



JOURNAL

VOL. 23, NO. 1

DECEMBER 1987

TECHNICAL PAPERS

The Seismic Signatures of Some Western Canadian Devonian Reefs

Neil L. Anderson and R. James Brown 7

Amplitude-vs-Offset Analysis: A Review with Reference to Application in Western Canada

Sudhir Jain 27

Locating Swan Hills Porosity at Judy Creek using Seismic Inversion

Peter Bower, John Boyd and Sudhir Jain 37

Seismic Attenuation and Poisson's Ratios in Oil Sands from Crosshole Measurements

Costas G. Macrides and Ernest R. Kanasewich 46

Linearized Inversion of Seismic Amplitude Data

M. Shahriar, F. Hron and G.L. Cumming 56

Reflection and Transmission at Plane Boundaries in Nonwelded Contact

E.S. Krebs 66

Attenuation from VSP Data Collected on Melville Island

N.A. Keehn and E.R. Kanasewich 73

DEPARTMENTS

Advertisers' Index	1	President's Page	6
Journal Staff & Regulations	3	Articles	7
Instructions to Authors	4	Authors' Biographies	85
CSEG Executive	5	Professional Directory	ix

CANADIAN SOCIETY of EXPLORATION GEOPHYSICISTS

ISSN 008-5022

ADVERTISERS' INDEX

Canjay Exploration (1975) Ltd.	v
CGG Geophysics Canada Ltd.	i
CSEG	Outside Back Cover
GECO	ii
Geophysical Micro Computer Applications (Intn.) Ltd.	x
Geo-X Systems	Inside Front Cover
Johnson & Herbert Construction Ltd.	v
Kelman Seismic Proc.	ii
Mark Products	Inside Back Cover
McAra Printing Limited	iv
Norcana Resource Services Ltd.	vi
Northern Geophysical (1986) Ltd.	iv
Petty Ray	i
Prime Brokerage Consultants Ltd.	vii
Professional Directory	ix, x
Ref Tek Canada	x
Seis-Pro & Consultants	iii
Solid State Exploration Ltd.	v
Western Geophysical of Canada Ltd.	vi
Western Seismic Exchange	vii



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

**VOL. 23, No. 1
December 1987**

EDITOR

R. JAMES BROWN, DEPT. OF GEOLOGY & GEOPHYSICS, UNIVERSITY OF CALGARY, CALGARY, ALBERTA T2N 1N4

BUSINESS EDITOR

ROBERT F. JARDINE, TELEDYNE EXPLORATION LTD., 221 - 62ND AVENUE S.E., BOX 5129, STN. A, CALGARY, ALBERTA T2H 1X3

PRODUCTION EDITOR

CECELIA FREY, 6228 TOUCHWOOD DRIVE N.W., CALGARY, ALBERTA T2K 3L9

ASSOCIATE EDITORS

Melvyn E. Beat
Bedford Inst. of Oceanography
Atlantic Geoscience Centre
P.O. Box 1006
Dartmouth, Nova Scotia B2Y 4A2

Harold W. Dosso
Dept. of Physics
University of Victoria
Victoria, British Columbia
V8W 2Y2

Zoltan Hajnal
Dept. of Geological Sciences
University of Saskatchewan
Saskatoon, Saskatchewan
S7N 0W0

Edward G. Lalonde
Home Oil Co. Ltd.
324 - 8th Avenue S.W.
Calgary, Alberta
T2P 2Z5

Woolf M. Moon
Dept. of Geological Sciences
University of Manitoba
Winnipeg, Manitoba
R3T 2N2

John W. Peirce
Petro-Canada Inc.
P.O. Box 2844
Calgary, Alberta
T2P 3E3

Brian H. Russell
Hampson-Russell Software
Services Ltd.
615 - 3rd Avenue S.W.
Calgary, Alberta T2P 0G6

Gordon F. West
Dept. of Physics
University of Toronto
Toronto, Ontario
M5S 1A7

A. Easton Wren
Geophysical Consultant
82 Eagle Ridge Drive S.W.
Calgary, Alberta
T2V 2V4

Submission of Manuscripts is invited in all areas of geophysics related to exploration. Case histories are particularly welcome.

Manuscripts should be sent, in quadruplicate, directly to the Editor. Papers received by the Editor will be deemed property of the C.S.E.G., unless the release of the paper is granted in writing by the Editor. There are no page charges but additional costs of colour reproduction are charged to authors.

Instructions for preparation of the manuscript may be found in "Instructions to Authors" on page 4.

Short Notes and discussions of the papers published in the Journal are welcome.

Responsibility for all statements and scientific opinions made in the papers lies with their authors. Only unpublished material should be submitted for publication. The authors are responsible for clearing their papers for publication in the

C.S.E.G. Journal from any Society or Journal which may have prior publication rights to the manuscripts.

Reprints can be supplied at cost if ordered prior to publication.

Subscription to the Journal is included in the membership dues. Non-members and organizations should direct their enquiries to the Secretary, C.S.E.G., at the address given below or, by telephone, at (403) 262-0015.

Advertisements are welcome. Rates may be obtained by writing to the Business Editor, C.S.E.G. Journal.

Previous Issues of the Journal are still available. For prices contact the secretary.

Claims for non-receipt of Journal should be made within three months of publication.

**Published by the Canadian Society of Exploration Geophysicists
501, 206 - 7th Avenue S.W.
Calgary, Alberta T2P 0W7**

INSTRUCTIONS TO AUTHORS

Editorial standard.

The JOURNAL adopts as its editorial standard the "Instructions to Authors" of the Society of Exploration Geophysicists as published in *GEOPHYSICS*, 52 (Jan., 1987), 1-10. Some augmentation to the SEG Instructions is included below and in cases of ambiguity or conflict the present CSEG Instructions will take precedence.

Submission of manuscript.

Submit an original and three copies, *i.e.*, four copies in all of each manuscript, complete with figures, tables, references, and figure and table captions. The figures and tables submitted with the original manuscript should be the originals described below in 4. However, it is acceptable to submit four sets of figure/table copies, the originals to be supplied upon acceptance of the paper. Manuscripts should be typed, double-spaced, on 21½ x 28 cm (8½ x 11 in) paper or on A4 (European-format) paper.

Organization of manuscript.

1. Title page. It should give the title, followed by the names, affiliations and full addresses of all the authors. Make the title of your paper as brief as possible. The first word should be a significant one, suitable for both classifying and indexing the paper. If your paper was given orally at a meeting, include a footnote specifying the name of the organization that held the meeting, where held, and the date of presentation.
2. Abstract. An abstract is not an introduction or a list of contents, but is rather a summary of the essential qualities, including the principal conclusions, of the paper. (See the SEG Instructions.) Every technical paper must be accompanied by an abstract of approximately 200 to 300 words. Short notes do not require abstracts.
3. Headings. Normally three levels of headings should be used. First-order headings are centred and capitalized; second-order headings are positioned at the left-hand margin; third-order headings are indented, underlined or italicized, and followed by a dash. Numbering of sections is optional.
4. Figures, tables and formulae. These should be compatible with a 21½ x 28 cm page size, two-column format; *i.e.*, they will be reproduced at either 9 cm (half-column) or 18 cm (full-column) width in vertical format or 23 cm wide in horizontal format.

— Figures should be drafted at approximately twice the published size. Photographs should be glossy prints, or in PMT format.

— All figures must be clearly marked on the back with the figure number and author's surname.

— Colour illustrations are encouraged where the use of colour is deemed essential. However, authors will be responsible for the additional costs of colour reproduction.

— Foldouts should be avoided unless absolutely necessary. Cross-sections should be designed to fit on facing pages.

— Original materials will not be returned to authors unless specifically requested at the time of submission.

— Tables, formulae and equations can be difficult to typeset and proofread. They should be submitted in a form suitable for direct reproduction, for example, laser-printer output is ideal.

— Captions for figures and tables should be provided on a separate page or pages of the manuscript; they should not be lettered on the original nor should a title be designed within the frame of the figure or table. A figure (or table) and its caption should be a self-contained unit which, in its essentials, can be understood without reference to the text.

5. References. Authors are responsible for citing and listing references correctly. Only references cited in the text should be listed under the heading REFERENCES. References *not* cited in the text, but deemed to be essential, should be grouped separately under the heading REFERENCES FOR GENERAL READING. For further details on the format of references, the SEG Instructions are adhered to with the following exceptions: commas are omitted before *and* in a string of authors' names; between journal name and volume number, and after words like *Bull.* and *Proc.* in the name of a publication.

Units and Spelling.

Physical quantities shall be expressed in SI units. Imperial or CGS equivalents may additionally be given. See R.E. Sheriff's '*Encyclopedic Dictionary of Exploration Geophysics*' (SEG, 2nd ed., 1984) for a comprehensive guide to SI units, forms of abbreviation, etc. Official Canadian SI spelling (*e.g.*, metre) shall be used. In other cases Canadian spelling is preferred (*e.g.*, centre, modelling, sulphur) although in many instances acceptable alternatives exist. Authors should, above all, be consistent in their spelling.

Review, Revision, Reprints.

Authors are strongly advised to have their manuscript critically read by at least one reader familiar with the subject matter before it is submitted. All manuscripts submitted are subject to a standard peer review process after which final revision should be made. Galley proofs will be forwarded to authors with a return date specified and with an order form for reprints if they are desired. If there is more than one author, it must be clearly indicated to whom the proofs are to be sent. At the discretion of the Editor, *minor* changes (as opposed to corrections) may be accommodated at galley-proof stage. Major revisions at this or at a later stage will be charged to the author. Authors may order reprints in any quantity and will be billed for them at cost. They should be ordered at this time only; back orders will entail much higher costs.

Copyright.

The copyright of accepted and published material is reserved by the Canadian Society of Exploration Geophysicists.

**CANADIAN SOCIETY
OF
EXPLORATION GEOPHYSICISTS**

**EXECUTIVE COMMITTEE
FOR YEAR ENDING FEBRUARY 1988**

President:	R.L. (Bob) Comer
First Vice-President:	R.M. (Ralph) Lundberg
Second Vice-President:	B.H. (Brian) Russell
Secretary:	R.M. (Bob) Stuart
Treasurer:	M.F. (Mel) Kyle
Business Manager:	A.G. (Art) Baptie
Journal Editor:	R.J. (Jim) Brown
Past President:	J.D. (John) Boyd
Recorder Editor:	K.J. (Keith) Young

PRESIDENT'S PAGE

I believe that the CSEG has achieved a successful blend of providing both technical and social benefits to its members. The technical portion, which as stated in the constitution is "to promote the science of geophysics . . . ," is achieved by the Journal, the technical luncheon meetings and the annual convention. The Journal is the most lasting of these; it provides a ready reference for solutions to many problems.

The Journal brings to the members the new developments and research in all aspects of our industry. Western Canada is now an area that has been explored in great detail; recent major discoveries show, however, that there are hydrocarbons still to be found. The more obvious fields have been found; the remaining reserves are in traps which are on the threshold of seismic resolution. It is imperative for a company that wishes to remain competitive to use every technological advance that is available. The Journal plays an important part in this process.

I wish to thank Journal Editor Dr. James Brown and his staff for their efforts in producing this year's Journal. On behalf of all the readers I wish to thank the authors for their efforts and also the companies who permit these articles to be published. Their cooperation, particularly in the release of case histories, is greatly appreciated.

To emphasize the commitment of the Society to the Journal, the executive has provided enough money in the 1988 budget for the publication of two issues. Obviously we need twice the number of papers that we have had in previous years so we encourage all members to give serious thought to submitting an article to the Journal.

R.L. Comer