



PTAC

PETROLEUM TECHNOLOGY ALLIANCE CANADA

An Association that Facilitates Collaborative
Research and Technology Development
in the Conventional Oil and Gas Industry



Conventional Heavy Oil

Drilling

E-Commerce

Environmental

Fundamental Research

Inactive Well Management

Natural Gas Production

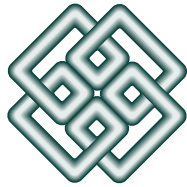
Occupational Health and Safety

Oil Production

Reservoir Recovery / Geoscience

Well Completion





PTAC

1999 Key Accomplishments

Record Number of R&D Projects Launched

R&D Project Results Realized

Increased Membership

Hosted Successful Workshops, Forums and Technology Information Sessions

Formalized Environmental R&D Framework and Process

Played Key Role in Founding COURSE

(Coordination of University Research for Synergy and Effectiveness)

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Achievements

growth and
R&D
project results

Message from the Board of Directors

PTAC continued to grow in 1999 and realized several significant milestones. We added 33 new members, hosted a record 31 Technology Information Sessions, sponsored 6 workshops and forums, issued 10 Requests for Proposals (RFPs), and facilitated the launch of an unprecedented number of R&D projects – 26 projects valued at \$4.5 million. PTAC has facilitated the launch of 51 R&D projects valued at \$10.6 million since inception in 1996. The results of 18 of these projects, including our first project on Water Content and Physical Properties of Acid Gases, have been provided to funders and whenever possible to other interested parties.

A significant milestone was the formalization of an Environmental R&D Framework and Process Model for the upstream oil and gas industry with CAPP (Canadian Association of Petroleum Producers). PTAC will provide overall facilitation and coordination for an improved approach, which is expected to provide a multitude of benefits to stakeholders.

PTAC played a key role in the founding of COURSE (Coordination of University Research for Synergy and Effectiveness), a new mechanism for funding fundamental energy related research in Alberta, which resulted in the launch of 15 new university research projects in 1999.

For the first time PTAC facilitated initiatives in e-commerce, which led to the publication of a business case document and the creation of an e-procurement standards working group in 1999.

Our successful track record for launching R&D initiatives has become more widely known. As a result, new oil and gas related initiatives are increasingly finding their way to PTAC's doorstep for facilitation.

On behalf of the Board, we would like to thank PTAC staff and volunteers on committees, workshops and projects for their dedication and efforts. Our vision of applying leading-edge technology developed through collaboration is becoming a reality.

Eric Lloyd
Eric Lloyd
President of PTAC

Alan Archibald
Alan Archibald
Chairman of PTAC

Projects Completed

R&D Project Results Realized

A total of 18 PTAC facilitated projects have been completed to date and the results reported to funders and whenever possible, to other interested parties. Most project results have been made available through PTAC Technology Information Sessions. However some project results are proprietary and only available to funders. Results have been made available for the following 13 projects, as well as five others launched in 1999.

Conventional Heavy Oil

- Development of Full Project Engineering and Economics for the VAPEX Process
- Assessment of Heavy Oil Fluid Gathering System Alternatives
- Cyclic Waterflood Simulation Study
- Reducing the Cost of Tank Cleaning in Heavy Oil Operations
- Evaluation of Markets for Produced Sand

Drilling

- Research and Software Development Project to Reduce Drilling and Completion Costs Associated with Borehole Instability

Natural Gas Production

- Water Content and Physical Properties of Acid Gases
- Onsite Electrical Generation from Flare Gas

Oil Production

- Predicting Internal Pitting Corrosion of Multiphase Pipelines

Reservoir Recovery / Geoscience

- Field Pilot for Water Abatement in Gas Reservoirs
- Economically Beneficial Waste Gas Injection for Medium/Heavy Oil Depletion

Well Completion

- Field Pilot for Near Well Treatment to Reduce Gas Coning/Channelling
- Low Cost, High Performance Diverting and Blocking

Launched

R&D Projects Launched in 1999

PTAC facilitated the launch of 26 projects valued at \$4.5 million during 1999. Further information on these projects, which are listed below, can be obtained by reading our 1999 newsletters or visiting our project index on our website (www.ptac.org). We expect to launch 25 additional projects during 2000 in the areas of: flaring; greenhouse gas (GHG) and fugitive emissions; human, ecological and animal health; heavy oil artificial lift; enhanced oil recovery; fundamental drilling research; and downhole technologies.

Conventional Heavy Oil

- Thermal Solvent Process – Field Scale Engineering and Economics
- In Situ and Refinery Upgrading of VAPEX Heavy Oil Production (VAPEX Phase II)**
- Casing Deformation Study
- VAPEX Refinery Upgrading Project
- Bio-upgrading for Heavy Crude Quality Improvement*

Environmental

- Assessment of Phytoremediation as an In Situ Technique for Cleaning Oil Contaminated Sites**
- Hydrophobic Soils
- Fugitive Emissions**
- Evaluation of Past Revegetation Mitigation Efforts
- Flaring Mitigation Centre Market Assessment**
- Gas Plant Remediation*
- Emissions from Individual Oil and Gas Reservoirs*

Natural Gas Production

- Mitigation of Harmonic Distortions in Oilfield Electrical Systems*

Oil Sands

- Novel Hardfacing Material System for the Oil Sands Industry*
- Investigation of Mass-Transfer Mechanisms in the VAPEX Process*
- Online Air-content Determination and Analysis (OSADA) Technology for Oil Sands Slurry Pipelines*
- Solids Distribution in Hydrotransport Process*
- Separation of Water and Fine Solids Through Asphaltenes Precipitation*
- Oil Sand Lump Size Estimation by 3-D Sensing*
- Particle Flow Modelling of Oil Sands Excavation*
- Production of Rutile Concentrate from Oil Sands Tailings*
- Role of Microbial Process on Sulfate-Enriched Tailings Deposits*

Reservoir Recovery / Geoscience

- Seismic Investigation of the Steen River Reservoir*
- Control of Water Coning in Gas/Oil Reservoirs*

Well Completion

- Field Pilot to Remove Pyrobitumen Blockage from Oil and Gas Reservoirs with the PRISTINE Process**

* Launched in conjunction with COURSE

** Results completed and reported to funders in 1999

VAPEX Twin Horizontal Well Pair Pilot Expected

This anticipated pilot is the direct result of the two VAPEX projects launched through PTAC in 1998/99. These projects had 26 funding participants in total and 14 R&D suppliers, an excellent example of collaboration for others to consider following. The successful piloting of this technology would likely provide an economical and GHG friendly opportunity to significantly increase bitumen and heavy oil production and reserves for the industry. PTAC hopes that pilot decision makers will continue their past approach of allowing participation from all organizations that are prepared to pay their fair share of the project cost.

PTAC

Alberta Energy Company Ltd.
Anderson Exploration Ltd.
Barrington Petroleum Ltd.
BP Amoco Petroleum
Burlington Resources Canada
Energy Ltd.
Canadian Hunter Exploration Ltd.
Crestar Energy
Encal Energy Ltd.
Fletcher Challenge Energy
Canada Inc
Gulf Canada Resources Limited
Husky Oil Operations Ltd
Imperial Oil Limited
Maxx Petroleum Ltd.
Murphy Oil Company Ltd.

Northstar Energy Corporation
Numac Energy Inc.
Ocelot Energy Inc.
PanCanadian Petroleum Limited
Penn West Petroleum Ltd.
Petroleum-Canada Resources
PrimeWest Energy Inc.
Ranger Oil Limited
Renaissance Energy Ltd.
Shell Canada Resources Ltd.
Suncor Inc. - Resources Group
Talisman Energy Inc.
Union Pacific Resources Inc. (UPRI)
Wascana Energy Inc.
Westpoint Energy Inc.

Adams Pearson Associates Inc.
Advanced Geotechnology Inc.
Air Liquide Canada Inc.
Alpine Environmental Ltd.
Aqueolic Canada
Barton Engineering Group Inc.
Benhope Energy Inc.
Brine-Add Fluids Ltd.
Business Development Bank of Canada
Canwell Enviro-Industries Ltd.
Centre for Passive Sampling Technology
CHEM-PET Process Technology Ltd.
Clearstone Engineering Ltd.
Colt Engineering, Core Project Group
Computalog Ltd.
Computer Modelling Group Ltd.
D.E. Towson and Associates Inc.
Duke Engineering Services
EBA Engineering Consultants Ltd.

Members

135 Members as of March 20, 2000

continued . . .

Outlook

Outlook for 2000

PTAC will continue to focus on R&D priorities that are brought to our attention by PTAC members and the industry. In 2000, we anticipate that we will focus on the following technical areas: Environmental; Heavy Oil; Drilling; Well Completion, Stimulation and Workover; Reservoir Recovery; and Natural Gas Production, Processing and Transportation.

We expect to see new initiatives in the areas of: flaring; greenhouse gas (GHG) and fugitive emissions; human, ecological and animal health; heavy oil artificial lift; enhanced oil recovery; fundamental drilling research; and downhole technologies.

A significant technology pilot (VAPEX), from the perspective of both bitumen/heavy oil recovery and environmental GHG emission reduction, is expected to launch in 2000. Plans are currently under consideration for the world's first VAPEX twin horizontal well pair experimental field pilot. This pilot is a direct outcome of the VAPEX projects (Phases 1&2) launched through PTAC in 1998 and 1999.

PTAC will be formulating an R&D Priorities and Strategy document for the Western Canadian oil and gas industry based on input from our members. The first two technical areas to be addressed will be Environmental and Drilling.

We have set a goal of launching a minimum of 25 projects with a value of \$5.0 million in 2000. We are predicting a modest increase in our annual budget to \$370,000 based on our growing membership. PTAC will continue to encourage member participation in workshop and forum planning to ensure collaborative R&D is focused on relevant issues.

PTAC and GRI (formerly known as the Gas Research Institute) recently initiated negotiations on a Technology Transfer function, to be hosted at PTAC and funded by GRI. The focus would be on commercialization in Canada of natural gas technologies that have been developed in recent years. This agreement would assist PTAC in planning and sponsoring events that focus on needs in natural gas related technical areas that could be addressed with new technology from GRI or others.

PTAC Board of Directors

Standing-

Don Towson, Bruce Peachey, Pat McLellan, Frank McIntyre, Kevin Hertz and Neil McCrank

Seated-

Bob Hill, Ken Putt, Larry Bell (Past Chairman), Eric Lloyd (President), Alan Archibald (Chairman), Murray Todd and Bruce Stewart

Missing-

Roger Bailey, Robert Child, Denis Gaudet, Patrick Jamieson, Rich Kerr and Bill Svreck



Board of Directors

PTAC Board Members

As of December 31, 1999

Alan Archibald, Chairman, PTAC
President, Westpoint Energy Inc.

Larry Bell, Past Chairman, PTAC
Vice President Operations Services,
Crestar Energy Inc.

Eric Lloyd, President, PTAC
Petroleum Technology Alliance Canada

Roger Bailey
Executive Director,
Alberta Oil Sands Technology and
Research Authority (AOSTRA),
Ministry of Alberta Innovation and Science

Robert Child
General Manager Gas Resources,
BP Amoco

Denis Gaudet
Vice President, Aqueolic Canada Ltd.;
Engineering Manager,
Winterhawk Technologies Ltd.

Kevin Hertz
Vice President Operations,
Burlington Resources Canada Energy Ltd.

Bob Hill
Vice President,
Technology and Operations,
Canadian Energy Pipeline Association (CEPA)

Patrick Jamieson
President and CEO, C-FER Technologies Inc.;
Vice President, Energy Technologies,
Alberta Research Council (ARC)

Rich Kerr
Chief Engineer, Wascana Energy Inc.

Neil McCrank
Chairman, Alberta Energy and Utilities Board

Pat McLellan
President, Advanced Geotechnology Inc.

Frank McIntyre
Reservoir Engineering Manger,
Rainbow Lake, Husky Oil Operations Ltd.

Bruce Peachey
President, New Paradigm Engineering Ltd.

Ken Putt
President, K.W. Putt Consulting Inc.

Bruce Stewart
Director, Western Research Centre,
Natural Resources Canada (CANMET)

Bill Svreck
Professor, Department of Chemical and
Petroleum Engineering, University of Calgary

Murray Todd
President, Todd Resources

Don Towson
Industrial Technology Advisor,
National Research Council's Industrial
Research Assistance Program (IRAP) -
Hosted at Petroleum Services Association
of Canada (PSAC)

... continued

e-Energy Inc.
 Enerplus Energy Services Ltd.
 EnviroTest Laboratories
 Epic Consulting Services Limited
 ESG International Ltd.
 Foothills Diamond Coring
 Gris Gun Manufacturing Inc.
 HCI StanchemTravis Chemicals
 Hycal Energy Research Laboratories Ltd.
 InStream Group
 John Zink Canada
 KBL Land Use Consulting Ltd.
 Kootenay Powder Coating Ltd.
 KPMG High Technology Practice Group
 Kudu Industries
 Lloyd Energy Inc.
 Mactronic Ltd.

Malibu Engineering
 Matrix Solutions Inc.
 Membrane Technology and Research
 Mercury Electric Corporation
 Millennium EMS Solutions Ltd.
 MJ Blair Corporation
 NetworkOil Canada Inc.
 NEWALTA Corporation
 New Paradigm Engineering Ltd.
 Noetic Engineering Inc.
 Nordic Engineering
 Norwest Labs
 NowSCO-Fracmaster Ltd.
 Ogilvie and Company
 Oil Technology (Overseas) Inc.
 Omnicorn Consultants Inc.
 OnX.com
 Opsco'92
 PCP International Inc.

Petro-Studies Consultants Inc.
 Proalta Machine and Manufacturing Ltd.
 Process Optimization Promore
 Prudential Steel Ltd.
 Quest an Alliance Corporation
 Questor Technology Inc.
 Radian Canada
 Ryan Energy Technologies Inc.
 SAIC Canada
 Schlumberger of Canada
 TankSafe Inc.
 Tornado Flare Systems
 Trican Well Service Ltd.
 Vaela Technologies Ltd.
 Variperm Canada Ltd.
 Vik International Inc.
 WellBid Inc.
 Winterhawk Technologies Ltd.

Adler, Dr. George
 Aysse, Conrad
 Bolt, Richard
 Burnside, Wayne
 Carleton, Mike
 Gaudet, Denis
 Logan, Al
 Luhnring, Richard
 Mathew, Roy
 McCann, Tom
 Neulander, John
 Porteous, Bob
 Putt, Ken
 Robertson, Duncan
 Stephens, Mark
 Todd, Murray
 Tzanco, Elena
 Willson, Diana
 Wilson, Kenneth

Alberta Research Council
 Alberta Sulphur Research Ltd.
 C-FER Technologies Inc.
 GRI
 Natural Resources Canada (CANMET)
 Petroleum Recovery Institute
 Petroleum Technology Research Centre
 Saskatchewan Research Council
 TIPM Laboratory (Perm Inc.)

University of Alberta
 University of Calgary
 University of Regina,
 Faculty of Engineering

AOSTRA

Founding Supporters:

Canadian Business Networks Coalition (CBNC)

Sessions

Technology Information Sessions

PTAC hosted 31 Technology Information Sessions attended by a total of nearly 1000 participants in 1999. These sessions provide our members with the opportunity to obtain funding and technical input for proposed R&D, learn about new R&D initiatives and emerging technology, report on project and field test results, and transfer and market new technology in the conventional oil and gas industry.

PTAC held the first all day session focused on water shut-off technology in early 2000, with a variety of presentations that were well received by attendees. PTAC plans to use this approach in other technical focus areas in the future with a Cost-Effective Abandonment Solutions TIS planned for May 2000. If you have a particular technical focus area that needs to be addressed, please contact PTAC with your ideas.

Workshops and Forums

PTAC sponsors workshops to provide opportunities for people to clearly define R&D issues and identify the direction which will yield the most promising solutions. Potential suppliers of R&D have the opportunity to hear first hand about such issues and to contribute their expertise and ideas for solutions. PTAC funds the workshops and provides the necessary facilitation, administrative support and coordination to launch projects. We widely distribute Request for Proposals (RFPs) with Expressions of Interest for each priority issue from workshops. Once we have identified those who will consider supporting the R&D, proposals are then solicited from potential suppliers. PTAC brings together the interested organizations in a structured way that leads to new R&D, while protecting proprietary interests.

PTAC also sponsored highly successful Environmental Forums in early 1999 and 2000. These forums were attended by over 300 participants who were provided with the opportunity to learn about the latest environmental oil and gas related research results and plans. For more information on our Environmental R&D Framework and Process, visit our website at www.ptac.org/tech_enviro.html.

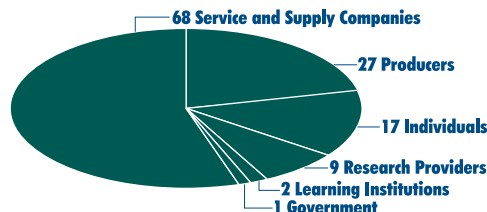
In 1999, PTAC sponsored workshops in Environmental, Conventional Heavy Oil and e-Commerce. As a result, 10 RFPs were formally issued and two e-Commerce working groups were created. Workshop attendance totalled over 300 participants.

The continued involvement of industry personnel is needed by PTAC in 2000 to plan workshops or forums in areas such as Environmental, Drilling, Heavy Oil, Completion, and Reservoir Recovery. Mini-workshops that focus on one particular issue are an effective way to initiate collaborative R&D projects. We encourage you to contact PTAC if you have ideas for such workshops.

Association and Regulator Working Relationships

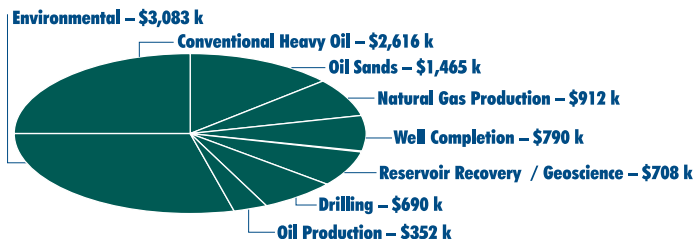
PTAC believes that working with industry associations and regulators to jointly sponsor events and distribute information is an important component of the overall approach to collaborative R&D.

The successful formalization of the Environmental R&D Framework and Process Model resulted from the cooperation and support of the Canadian Association of Petroleum Producers (CAPP), Environment Canada, Alberta Environment (AEnv) and other interested organizations. PTAC strives to build new relationships where there is mutual interest and continues to strengthen existing relationships.



Membership by Category

The number of PTAC members increased to 124 by year-end 1999. Our current members produce approximately 60% of Canadian Conventional Oil and Gas. PTAC signed up our 135th member in March 2000, continuing our pattern of steady membership growth.



Project Expenditure by Technical Area

PTAC has facilitated the launch of 51 projects valued at \$10.6M since inception in 1996.

Technical Subcommittees

PTAC now has 11 Technical Subcommittees (TS) and over 2800 contacts in the following areas:

- Conventional Heavy Oil
- Drilling
- E-Commerce
- Environmental
- Fundamental Research
- Inactive Well Management
- Natural Gas Production
- Occupational Health and Safety
- Oil Production
- Reservoir Recovery / Geoscience
- Well Completion

The approach used by the Conventional Heavy Oil and Environmental TS has proven very effective in moving forward needed R&D. PTAC needs interested senior technical people to assist in identifying important issues that require R&D. If you are interested in participating, or seeing particular issues addressed, we encourage you to contact PTAC for additional information.

Technical Areas

Collaboration

Financials

Auditor's Report

We have audited the financial statements of PTAC Petroleum Technology Alliance Canada for the year ended December 31, 1999 and have reported thereon without reservation under date of March 2, 2000. The accompanying summarized balance sheet and summarized statements of revenues, expenses and surplus have been prepared from the audited financial statements.

In our opinion, the accompanying summarized balance sheet and statements of revenues, expenses and surplus fairly summarize the information as to the financial position of PTAC Petroleum Technology Alliance Canada and the results of its operations contained in the audited financial statements.

KPMG, Chartered Accountants
Calgary, Canada,
March 2, 2000

Summarized Balance Sheet

As at December 31, 1999, with comparative figures for 1998

Assets	1999	1998
Cash	\$ 20,843	\$ 29,938
Marketable securities	43,896	62,237
Accounts receivable	46,049	75,040
	110,788	167,215
Capital assets	28,661	27,147
	\$139,449	\$194,362
Liabilities and Surplus		
Accounts payable, accrued liabilities	\$ 16,391	\$ 6,240
Deferred revenue	121,035	168,692
	137,426	174,932
Surplus	2,023	19,430
	\$139,449	\$194,362

Summarized Statements of Revenues

Expenses and Surplus for the year ended December 31, 1999,
with comparative figures for 1998.

Revenues	1999	1998
Membership	\$336,992	\$297,088
Other	14,586	38,238
	\$351,578	\$335,326
Expenses		
Operating	\$368,985	\$335,491
Excess (short) of rev./exp.	(17,407)	(165)
Surplus, beginning of period	19,430	19,595
Surplus, end of period	\$ 2,023	\$ 19,430

The complete audited financial statements of PTAC for the year ended December 31, 1999 are available from PTAC offices upon request.

Skid for Improved Liquid/Vapour Separation Project

Physical Model of VAPEX Recovery at PRI

PTAC

An Association that Facilitates Collaborative
Research and Technology Development
in the Conventional Oil and Gas Industry

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