VOLUME 2 - NOVEMBER 2000

# ON COURSE

Coordination of University Research for Synergy and Effectiveness

## COURSE MEMBERS

**Companies**
Albian Sands Energy Inc.
Applied Patents Inc.
Arkril Enterprises
Burning Rock Oil Co. Ltd.
Canadian Occidental Petroleum
Crestar Energy Inc.
D.E. Towson & Associates Inc.
ELF Exploration Production
Fekete Associates Inc.
Fluid Treatment Technologies Inc.
Husky Oil Operations
Imperial Oil Resources Limited
International Downhole Equipment Ltd.
INTRATECH
Komex International Ltd.
Nordic Engineering Ltd.
NOVA Chemicals Ltd.
Opus Petroleum Engineering Ltd.
PanCanadian Petroleum Limited
Petro-Canada Oil and Gas
Rakhit Petroleum Consulting Ltd.
Suncor Energy Inc.
Syncrude Canada Limited
T.J. McCann and Associates Ltd.
Ulster Petroleum Ltd.

**Research Organizations**
Alberta Research Council
Canadian Energy Research Institute
CANMET Western Research Centre
National Centre for Upgrading Technology

**Industry Associations**
Alberta Chamber of Resources
Petroleum Technology Alliance of Canada
Canadian Energy Pipeline Association

**Government Organizations**
Alberta Energy Research Institute
Alberta Energy and Utilities Board
Alberta Environment
Alberta Science, Research and Technology Authority
Fisheries and Oceans Canada

**Universities**
University of Alberta
University of Calgary

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Yang Gao, University of Calgary
Murray R. Gray, University of Alberta
Alan Hildebrand, University of Calgary
Ronald J. Hugo, University of Calgary
Apostelus Kantzas, University of Calgary
Donald C. Lawton, University of Calgary
Dongyang Li, University of Alberta
Qi Liu, University of Alberta (2 projects)
Phillip M. Fedorak, University of Alberta
Samuel Frimpong, University of Alberta
Brij B. Maini, University of Calgary (2 projects)
Jacob Masliyah, University of Alberta
Carl Mendoza, University of Alberta
Bruce J. Milne, University of Calgary
Martin P. Mintchev, University of Calgary
Krishnaswamy Nandakumar, University of Alberta
Anne L. Norman, University of Calgary
Nancy Papanikolaou, University of Calgary
Mehran Pooladi-Darvish, University of Calgary
Laurier L. Schramm, University of Calgary (adjunct)
Jozef Szymanski, University of Alberta
Dwayne D. Tannant, University of Alberta
Gregory T. Taylor, University of Alberta
Gerrit Voordouw, University of Calgary
Ron K.C. Wong, University of Calgary
Wilsun Xu, University of Alberta
Zhenghe Xu, University of Alberta
Harvey Yarranton, University of Calgary
Hong Zhang, University of Alberta

WHO

## COURSE BOARD AND MANDATE EXPANDING

The COURSE Leadership Board will be seeking new members to provide guidance in the expanded mandate. The COURSE Leadership Board is comprised of senior industry, university and government volunteers. The Board works to stimulate increased energy resources research at Alberta universities. The concept is to promote increased collaboration between the Alberta universities to provide combined teams of researchers for energy resources research.

Three of the original Leadership Board representatives have retired after serving since COURSE was formed in March, 1999. Our thanks and good wishes are extended to John Clark, former Manager of Research with Syncrude Canada, Ron Kratochvil, former Senior Advisor, Research and External Affairs, University of Alberta and Roger Bailey, former Executive Director of AERI.

35

## PROJECTS FUNDED

Since beginning in March 1999, COURSE has held two funding competitions which resulted in 35 new projects with a total value of $7,900,000 which includes $3.5 million from Alberta Innovation and Science.

**June 1999 Applications**
(15 of 59 funded)

- Innovation and Science $1.5 million
- Industry, NSERC and others $1.1 million

**January 2000 Applications**
(20 of 61 funded)

- Innovation and Science $2.0 million
- Industry, NSERC and others $3.3 million

FUNDING

## $3 MILLION FUNDING – January 2001

One of the earliest actions by the newly formed Alberta Energy Research Institute (AERI) was to direct COURSE to proceed with a $3,000,000 funding competition for new energy research projects at Alberta universities. The funding is provided by the Ministry of Alberta Innovation and Science through the Alberta Science, Research and Technology Authority (ASRA). University research into the energy resources of Alberta has been set as a priority by AERI "to develop the seed grain for the future (research ideas and people)".

ASRA and AERI have set an expanded and widened mandate for the COURSE energy resources research competition including:

- Conventional Oil and Gas
- Oil Sands
- Coal
- Coal Bed Methane
- Biomass
- Electricity
- Hydrogen
- Fuel Cells
- Petrochemicals
- Environmental
- Renewable Energy (wind, solar, hydro)

**The deadline for applications is Monday, January 29, 2001.**

TIMING

## JANUARY LEVERAGE

The Universities and Industry advised COURSE that January is the optimum time for the COURSE funding competition because:

1. it fits industry budget year
2. early funding attracts top students
3. it increases success at competitions later in year
4. it increases leverage for Alberta's investment

The date change appears to be popular. The June 1999 competition attracted a 1.7-1 leverage of Alberta Innovation and Science investment while the leverage in January 2000 increased to 2.7-1.

KEY

## INDUSTRY PARTICIPATION

Industry participation in a university research project or in the application for funding is arranged directly between the company involved and the university researcher under terms acceptable to both parties. COURSE will assist the researcher and company to "find" each other, but the university and the company determine participation terms independently.

Each project is encouraged to have an industry company or companies involved in the project acting in one or more of the following manners as arranged between the Principal Researcher and the company to fit the project:

- "receptor" of the research results (receiving the final non-confidential report);
- assisting in formulating the project plan or as advisor to the project;
- providing a letter of support for the application;
- providing work-in-kind to support the research; or
- providing direct financial assistance*

*Industry funding or participation is not a necessary requirement for an application, although it is a consideration in awarding funds.

# 20 NEW PROJECTS FUNDED IN JANUARY 2000, COMPETITION

20 new projects, valued at $5,300,000, were launched as a result of the January 2000 COURSE Funding Competition. Alberta Innovation and Science provided $2,000,000 with industry, NSERC and others providing the remainder. 61 applications for funding were received. This raises to 35 the number of new projects launched by applications to COURSE since startup in March 1999.

The 20 new projects are described below and to the right. For more information on a specific project – please contact the researcher directly. More general questions may be addressed to Richard Luhning, Director of COURSE or the COURSE Administrative Assistants: Brenda Brindza, University of Alberta, or Beth Hill, University of Calgary. Contact information is available on the back page of this newsletter.

NEW PROJECTS

## ENVIRONMENTAL

### Improving the Performance of High Temperature Fuel Cells

The goal is low cost electrode materials to increase efficiency, while lowering the operating temperature for solid oxide fuel cells.

Contact: **Viola Birss**
University of Calgary
Phone: (403) 220-6432
Fax: (403) 289-9488
E-mail: birss@ucalgary.ca

### Combustion Enhancement and Emission Reduction from Flare Stacks using Passive Jet-Flow Control

Flow control methods for better mixing of the fuel and air to reduce emissions will be assessed.

Contact: **Nancy Papanikolaou**
University of Calgary
Phone: (403) 220-5918
Fax: (403) 282-8406
E-mail: papaniko@enme.ucalgary.ca

### Natural Attenuation of Petroleum Hydrocarbons at Upstream Oil and Gas Facilities

Evaluate the viability of natural attenuation for environmental remediation under various conditions.

Contact: **Kevin Biggar**
University of Alberta
Phone: (780) 492-2534
Fax: (780) 492-8198
E-mail: kwbiggar@civil.ualberta.ca

### Degradation of Petroleum Hydrocarbon at the Soil/Root Interface in Contaminated Soils

Measure degradation of petroleum hydrocarbons in contaminated soils in the vicinity of plant roots.

Contact: **Gregory Taylor**
University of Alberta
Phone: (780) 492-5172
Fax: (780) 492-9234
E-mail: gregory.taylor@ualberta.ca

## DRILLING / COMPLETIONS

### A New Measurement while Drilling Surveying Technique Employing the Technology of Fiber Optic Gyroscopes in a Strapdown Inertial Navigation System

New techniques to replace the magnetic MWD surveying system with the technology of fiber optic gyroscopes.

Contact: **Martin Mintchev**
University of Calgary
Phone: (403) 220-5309
Fax: (403) 282-6855
E-mail: mintchev@enel.ucalgary.ca

## SEISMIC / EXPLORATION

### Seismic Velocity Anisotropy and Depth Imaging

Investigate the effects of seismic velocity anisotropy on accuracy of imaged targets in the subsurface.

Contact: **Donald C. Lawton**
University of Calgary
Phone: (403) 220-5718
Fax: (403) 284-0074
E-mail: dclawton@geo.ucalgary.ca

## IN SITU OIL SANDS

### Performance Evaluation of Shale for Ensuring Hydraulic Isolation around Thermal Wellbores

Analytical solutions will be developed and used to evaluate the performance of shale for hydraulic isolation and casing support.

Contact: **Ron K. Wong**
University of Calgary
Phone: (403) 220-4998
Fax: (403) 282-7026
E-mail: rckwong@ucalgary.ca

## CONVENTIONAL OIL / GAS & EOR

### Enhanced Oil Recovery by Urease-Catalyzed, Microbial Calcium Carbonate Blocking

The project aims to improve oil recovery by deposition of solid, durable, microbially formed calcium carbonate in high permeability zones in oil fields, forcing injected water to sweep more productive areas.

Contact: **Gerrit Voordouw**
University of Calgary
Phone: (403) 220-6388
Fax: (403) 289-9311
E-mail: voordouw@ucalgary.ca

### Evaluation of Miscible and Sub-Miscible Flue Gas Injection for Improved Recovery of Light Oils and Sequestering of Greenhouse Gases

Evaluate the potential of using flue gases to improve oil recovery and sequester greenhouse gases.

Contact: **Brij Maini**
University of Calgary
Phone: (403) 220-8777
Fax: (403) 282-3945
E-mail: bmaini@ucalgary.ca

## EXTRACTION

### Research into Cold (25°C) Conditioning of Oil Sands with regard to Solids Reduction in Froth through Solvent/ Demulsifier Nascent Froth and Naphtha/Paraffinic Diluent Post-Production Froth Treatment Schemes

Better understand the physical mechanisms for cold froth treatment in Athabasca oil sands bitumen recovery.

Contact: **Laurier L. Schramm**
University of Calgary
Phone: (403) 210-5201
Fax: (780) 450-5242
E-mail: schramm@ucalgary.ca

### Fundamental Study of Bitumen Digestion Process

Investigating fundamental physics and chemistry in bitumen extraction from Athabasca oil sands deposits.

Contact: **Zhenghe Xu**
University of Alberta
Phone: (780) 492-7667
Fax: (780) 492-2881
E-mail: zhenghe.xu@ualberta.ca

## PLANT OPERATIONS

### In-Line Multiphase Flow Meter Development

Develop a multiphase flow meter that is both economic, accurate and insensitive to flow regime.

Contact: **Ronald Hugo**
University of Calgary
Phone: (403) 220-2283
Fax: (403) 282-8406
E-mail: hugo@ucalgary.ca

### Optimization of Steam Generation Performance

The fundamental physical and chemical processes occurring in the oil field boilers will be investigated to reduce the cost of steam generation.

Contact: **Bruce Milne**
University of Calgary
Phone: (403) 220-7447
Fax: (403) 284-4852
E-mail: milne@ucalgary.ca

### Intermetallic-Based Alloy-Coatings on Steel Structures used in Oxidation, Sulphidization and Carburization Environments

Explore the application of intermetallic based alloy coatings to replace high alloy and specialty steels in the oil and gas industry.

Contact: **Weixing Chen**
University of Alberta
Phone: (780) 492-7706
Fax: (780) 492-2881
E-mail: weixing.chen@ualberta.ca

## HEAVY OIL

### Asphaltene Deposition

The detection of organic deposition using in situ techniques such as x-ray tomography will be tested. The mechanism of asphaltene deposition will be investigated.

Contact: **Harvey Yarranton**
University of Calgary
Phone: (403) 220-6529
Fax: (403) 282-3945
E-mail: hyarrant@ucalgary.ca

### Characterization of Conventional Oil & Gas, Heavy Oil and Bitumen Formations Using Low Field NMR Spectroscopy

Low field nuclear magnetic resonance (NMR) spectroscopy for the characterization of heavy oil and bitumen formations will be studied.

Contact: **Apostolos Kantzas**
Phone: (403) 220-8907
Fax: (403) 220-5060
E-mail: akantzas@ucalgary.ca

# 2001 CALL FOR APPLICATIONS

## NEW PROJECTS

### OIL SANDS MINING

#### At Face Slurrying: Advancing Innovative Technology for Oil Sands Production

Develop new technology and advance knowledge for economic extraction and slurrification of oil sands at the mining face.

Contact: **Samuel Frimpong**
University of Alberta
Phone: (780) 492-4053
Fax: (780) 492-0249
E-mail: sam.frimpong@ualberta.ca

#### Development of a New Management System to Improve the Equipment Utilization Rate in Mining Operations

Develop a mobile equipment management system for oil sands mining to improve equipment utilization.

Contact: **Yang Gao**
University of Calgary
Phone: (403) 220-6174
Fax: (403) 284-1980
E-mail: gao@ensu.ucalgary.ca

### TAILINGS PONDS

#### Geotechnical Behaviour of Oil Sands Thickened Tailings

Investigate the geotechnical and geochemical physics of thickened tails and its behaviour over time.

Contact: **Richard Chalaturnyk**
University of Alberta
Phone: (780) 492-9992
Fax: (780) 492-8198
E-mail: rjchalaturnyk@civil.ualberta.ca

#### Impact of Residual Bitumen Removal Methods on the Separation of Heavy Minerals in the Oil Sands Tailings

Investigate the effects of residual bitumen removal methods to produce heavy minerals from the oil sands tailings.

Contact: **Qi Liu**
University of Alberta
Phone: (780) 492-8628
Fax: (780) 492-2881
E-mail: qi.liu@ualberta.ca

## INTER-UNIVERSITY COLLABORATION

COURSE encourages appropriate inter-university and faculty collaboration to form teams for research excellence. To date, 65% of the projects have such collaboration, half of which are inter-faculty.

## COURSE-CIM COOPERATION

A full afternoon was devoted exclusively to invited papers by COURSE researchers at the June CIM conference in Calgary. The concept was very well received and is being planned for the 2001 CIM conference.

## SIMPLIFIED APPLICATIONS

The COURSE Application Evaluation panel, the researchers and ASRA provided input to simplify and standardize the COURSE funding application. Material not considered to be "core" information for the evaluation panel has been eliminated. Fill in the blank budget tables are being computerized and the application is being mounted on the PTAC web site at www.ptac.org.

## EVALUATION PANEL

The evaluation panel will have a minimum of 12 voting members and the director of COURSE as the non-voting Chair. Six members will be appointed independently by the universities. Six industry members will be selected by the industry representatives on the COURSE Leadership Board. The names of the panel members will not be announced until after the formal announcement of the competition results. Non-voting personnel from AERI and ASRA may attend the evaluation panel meeting(s) as observers.

## CALL FOR $3 MILLION FUNDING APPLICATIONS

**DEADLINE: Monday, January 29, 2001**

The intended funding for the January 29, 2001 competition is $3,000,000 for projects conducted for a maximum duration of three years from 2001-2004. The level of funding is subject to approval of the AERI and ASRA business plans and Alberta government budget for those fiscal years. Actual levels of funding will be dependent on the quality and number of applications received. Applications are invited from and limited to all Alberta universities.

- Percentage of project cost may vary from a minor share up to 100% of individual projects costs.
- There is no limitation on the number of funding participants or the total cost of a project which may receive funding, subject to the guidelines and funding availability noted above.

Application forms are available through the COURSE offices at the universities of Alberta and Calgary, the COURSE administrative network representative in each department and the PTAC website at www.ptac.org. See COURSE contacts on the back page for more information.

## APPLICATION SELECTION CRITERIA

| FACTORS | POINTS* |
|---|---|
| **A. Importance to Alberta Energy Resources** | ____/20 |
| 1. Significant Impact | |
| 2. Strategic Importance to Alberta Energy Resources | |
| 3. Environmental/Sustainable Performance | |
| 4. Basis for New Industry Potential | |
| 5. Quality of Life Improvement | |
| **B. Importance to Industry** | ____/20 |
| 1. Commercial Viability | |
| 2. Fundamental Support to Commercialize Important Technology | |
| 3. Significant Potential Economic Benefit | |
| 4. Improvement over Alternatives | |
| 5. Potential for Success | |
| **C. Collaboration and Technology Transfer** | ____/20 |
| 1. Collaborative Approach (other universities/departments) | |
| 2. Industry Support/Interest | |
| 3. Significant Technology Advance | |
| 4. Technology Transfer Plan | |
| 5. Training and Skills Development | |
| 6. Leverage of Research Funding | |
| **D. Importance to University** | ____/40 |
| 1. Technical Quality of Application | |
| 2. Fundamental Science and Information Generation | |
| 3. Experience/Capability of Researchers | |
| 4. Achievable Plan and Budget | |
| 5. New Researcher Beginning | |
| **E. Total Points** (sum of A, B, C & D) | ____/100 |

* Rating of 100 points is perfect ranging down to 0 for totally unacceptable.

## COURSE RESEARCHERS IN THE NEWS

Congratulations to Murray Gray of the University of Alberta for stimulating a five-year $3.5 million chair for upgrading bitumen sponsored by Syncrude, NSERC and the University of Alberta.

Kudos to Greg Taylor of the University of Alberta on receiving the prestigious Killam Professorship award.

## COMPUTERIZED AGREEMENTS

COURSE has computerized the funding agreements for university research to simplify and accelerate the process while making it less stressful for all involved. A "fill-in-blank" agreement template in an e-mail format was developed to meet the legal and accounting requirements of the University, Alberta Innovation and Science and the Auditor General. The researcher fills in the information on the researcher's computer and the COURSE administrative assistant at either of the University of Alberta or Calgary checks it for completeness. It is then e-mailed simultaneously to the legal and administrative personnel. The bulk of the 20 agreements for the January 2000 competition were moved to the execution stage without "recycle".

## STUDENTS AND RESEARCH

The training and development of skilled personnel through the research project activity is important. Projects may be staffed, in order of preference, by graduate students, post doctoral fellows, research assistants and technicians. A new Principal Researcher is given preference to the extent of "points" in the evaluation criteria.

Fundamental research and breakthrough projects are of more interest than incremental aspects of mature technology or ongoing programs. Fundamental research is defined as the stage between basic and applied research.

## LETTER TO THE EDITOR

Significant progress has been made in the project for a new anti-wear coating system employing pseudoelastic TiNi alloy. Additional industry participation will be welcomed. We are grateful for the strong support from the COURSE program to realize this research and development of original knowledge.

Dongyang Li, University of Alberta
Phone (780) 492-6750

Editor's Comment:
Contact any COURSE researcher to discuss project access/participation.

## THANK YOU MEMBERS

In the first COURSE newsletter of November 1999, fee-free membership in COURSE was invited. As shown in the listing of Members on the front page, the response of companies, research organizations, industry associations, government organizations (provincial and federal) and universities was wonderful.

The benefits of membership are:

1. **Promote energy research priorities**
   - Leadership Board
   - Application Evaluation Panel
   - Special Task Forces
2. **Competitive advantage**
   - Awareness of energy research projects
   - Identifying top researchers in the field.

The Membership/Newsletter Fax Back below can be used to apply for membership and/or to receive this "ON COURSE" newsletter.

## MEMBERSHIP/NEWSLETTER FAX BACK

Please fax back this page to (780) 492-2581 to receive your fee-free membership information package. New members will be featured in the next newsletter.

Name

Company

Address

Fax Phone

Email Address

Select one category under which to list, or change the listing for your organization in the newsletter.

____ Producing Company
____ Service Company
____ Research Organization
____ Industry Association
____ Government Organization
____ University

**ON COURSE Newsletter** is published by COURSE – Coordination of University Research for Synergy and Effectiveness – to increase communication between industry, government and university research providers for energy resources.

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