkins

Seismic expression of a carbonate-evaporite sequence in Northern Alberta, Canada G. W. Klose and W. G. Holland 38

Error analysis in automatic data reduction of potential field data R. J. Bolton 48

A system for real amplitude recovery in land seismic recordings S. Jain 55

Interpretation of magnetic anomalies of a two-dimensional fault by Fourier Integral R. Sengupta 65

An efficient computation of the angle of latitude P. Lancaster 72

Special Report

Canadian Geophysical Activity, 1975 B. Berg 74

DEPARTMENTS

Front Advertisements	i-xvi	President's Page	5
CSEG Executive page	1	Memorial	78
CSEG Committee page	2	Professional Directory	xvii
1975 Corporate Members List	3	Back Advertisements	xviii
Advertisers' Index	4		

THE CANADIAN SOCIETY OF EXPLORATION GEOPHYSICISTS

The C.S.E.G. was founded in 1949

The Canadian Society of Exploration Geophysicists is an association of exploration professionals who are dedicated to promote the science of geophysics in the fields of petroleum, mining and ground water exploration, and to promote fellowship and cooperation among those persons and organizations interested in geophysical problems.

Our Society has over 1,000 members at the present time. Membership fees are \$7.00 Canadian per year, which also includes the cost of the CSEG annual technical Journal.

Active membership may be granted to anyone engaged or interested in the geophysical profession. All applicants must be sponsored by two members of the Society, with the exception of S.E.G. members who require no sponsors. Enquiries should be directed to the CSEG Membership Committee, P.O. Box 117, Calgary, Alberta.

Technical luncheon meetings are held monthly, except July and August, in Calgary, Alberta.

C.S.E.G. JOURNAL

1. Subscriptions are given to all members of the Society in good standing.
2. Claims for non-receipt must be sent within three months of publication.
3. Advertising rates will be sent upon request.
4. Previous issues are still available. For prices contact the Secretary/Treasurer.

ISSN 0008-5022 — This is the International Standard Serial Number for the Journal of the C.S.E.G. It was assigned in March, 1974 as part of a record of world serial publications.

THE CANADIAN SOCIETY OF EXPLORATION GEOPHYSICISTS

COMMITTEES — 1975

Committee	Chairman
Bar-B-Que & Picnic	Hinds Agnew
Bonspiel	Roy Millice
Doodlebug Golf	Dunc Goodwin
Ladies Auxiliary	Shirley Kostashuk
Convention — 1976	Ken Morrison
Convention — 1977 (SEG)	Hal Goodwin
University Liaison-Education	Verne Street
Best Paper	George Kostashuk
Honors & Awards	John Harding
Journal	Hefin ab Iorwerth
Journal Bus. Mgr.	Bob Fyvie
Membership	Bill Watson
Corporate — Membership	Ted Rosza
Newsletter	Dave Miles
Projectionist	Greg Milne
Publicity	T. A. G. Watson
Future Directions CSEG	Bill Black
Professional Affairs	Jack Pullen
Government Relations	Wes Rabey
Statistics	Ben Berg
Metrication	Rich Mayer
Canadian Geoscience Council	Pete Savage, John Harding, Jack Pullen, Wes Rabey
Scholarship	Ken Morrison
Pet. Industry Committee on Employment of Northern Residents	Bill Cherniak
Free Public Lecture for Cable T.V. Series	Grant Fawcett
Historical Committee	Jim Carrow
History of Geophysics in Canada	Easton Wren

1975 C.S.E.G. CORPORATE MEMBERS

AMERADA MINERALS CORPORATION OF CANADA LTD.
ALMINEX LTD.
ANSCHUTZ (CANADA) EXPLORATION
AQUITAINE COMPANY OF CANADA LTD.
AMOCO CANADA PETROLEUM COMPANY LTD.
AGIP CANADA LTD.
ASHLAND OIL CANADA LIMITED
BASSET OIL LTD.
B.P. CANADA LIMITED
BRASCAN RESOURCES
CANADA-CITIES SERVICE, LTD.
CANADIAN INDUSTRIAL GAS & OIL
CANADIAN WESTERN NATURAL GAS CO. LTD.
CANADIAN OCCIDENTAL PETROLEUM LTD.
CHEVRON STANDARD LTD.
CANADIAN RESERVE OIL & GAS LTD.
CANADIAN SUPERIOR OIL & GAS LTD.
DEMINEX CANADA LTD.
FRANCANA OIL & GAS LTD.
GULF OIL CANADA LTD.
HUSKY OIL OPERATIONS LTD.
HUDSON'S BAY OIL & GAS
HALLIBURTON SERVICE LTD.
IMPERIAL OIL LTD.
MURPHY OIL COMPANY LTD.
MESA PETROLEUM
PANCANADIAN PETROLEUM LIMITED
PETTY-RAY GEOPHYSICAL LTD.
RANGER OIL COMPANY
SCURRY-RAINBOW OIL LIMITED
SCHLUMBERGER OF CANADA
SUN OIL COMPANY
SHELL CANADA LTD.
TEXASGULF INC.
TEXAS PACIFIC OIL CO. INC.
TENNECO OIL & MINERALS
TOTAL PETROLEUM (NORTH AMERICA) LTD.
TOTAL LEONARD INC.
UNION OIL COMPANY OF CANADA LTD.
UNITED CANSO OIL & GAS LTD.
VOYAGER PETROLEUMS LTD.
WESTERN DECALTA PETROLEUM LTD.

ADVERTISERS' INDEX

ACE Explosives	1	Kenting Explorations Services Ltd.	xxxii
Airborne Geophysical Surveys, Ltd.	xi	Kirst Exploration	xv
Alpine Helicopters Ltd.	xvii	Lundberg Seismic Consultants Ltd.	xv
Aqua Terra Consultants, Ltd.	v	MacMillan Construction Peace River Ltd.	xv
L. R. Baxendale Seismic Consult- ants Ltd.	xvi	E. F. Mahaffy Consulting Ltd.	xvi
Beaver Geophysical Services Co. Ltd.	xiv	Mark Products, Inc.	xix
Bediz Exploration Consultants Ltd.	xvi	Marsh Head Construction Ltd.	xxii
Caldraft Ltd.	x	Nickle Map Services Ltd.	xxii
Canadair Flextrac	xviii	Norcana Geophysical Services Limited	xviii
Canadian Society of Exploration Geophysicists	xxxii	Ed Norton Construction Ltd.	xxii
Century Geophysical Corporation of Canada	xii	Northern Geophysical (1975) Ltd.	xxvi
W. E. Chilton Consultants Ltd.	xv	W. M. Oakley and Associates Ltd.	xvi
Comer & Wilson Ltd.	xvi	Paterson, Grant & Watson Ltd.	xviii
Compagnie Generale de Geophysique	xxv	Photogravity Surveys Ltd.	xi
Digicon Exploration, Ltd.	xv	Probe Data Market Ltd.	xvi
Digitech Ltd.	xiii	Lorne H. Reed & Associates Ltd.	xv
Dornian Consultants Ltd.	xv	Schlumberger	viii
Dresser Olympic Operations	xxi	Sedco Drilling	xxv
Electraflex Surveys Ltd.	xvii	The Sefel Group	xxx
Eureka Exploration Ltd.	x	Seisform Drilling Ltd.	vi
Hugh Evans	xxiv	Geo-Seis Ltd.	vi
Exploranium Corporation of Canada	xvi	Seismic Service Supply (1958) Limited	iii
Exploration Data Exchange	iv	Seiscan Delta Ltd.	xxviii
Explosives Limited	i	Seismotech (64) Ltd.	x
Geodigit	xx	Sigma Exploration Ltd.	iv
Geo Space	vii	Stacs Data Services Ltd.	xxv
C. L. Hart and Associates Ltd.	xv	Statcom Ltd.	xv
Indel-Davis Ltd.	xxiv	Teledyne Exploration Ltd.	xxiii
International Geophysical Consultants Ltd.	xv	Terra-Ex Services Ltd.	xvi
Jean Alix Co. Ltd.	xviii	United Geophysical Company of America	ix
Johnson and Herbert Construction Ltd.	vi	Walker-McDonald Bit Distributors, Ltd.	xxix
J.L.J. Exploration Consultants Ltd.	xvi	West Canadian Graphic Industries Ltd.	x
Kary Data Consultants Ltd.	ii	Western Electronic Systems	ii
		Western Geophysical Co. of Canada, Ltd.	xxix

PRESIDENT'S PAGE

As the Journal enters its second decade of publication, (this is Volume 11) it provides a silent but eloquent tribute to the Society's maturity and responsibility. The row of blue volumes represents a great deal of co-ordinated effort on the part of authors, editors, proof-readers, advertisers and supporters. And let us not forget the Society members who through their dues and support of the Society's continuing education and convention programs, have supplied the finances necessary to cover the gap between the advertisers' and contributors' important contributions and the rapidly rising costs (in the case of the 1974 issue, \$4,000 — approximately one half of the cost). However, finances are not the problem, our Society is growing and is relatively solvent, and has been given encouragement to expand its publication program both by federal government support for the printing of papers presented at our conventions, and by the general acceptance of the Journal outside our membership.

Over the last two years editors have worked hard and unsuccessfully to acquire sufficient papers to increase regular publications to two per year. In spite of the stimulus provided by our National Conventions, in spite of our increased membership, in spite of our regular technical meetings, Canadian geophysicists are just not writing enough to fill an extra issue.

Over the years, geophysicists have been very tight-lipped about their work and rightly so. Much of our success is due to innovations and in our competitive world successful innovation often equals success itself. However, as the targets of our

search grow smaller and more elusive, it also becomes very helpful and economically and politically important to share at least part of our progress with others. Indeed this slowness of publication is often criticized, usually by those outside of the industry, who interpret it as detrimental to our efficiency.

Let us therefore take the time to record publicly the results of the great variety of presently unreported and certainly unrecognized research being done in Canada. We are justifiably proud of our developments in Applied Seismology Research, ranging from improvements in field layouts and data processing to the development of new mapping techniques. These certainly warrant printing and the CSEG is ready.

For 1976 an objective of one regular issue and one special issue has been set by the CSEG executive.

Subjects which might be addressed in the special issue are:

Canadian Geophysical Case Histories

Special field procedures for Canadian problems

Multiple suppression techniques as applied to Canadian data

Permafrost corrections

Mining geophysical papers

Please pass on your ideas for papers to Hefin ab Iorwerth and he will assist in coordinating the preparation.

J. R. PULLEN