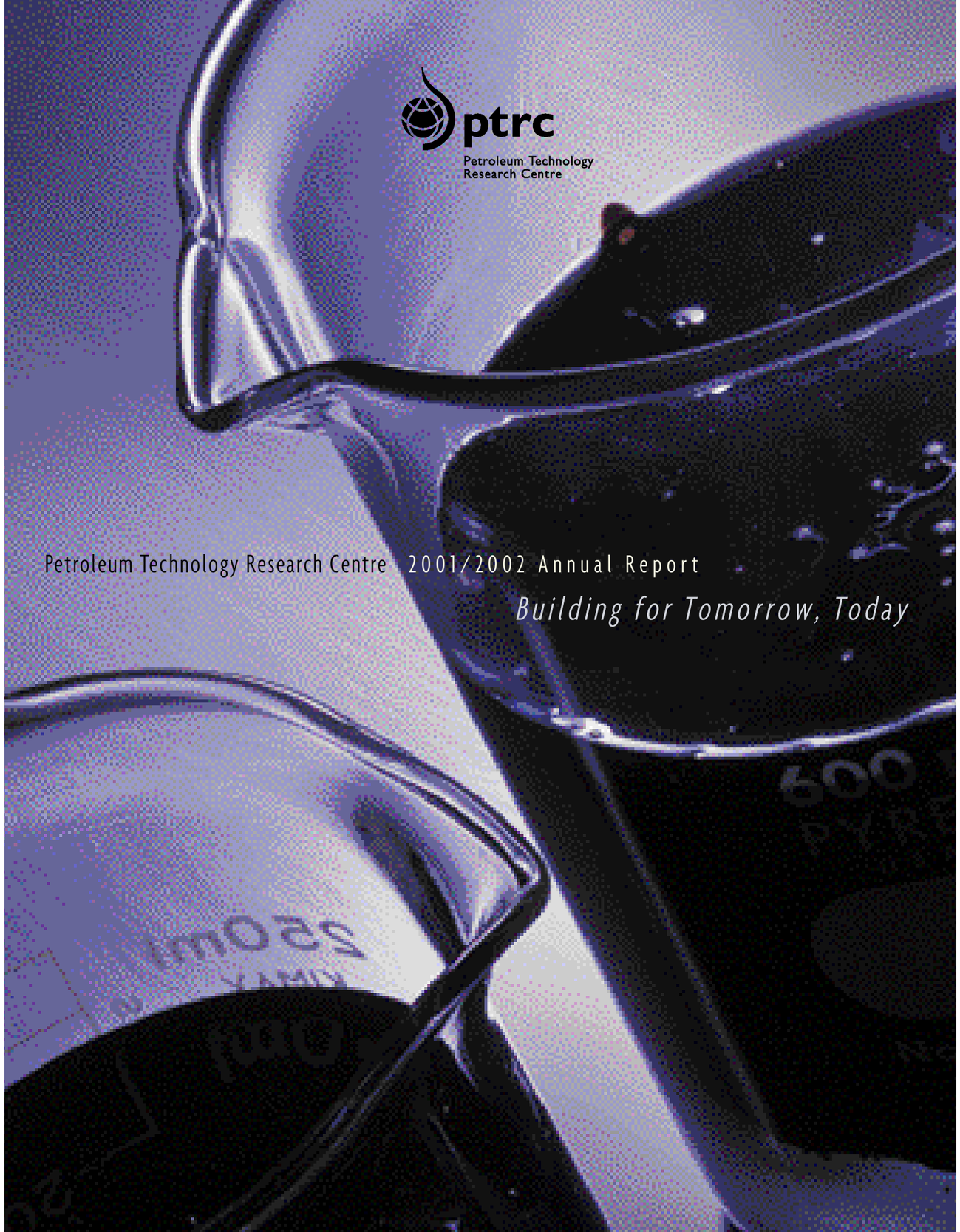
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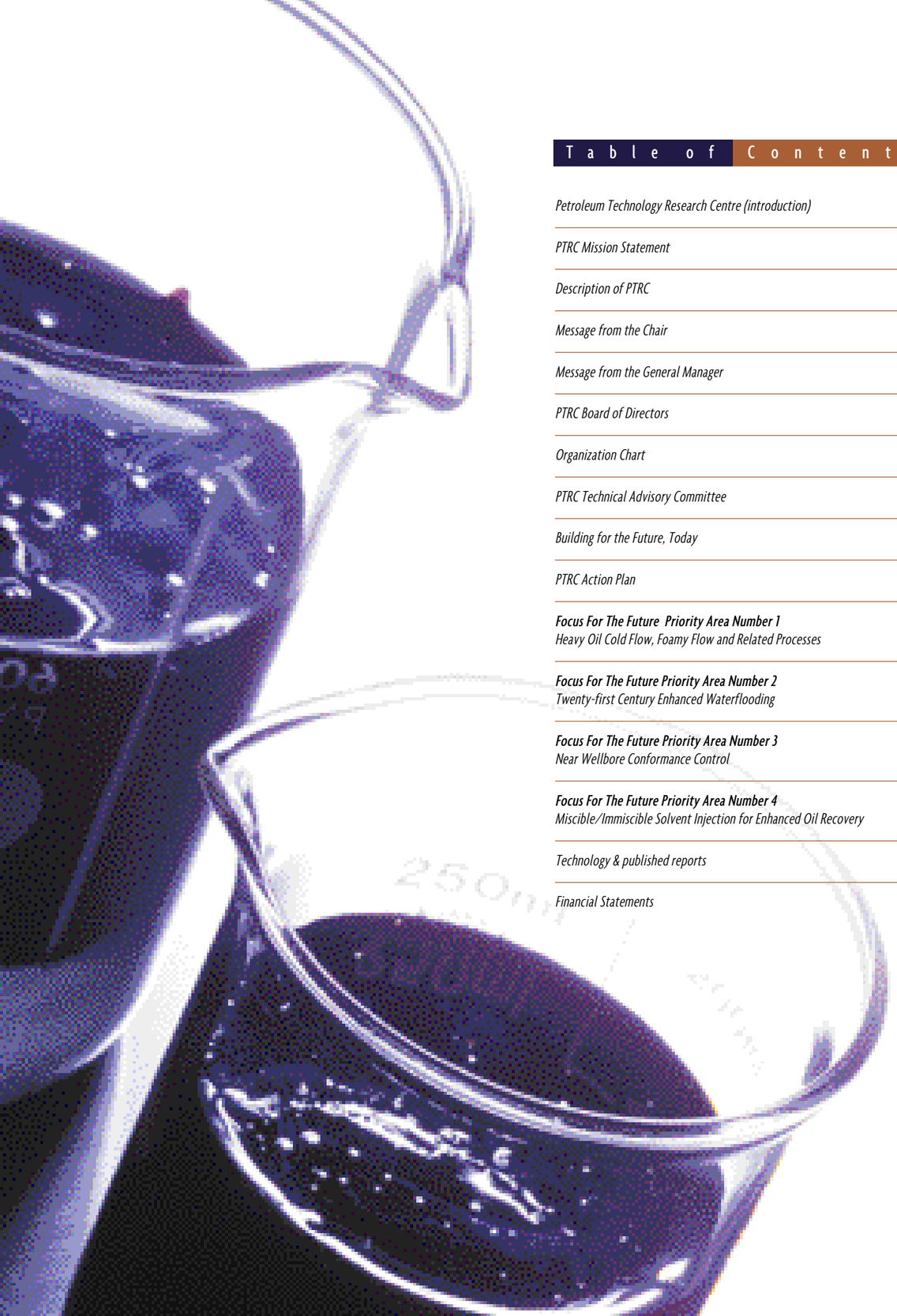
Petroleum Technology
Research Centre
Petroleum Technology Research Centre 2001/2002 Annual Report
Building for Tomorrow, Today



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Petroleum Technology Research Centre

PTRC is an internationally recognized innovative leader in the petroleum research and development area that delivers world-class quality basic and applied research for the benefits of the people of Saskatchewan, Canada and our customers.

PTRC Mission Statement

The PTRC will initiate and support research and development projects aimed at enhancing the production and recovery of Canadian petroleum resources by drawing primarily but not exclusively upon the expertise of the Petroleum Branch of the SRC and the Engineering Faculty of the University of Regina.

In addition, the PTRC will ensure that the findings of the work it supports are applied by the petroleum industry. The avenues for this effective application of results will include very close collaboration with the industry participants, presentation of technical papers, and the organization of technical conferences.

Description of PTRC

The PTRC is a non-profit petroleum research and development corporation located in Regina, Saskatchewan. The PTRC brings a fresh approach to finding, developing and applying innovative technologies and engineering solutions for the petroleum sector.

The PTRC is a collaborative initiative of Natural Resources Canada (NRCan), Saskatchewan Energy and Mines (SEM), the University of Regina and the Saskatchewan Research Council (SRC). The PTRC has financial support from the federal and provincial governments to sponsor research and development projects initially for five years. The PTRC will attract support for its research projects from the petroleum industry to complement the support it receives from the two levels of government.

Message from the Chair

This was the year the Petroleum Technology Research Centre (PTRC) evolved from its incubation stage to focusing on its core competencies for the future.

We have a clear vision for the future. We are Building for Tomorrow, Today.

Our goal since inception in 1998 was to become an internationally recognized petroleum research institute in Saskatchewan. We have made significant progress during the past year to achieving that goal and have established a unique Focus For the Future to utilize our flexibility, size and core competencies.

To achieve our Focus For the Future objectives, the PTRC will continue to support and promote applied research conducted by the Saskatchewan Research Council (SRC). We will also support and promote the fundamental research being done at the University of Regina. It's important that the PTRC act as facilitator for these types of complementary research.

We will also continue to develop unique collaborative research projects such as the Weyburn CO_2 Monitoring and Storage Project. This international research initiative has piqued international attention and financial support from Governments and industry from Europe, US and Canada. In addition, our Vapex III project that involved financial support and involvement by nine industry participants, proved so successful that a Vapex IV is planned to continue studying the use of hydrocarbon solvents for heavy oil enhanced recovery.

Our Focus for the Future involves these core areas of competency:

1. Heavy Oil Cold Flow, Foamy Flow and Related Processes
2. Enhanced Waterflooding
3. Near Wellbore Conformance Processes
4. Miscible/Immiscible flooding

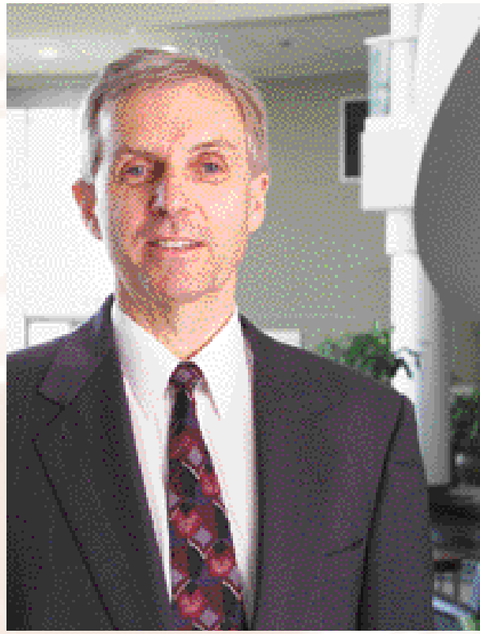
PTRC will work to be recognized nationally, and internationally, in these four core areas. We believe the PTRC will become recognized as the group that industry will approach first when faced with problems within the PTRC core areas of expertise.

We've emerged from this year with a clear focus and a better understanding that the work of the PTRC is Building For Tomorrow, Today for the petroleum industry.

Finally, I wish to thank our Board of Directors, Roland Moberg, the General Manager of the PTRC and our founding partners for their continued support.

Frank Proto
Chairman

Message from the General Manager



Now, more than ever, the Petroleum Technology Research Centre (PTRC) has a clear understanding of our strengths and weaknesses, where we have been, where we are going and how we are going to achieve our vision.

We not only have a plan for the future, but more importantly we have the building blocks in place to get there.

The last few years have been a critical learning phase. Now, we will focus on areas that are important to our future. We are entering an expansion phase in terms of getting the people and equipment capacity into place while working with our partners, the Saskatchewan Research Council and the University of Regina.

During the past year, the PTRC has continued to work with industry, governments and research organizations on collaborative projects. We have 34 "innovation" projects and nine "incubation" projects underway.

The reception PTRC received from industry during business meetings in Calgary and industry conferences in Europe and North America was overwhelmingly positive. There is a genuine dedication and interest among many of the companies that we visited to see PTRC succeed.

Some conclusions I have reached about how the PTRC is viewed by industry:

- There is a strong interest in cheap and fast field demonstration projects. PTRC will develop the necessary capability to fully support these field tests.
- PTRC has lots of potential that needs to be fully realized over the next few years.
- There is a high degree of industry interest in providing exchange opportunities for personnel affiliated with PTRC.
- There is a high degree of support and enthusiasm for the University of Regina students graduating from the Petroleum Systems Engineering Program.
- We need to empower the PTRC's Technical Advisory Committee to provide stronger industry guidance as well as involving more companies.
- Data analyses/interpretation/use of Artificial Intelligence is a broad opportunity area.

PTRC has developed an extensive set of performance indicators for the next five years and will monitor and report on its performance against those success metrics in the future.

Now, more than ever, the PTRC is Building For Tomorrow, Today.

Roland Moberg
General Manager

PTRC Board of Directors

Board of Directors from left to right:

Mike Langley – Ensyn Energy Corp.

Laurier Schramm, President – Saskatchewan Research Council

Frank Proto, Chairman – Petroleum Technology Research Centre

Carl Henneberg, President – Blacksmith Resources

Mike Monea, President – Flatland Exploration Ltd.

Nigel Howard, President – Saskatchewan Opportunities Corp.

Ric Cameron, Assistant Deputy Minister – Natural Resources Canada

Missing from photo

Roger Thomas, President – Nexen Canada Ltd.

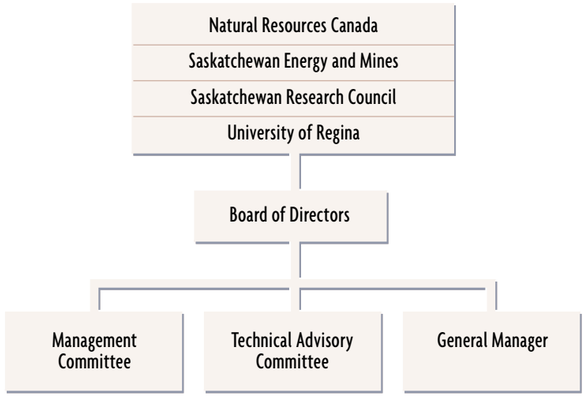
Dee Parkinson-Marcoux, President – Ensyn Energy Corp.

John Zahary, President – Petrovera Resources Ltd.

David Barnard, President – University of Regina

Bob Mitchell, Vice-President – Talisman Energy Inc.

Organization Chart



PTRC Technical Advisory Committee

PTRC Technical Advisory Committee, from left to right:

Dan McFadyen, Saskatchewan Energy and Mines

Brian Kybett, University of Regina

Ken Brown, PanCanadian Petroleum

Bruce Stewart, Natural Resources Canada

Sam Edgerton, Nexan Canada Ltd.

Garth Simmons, Saskatchewan Energy and Mines

Roland Moberg, Petroleum Technology Research Centre

Rob Morgan, Petrovera Resources

Brian Kristoff, Saskatchewan Research Council

Lorne Cannon, Husky Oil

Howard Loseth, Saskatchewan Energy and Mines

Laurier Schramm, Saskatchewan Research Council

Missing from photo

Bill Brown, Passage Energy

Rich Kerr, Wascana Energy

Gordon Moore, University of Calgary

Malcolm Wilson, University of Regina

Finding new, economical and efficient ways to produce hundreds of millions of barrels of crude oil remaining beneath the ground following primary oil production will have a dramatic impact on the economy.

For the past four years, the Petroleum Technology Research Centre (PTRC) has been building relationships with the industry and research scientists at the University of Regina and the Saskatchewan Research Council to begin solving those problems.

The PTRC is Building For Tomorrow, Today.

Why? More than 8,300 people work in the Saskatchewan oil and gas industry, making it the largest single industrial employer in the province. During the ten-year period from 1991 to 2000, annual net revenues for the province from taxes and oil royalties grew to $700 million from $168 million.

So, benefits from growing this key sector of the provincial economy would be huge for taxpayers, the province and oil companies as well.

The challenge for the PTRC is not to help industry find more oil reservoirs, but rather solve problems associated with getting more oil out of the ground. It is estimated that over 85 per cent of the oil fields in the province have already been discovered. Having been under production for decades, most of Saskatchewan's oil reservoirs are now in a mature state of declining production. The average primary oil recovery from Saskatchewan reservoirs is in the range of 10 to 15 per cent of the Original Oil In Place (OOIP). This indicates that the majority of the resource will not be recoverable under the natural drive mechanisms present, so that means Enhanced Oil Recovery (EOR) techniques will produce the best results.

There are about 10,000 oil wells being abandoned, or suspended and being considered for abandonment in Saskatchewan. Heavy oil is the most promising and challenging area with an estimated 93 per cent of known reserves remaining following primary production methods.

Analysis of the ultimate oil recovery from natural drive mechanisms and waterflooding in Saskatchewan reservoirs shows that at $20 (U.S.) per barrel over $60 billion (U.S.) potential will be left underground. So, if just five percent of those reserves were recovered through new, innovative EOR techniques, that is more than $3 billion (U.S.) in economic activity within Saskatchewan.

The PTRC is striving to earn a reputation in the oil patch of having a customer-focused research team that is flexible to meet a variety of challenges.

"I recommend PTRC for research projects because they are a smaller more responsive group that provide, very practical approaches to problems, have very dedicated individuals doing the research and always attempt to provide the most comprehensive solution possible," said heavy oil consultant Bill Brown.

"In addition, the geographical location of the PTRC (in Regina) provides a unique positive benefit. PTRC staff has a different perspective on problems and are isolated from the distractions of the daily chaos in the oil industry in Alberta. PTRC also has the major advantage of full integration between industry, industry researchers and university-based researchers. This is a unique relationship that I have not seen function either at this scale or full range of services in any other research organization in the oil industry."

Bernard Chung, Manager of Reservoir Engineering, the Heavy Oil Business Unit of Nexen, was part of a key PTRC project during the year involving nine participants known as Vapex III.

Vapex — or the Vapour Solvent Extraction of Heavy Oil — is a promising EOR process for heavy oil. It is similar to Steam Assisted Gravity Drainage (SAGD) or other thermal recovery processes, but instead of steam a vapour solvent is used to reduce the viscosity of the heavy oil and at the same time extract the heavy oil from the reservoir.

"The benefits to the industry, governments, and the Saskatchewan economy from this new technology could be significant incremental heavy oil production and reserves," Chung said.

"The SAGD technology was instrumental in the commercial development of Athabasca bitumen. The Vapex technology could have a similar commercial impact for the enhanced oil recovery of heavy oil in Saskatchewan and Alberta. Consequently, Vapex could recover a significant amount of the heavy oil being left behind in the reservoir after primary production."

Chung believes the next step in Vapex research is field testing and piloting to prove the technology and its viability in the marketplace.

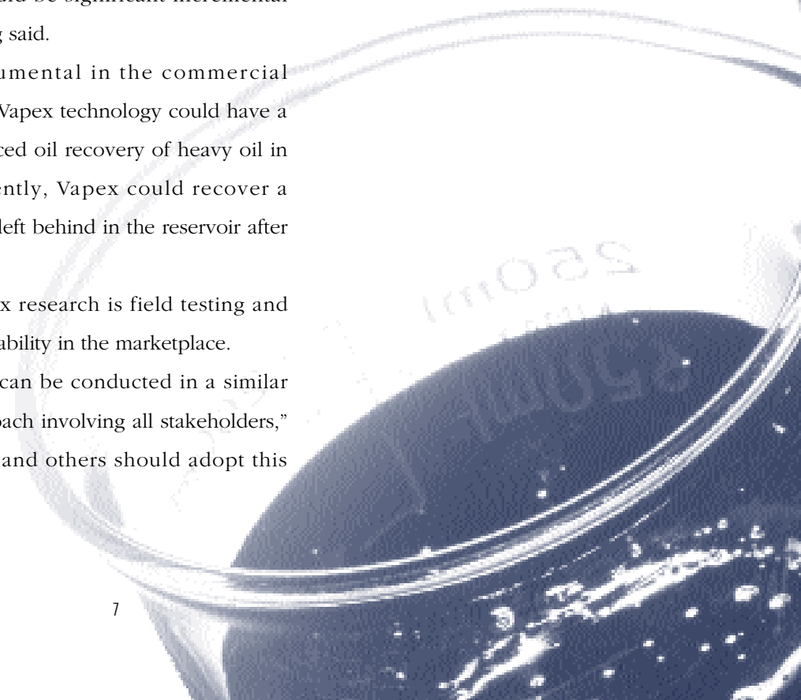
"It would be great if these field tests can be conducted in a similar collaborative, effective and efficient approach involving all stakeholders," Chung said. "PTRC, industry members and others should adopt this approach for the field tests."

PTRC Action Plan

The PTRC action plan for the next five years builds on the success of the past with a Focus For The Future on four areas of competency:

1. Heavy Oil Cold Flow, Foamy Flow and Related Processes
2. Enhanced Waterflooding
3. Near Wellbore Conformance Processes
4. Miscible/Immiscible Flooding

PTRC will become the first choice for industry when faced with problems in these key areas of EOR as the PTRC continues Building For Tomorrow, Today.



Heavy Oil Cold Flow, Foamy Flow and Related Processes

Making Saskatchewan Heavy Oil More Productive

Improving the recovery from heavy oil reservoirs under cold and foamy flow is one of the four core areas of competency the Petroleum Technology Research Centre will have in the future.

"The potential benefit is huge," said PTRC focus area team leader Harald Liebe, the senior research engineer in the Horizontal Wells/Thermal Enhanced Oil Recovery Group with the Saskatchewan Research Council.

"Average oil remaining in place from one of these heavy oil reservoirs is 93 per cent of the initial oil in place. Industry trusts us in this type of applied fieldwork."

The area of focus for his research team has been likened to Alberta's Tar Sands in terms of economic impact and size.

"We will reverse engineer a solution by taking all field data into account and applying the basic research findings of others to understand the problem," Liebe said. "Based on this understanding, we will determine what enhanced oil recovery methods will be best suited for a producer's particular application through work in our labs and computer simulations before actively working with producers in the field to implement the solution."

The phenomenon of achieving heavy oil production from vertical wells in unconsolidated sands, without heating, and while allowing sand production, has been termed cold flow production. The technique consists of drilling a vertical well, installing a progressive cavity pump and applying high draw down with the pump to achieve production.

In fact, the arrival of reliable progressive cavity pumps in the early to mid 1980s was the single greatest factor for increased heavy oil

"Average oil remaining in place from one of these heavy oil reservoirs is 93 per cent of the original oil in place."

93 per cent of the original oil in place

Opposite page: *SRC engineers and technologists have extensive experience in scaled physical modeling.*

"While many researchers have investigated many aspects of heavy oil cold flow production, it is our intent to ***assemble all of these bits of information into one useful tool*** *for the operator."*

production from Saskatchewan and Alberta reservoirs.

The term foamy oil flow is used to describe the flow of heavy oil containing a large volume fraction of very small gas bubbles.

"Our intent is to provide the key to unlocking a reasonable portion of the resource potential presently left behind in cold-flow produced reservoirs. Presently, only about 7 per cent of this resource is recovered," he said. "We'd like to see that increase three or four fold in the range of 21 to 28 per cent."

Industry, the provincial economy and taxpayers would benefit from improvements in heavy oil cold and foamy flow processes.

"Industry has a good idea of how much oil is left in the ground and where it is after cold flow production has taken place," he said. "It provides increased shareholder value by implementing technologies to produce oil that would have otherwise been left behind."

Saskatchewan's economy would benefit by increasing the probability of continued oil production that would generate more oil royalties as well as maintaining or even creating more jobs in the oil patch.

Canada's economy would benefit from the increased energy independence and the possibility of technology exports.

"Taxpayers are the big winner when there's someone else to shoulder the tax burden," the veteran research scientist said.

Work must proceed quickly.

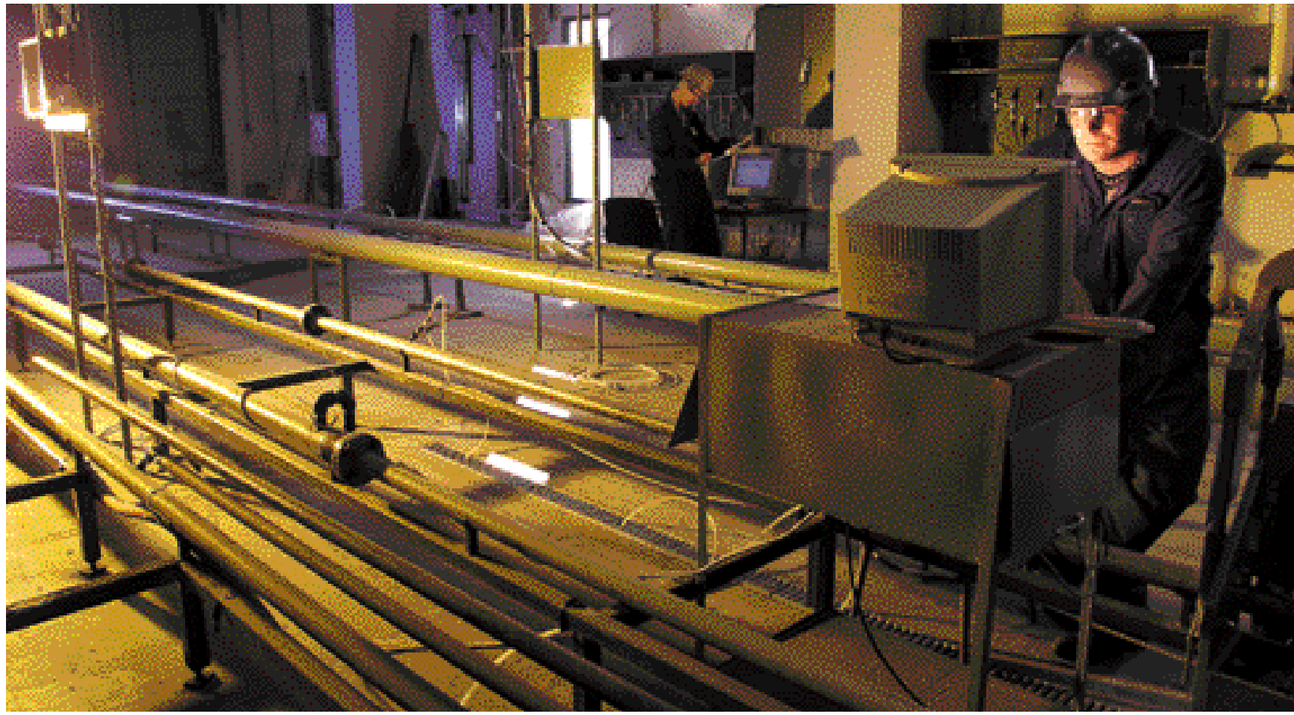
"Oil wells used for production from this type of reservoir are disappearing at a large rate. Progress must, therefore, be fast," he said. "We intend to learn as much as we possibly can in the first year of the project about one or two given reservoirs to launch "smart" production techniques in the second year of the project. By definition, this would be a tangible project in the oil patch."

The goal of "smart" production is to extend the life of wells without major technology intervention. In Year 3, the concept will be brought to new fields while moving into low level enhanced oil recovery techniques in the original fields. This is where field impact will really start."

A recent report commissioned by the PTRC concludes about 6 billion stock tank barrels are under cold flow production in Saskatchewan. It also estimates that only about seven per cent of this amount is recoverable from these reservoirs.

"With few new reservoir discoveries, these figures suggest ample incentive for a focused research approach in the area of post cold flow production," Liebe said. "While many researchers have investigated many aspects of cold flow production, it is our intent to assemble all of these bits of information into one useful tool for the operator."

The ultimate goal for this PTRC focus area is to see production enhancements piloted in the field with ample data collection to learn how to improve the suggested processes. ◆



Below: *SRC has a comprehensive research support system available for the petroleum industry including pipe flow and slurry research.*

Focus For The Future | Priority Area Number 2

Twenty-first Century Enhanced Waterflooding

Water and Heavy Oil Do Mix!

Finding a more effective way to use water in heavy oil production is a core competency the Petroleum Technology Research Centre will focus on in the future.

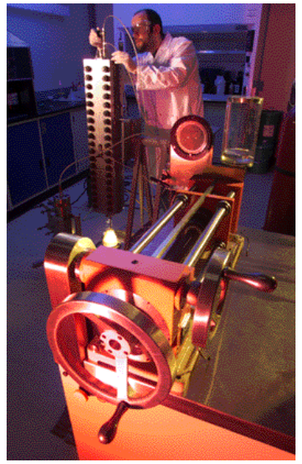
"Everyone knows that oil and gas play a major role in the Saskatchewan economy," explained focus area team leader Muhammad Ayub, Petroleum Professor in the Faculty of Engineering at the University of Regina.

"However, most oil reserves in the province are very viscous and usually are produced by thermal methods. The cost of supplying thermal energy, which is mainly steam, to heavy oil reservoirs is high. By developing and implementing more advanced waterflooding procedures, the province can gain additional revenues."

"By developing and implementing more advanced waterflooding procedures, the province can gain additional revenues."

There are now more than 200 active waterflood projects in Saskatchewan. Most of these active projects are mature. The most important and challenging goal for the PTRC focus area is to develop new techniques to improve oil recovery from such existing waterflood projects. In the province many water flood projects are still economical even after reaching very high water production levels in the range of 90 per cent and more.

The university petroleum professor explained that primary methods of oil recovering using natural producing mechanisms, such as liquid expansion and solution gas drive, leave behind 80 per cent or more of the original oil in place.



Left and opposite page: *Mr. Khalid Alkaddifi works on a high pressure one-dimensional flow system. This set up allows researchers to study the effect of horizontal wells on waterflooding and oil production.*

"optimizing its performance and extending its applications to heavy oil reservoirs are important research areas, which have received less attention."

As a result, an enormous amount of oil remains unrecovered not only in Canada but elsewhere in the world, he said.

"On a worldwide basis, waterflooding currently is accepted as one of the most reliable and economical oil recovery techniques," Muhammad said. "Almost every significant oil field that does not have a natural water drive has been, is being or will be considered for waterflooding."

Waterflooding is the most common of oil recovery methods in Saskatchewan. It is a proven technology, which is reliable, low-risk and often economically successful even at low recovery levels.

"Most of the knowledge gaps have been solved since the 1960s," Muhammad said. "However, optimizing its performance and extending its applications to heavy oil reservoirs are important research areas, which have received less attention."

Successful and economically viable enhanced waterflooding techniques implemented in Saskatchewan can also be used in Alberta and elsewhere in Canada. This would help the national economy not only from increased oil revenues but also creating new job opportunities.

Waterflooding started as an oil patch production technique by accident.

Water escaped from abandoned wells into producing wells in a Pennsylvania field in 1880. The operators realized that the subsequent oil recovery was significantly larger than from their primary production.

The number of waterflood operations expanded rapidly during the 1920s to 1960s in the United States and around the world. Saskatchewan too has many active waterflood projects, which are playing a significant role in improving oil recovery.

Priority work for the enhanced waterflood focus area team is projects that may impact the province's economy significantly in a shorter period of time. To accomplish this PTRC will initiate joint ventures with other well-respected research organizations and universities. ◆

Opposite page: *SRC Technologist Larry Kurucz monitors heavy oil production in an enhanced waterflood experiment .*

Near Wellbore Conformance Control

Rejuvenating Thousands of Saskatchewan Oil Wells

About 10,000 Saskatchewan oil wells may get a second chance on life and continue to produce rather than be abandoned as a result of a work to be conducted by the Petroleum Technology Research Centre on developing methods for near wellbore conformance control.

Most of Saskatchewan's oil and gas is produced from mature fields in the Western Canadian Sedimentary Basin.

"In many cases oil wells are facing conformance problems caused by excessive water production or wax and asphaltene precipitation," said PTRC team leader Koorosh Asghari, an assistant professor of Petroleum Systems Engineering at the University of Regina.

"The oil production is low as a result of these problems and cannot be economically sustained. This has led to nearly 10,000 wells being either suspended, abandoned or on the verge of abandonment."

"Enhanced oil recovery (EOR) methods, such as near wellbore conformance improvement techniques can help recover some of this potential," he said.

"Even if only five percent of these reserves are recovered due to the research proposed in this proposal, it will translate to over $3 billion (US) additional revenues. This simply is too big of a prize to be neglected."

That is the key reason that research on a spectrum of near wellbore conformance control methods that are most suitable and applicable to Saskatchewan oil fields will be one of the core focus areas for PTRC in the future.

Conformance control is any action taken to improve the injection or production profile of a well. It includes procedures that enhance recovery efficiency, improve wellbore casing integrity and satisfy environmental regulations. Many factors are responsible for near wellbore conformance

"This has led to nearly 10,000 wells being either suspended, abandoned or on the verge of abandonment."

"Even if only 5 per cent of these reserves are recovered due to the research, it will translate to over $3 billion (US) additional revenues."

over $3 billion (US) in additional revenues

Opposite page: *Mr. Loran Taabbodi assembles a high pressure core holder that is used for conducting flow experiments at pressure and temperatures similar to real reservoir conditions. This set up would allow us to simulate reservoir conditions up to 10,000 psi pressure.*

problems in wells and so many treatments have been devised to solve those problems.

The work is divided into two parts.

Part One is to evaluate and modify some of the commercially available techniques to be implemented in Saskatchewan reservoirs. These methods are gel placement, selective permeability reduction and microbial treatment. This study is needed since the proper choice of any method and the success of the field tests depends on a detailed knowledge of the geology and other reservoir and fluid characteristics.

Part Two is innovative research to improve currently available techniques and develop new methods for near wellbore conformance control purposes in Saskatchewan reservoirs.

Novel research programs on developing state-of-the-art laser systems for near wellbore conformance control, targeted plugging processes and developing new polymers and chemicals are among the innovative areas of research proposed in this focus area.

"Our goal is to improve the conformance of water in the near wellbore area and to increase the overall oil recovered from the reservoir. These methods are generally referred to as conformance control," professor Ashgari said.

"The first and most difficult step is to determine exactly what is happening downhole so that the correct treatment can be used," he said. "A mistake here is usually as a result of insufficient information about the conditions downhole and can result in an ineffective treatment."

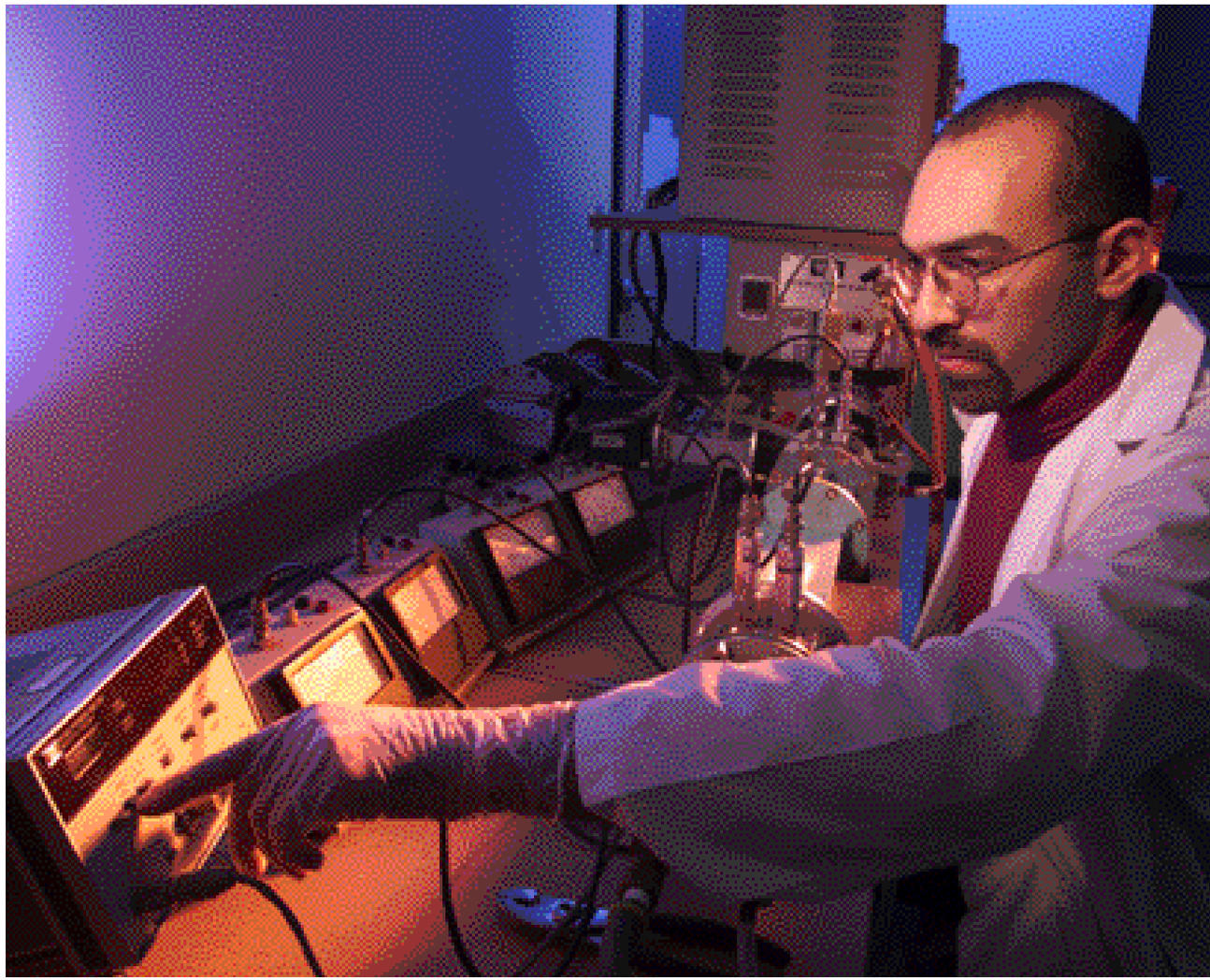
Another group of conformance problems is due to the precipitation of asphaltene and wax, clay swelling and particulate movement and blockage in the near wellbore area of the reservoir. These groups of problems have to be treated accordingly.

"Conducting research and field trials for improving near wellbore conformance control in Saskatchewan will not only generate more wealth for this province and the people residing here but also create knowledge and technology that would be extremely useful for and applicable to the oil and gas industry in other parts of Canada and the world."

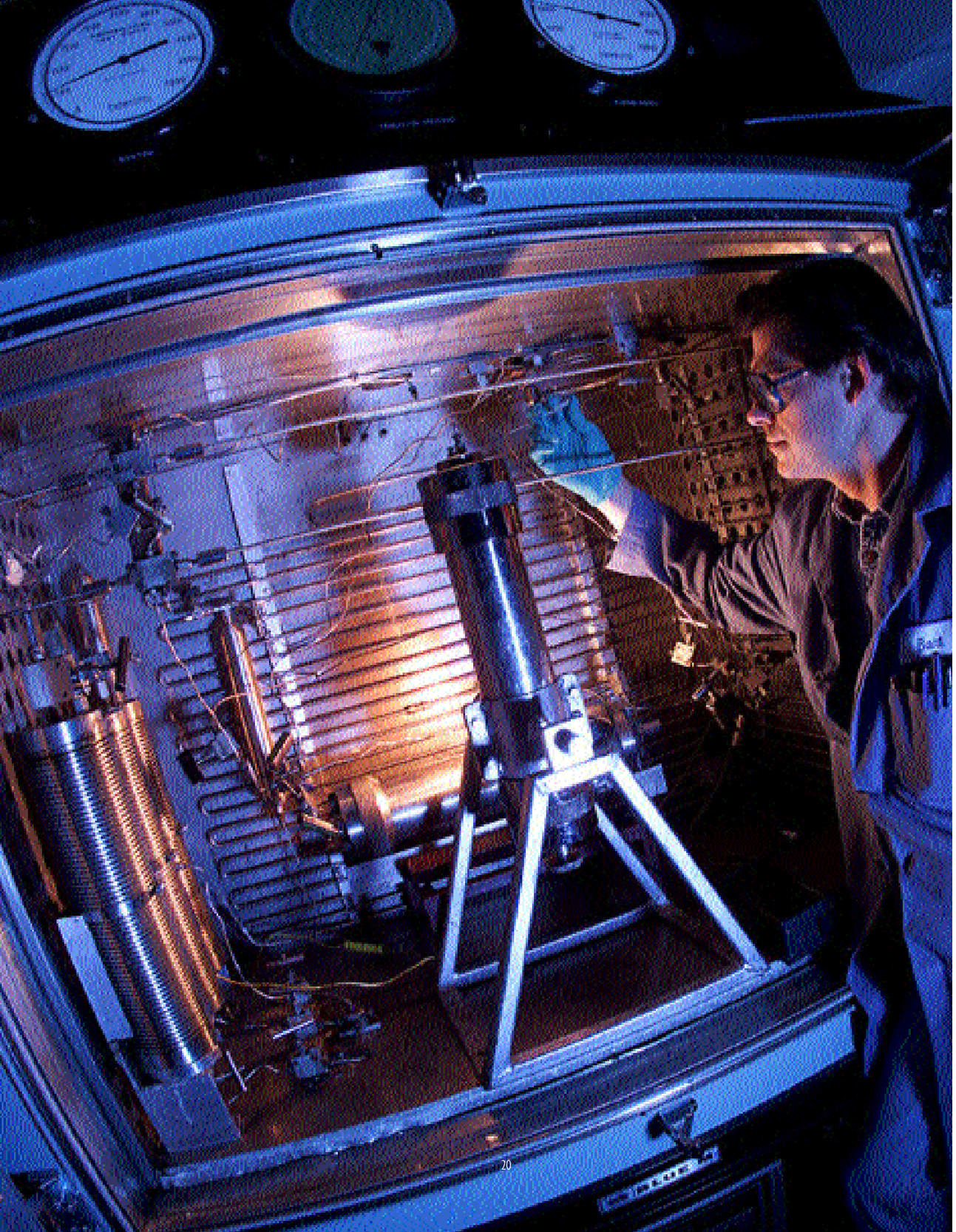
He said that over the past decade, there has been an accelerating recognition within the oil industry of the need for truly effective conformance control technologies and treatments. ◆

"Our goal is... to increase the overall oil recovered from the reservoir."

increase the overall oil recovered



Opposite page: *Mr. Mohammad Sheidaei works on a series of innovative techniques for preventing wax formation and precipitation at the near wellbore region by using electromagnetic energy.*



Focus For The Future Priority Area Number 4

Miscible/Immiscible Solvent Injection for Enhanced Oil Recovery

Flooding Oil Fields With Carbon Dioxide or Hydrocarbon Solvents

Injecting carbon dioxide or a hydrocarbon solvent into the oil reservoirs may be the key to unlocking production of hundreds of millions of barrels of light, medium and heavy oil remaining after fields have reached their economic limit through conventional drilling and water flood methods.

Both technologies are relatively new in Saskatchewan but are yielding positive results, said Sam Huang, Manager of gas/chemical EOR at the Saskatchewan Research Council. He is the team leader for the Petroleum Technology Research Centre's team studying miscible/immiscible solvent injection techniques for Enhanced Oil Recovery (EOR).

Carbon dioxide flooding is a proven oil field technology that has been successfully applied for more than 20 years in West Texas and New Mexico, where the gas is readily available and inexpensive.

As a result, CO_2 injection has become the leading EOR process in the United States, adding decades of life to reservoirs believed depleted and millions of barrels of oil to the world supply. In 2000, gas injection processes, which were mostly CO_2 floods, accounted for about 44 per cent or 328,000 bbl/d of the total U.S. EOR production.

Canada is different. The emphasis here is more on hydrocarbon injection with 29 miscible hydrocarbon projects and two miscible CO_2 projects being implemented.

"When CO_2 is pumped into the reservoir through an injection well, the gas contacts the oil and dissolves into it," Huang said. "The CO_2 acts as a solvent and makes the oil less viscous, allowing the oil to overcome the forces, which trap it in tiny rock pores and helping to sweep the immobile crude that's been left behind."

"With the Weyburn project, Saskatchewan is becoming Canada's leader in carbon dioxide enhanced oil recovery"

Opposite page: *SRC technologist Bart Schnell prepares the coreflood apparatus to evaluate oil recovery in a coreflood test.*

"the injection and subsequent storage of CO_2 into southeast Saskatchewan's oil reservoirs for the purpose of EOR could consume the CO_2 stack emissions from the Boundary Dam Power Plant for the next 50 years."

Ideal conditions for a CO_2 flood include a reservoir depth of at least 2,500 feet – to allow for the high pressures needed to ensure the miscibility of oil and CO_2 – and an oil gravity of at least 25 degree API.

Many of Saskatchewan's light and medium oil reservoirs fit the criteria perfectly for CO_2 injection.

For example, EnCana's holdings near Weyburn have an average reservoir depth of 4,655 feet and oil gravity range of 25 - 34 degrees API. This has led EnCana and its partners to embark upon an ambitious $1.1-billion, 25-year investment in CO_2 flooding that will recover an additional 120 million barrels of oil from the field.

"With the Weyburn project, Saskatchewan is becoming Canada's leader in carbon dioxide enhanced oil recovery," the research scientist said.

Injecting CO_2 into an oil reservoir can provide a win-win situation for Saskatchewan: adding years to the viability of reserves that believed to have been fully depleted and CO_2 storage. One of the objectives of the research project is to determine how much carbon dioxide is dissolved into the oil, how much is used as a "gas driver" and how much stays underground.

In signing the Kyoto Protocol, Canada has committed to reducing the greenhouse gas emissions to six per cent below the 1990 level by 2010.

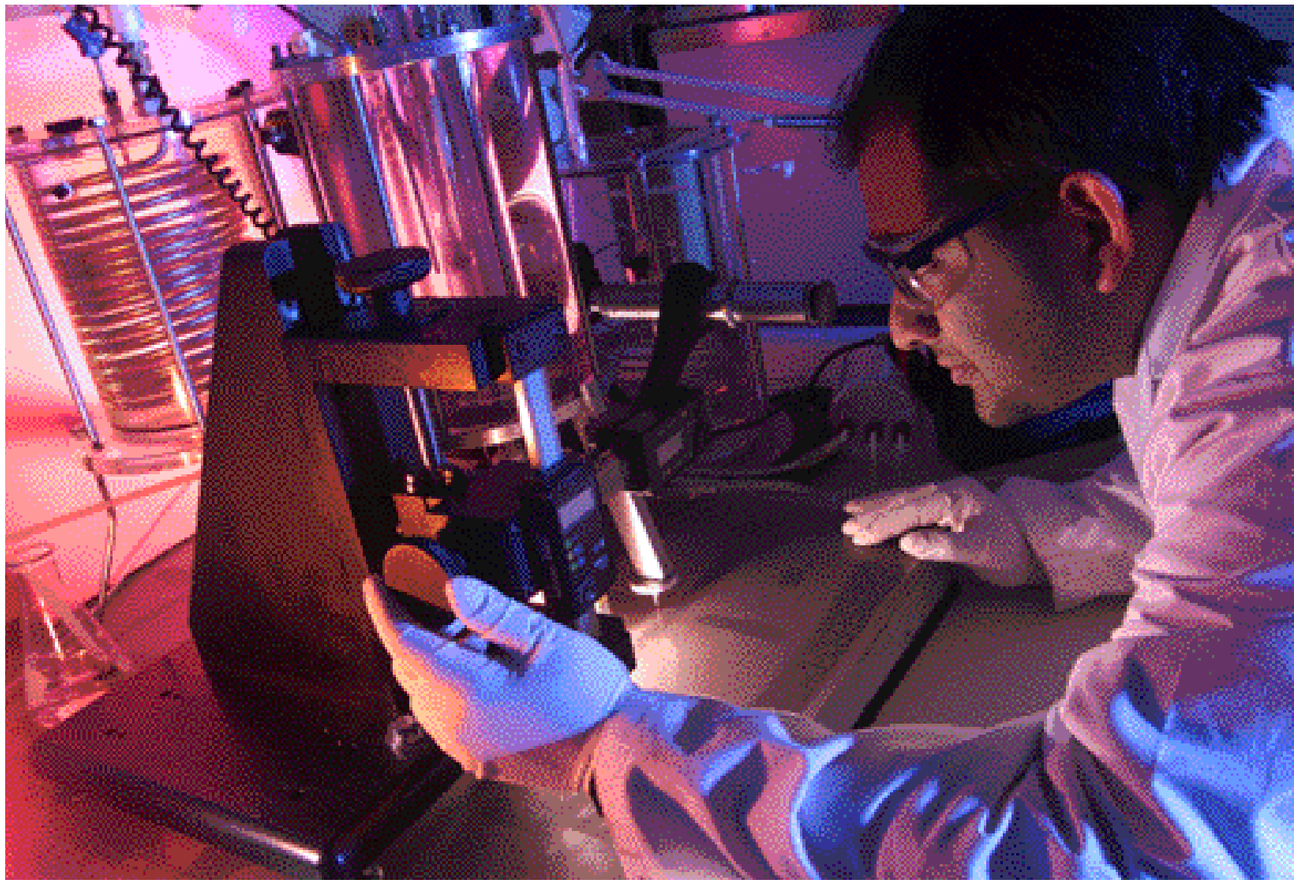
"Significant reduction of greenhouse gas emissions on a global scale can be achieved in part by capturing and storing CO_2 and other greenhouse gases," Huang said. "Research indicates that the injection and subsequent storage of CO_2 into southeast Saskatchewan's oil reservoirs for the purpose of EOR could consume the CO_2 stack emissions from the Boundary Dam Power Plant for the next 50 years."

Another landmark research project, Vapex Phase 3, involves the PTRC and nine industry participants.

This project involved a process using hydrocarbon solvents to extract bitumen or heavy oil from the reservoirs. In the Vapex process, gas or solvent is injected near the dew point so that the solvents can remain vaporized in the reservoirs. The diluted oil becomes less viscous along the boundary of the vapor chamber and drains by gravity downward to the production well.

Initial findings indicated the Vapex process is a promising method to increase heavy oil recovery.

As a result, Nexen Canada Ltd. plans to proceed to field pilot the Vapex process in a Saskatchewan heavy oil pool previously produced by primary recovery. Nexen will work with PTRC and invited industry to participate in the pilot test. ◆



Below: *Mr. Naveen Ramachandran works on the kinetics of carbon dioxide separation. Different solvents are used for this study and the goal is to find the best solvent and optimum concentration for removing carbon dioxide from a mixture of gases.*

Saskatchewan Research Council Projects

Vapex Engineering & Economics—Heavy Oil Recovery in Saskatchewan and Alberta, *(Project Leader: Dr. Norman Freitag; Status: ongoing)* This Phase III of the Vapex program is aimed at helping stimulate a field pilot in the second half of 2002. The $375,000 project has nine industrial clients and is also being funded by PTRC, Natural Resources Canada, and Alberta Energy Research Institute.

IEA Weyburn Monitoring Program—Monitoring and Laboratory PVT Studies and Coreflloods, *(Project Leader: Dr. Norman Freitag; Status: ongoing)* SRC staff conducted two tasks (total $115,000) to monitor any changes in the miscible behaviour of the Weyburn field as a result of CO2 injection.

Immiscible Gas Injection for Heavy and Medium Oil Recovery, *(Project Leader: Dr. Sam Huang; Status: completed)* This research is aimed at promoting rapid progress to an industry-operated immiscible gas field pilot in a heavy oil reservoir. This year's comprehensive $200,000 study included phase behaviour modeling, coreflood tests and numerical simulation.

Alkaline/Surfactant/Polymer Flood for Southwest Saskatchewan Medium Oil Reservoirs, *(Project Leader: Dr. Sam Huang; Status: completed)* This $225,000 project advanced previous SRC research in ASP flooding towards field-test readiness, while emphasizing the improvement of process economics.

Fine Solids in Oilfield Production and Refinery Operations: A Characterization Study, *(Project Leader: Doug Soveran; Status: completed)* Backed by three industry clients and the PTRC, this $100,000 project was a collaboration with CANMET (Devon, Alberta). Its aim was to characterize slop oil solids in order to match the characteristics of a production site with an appropriate solids separation scheme.

Effect of Gas in the Steam-Assisted Gravity Drainage Process, *(Project Leader: Harald Liebe; Status: completed)* This research examined the effect of gas co-injection on the efficiency of the SAGD process. It had a budget of $200,000.

Water Treatment Technology Options in Steam EOR Heavy Oil Production, *(Project Leader: Doug Soveran; Status: completed)* The findings of this $100,000 project will help producers develop adequate supplies of process water for steam EOR. The objectives were to determine the treating requirements for a combination of fresh water and recycle water, identify current treatment technologies for salt and hydrocarbon removal, and establish the treating costs for the treatment technologies.

Artificial Intelligence System Development for Oil–Water Separation Processes, *(Project Leader: Doug Soveran; Status: ongoing)* This purpose of this project is to design an artificial intelligence control system for treater control and implement a control system on a commercial treater. Significant funding was obtained from Precarn; further support is being provided by three industry clients and a treater manufacturer. The project team expects to have a commercial software product by the end of this project in March 2003.

SRC Petroleum Branch Publications

Flue Gas Injection for Heavy Oil Recovery, *Dong, M. and Huang, S.:* paper presented at the 9th Petroleum Conference of the South Saskatchewan Section, Petroleum Society of CIM, in conjunction with the 9th Williston Basin Horizontal Well Conference, held in Regina (April 29–May 1, 2001).

Oil Layer Flow in Noncircular Capillaries by Gravity Drainage, *Dong, M. and Chatzis, I.:* paper presented at the 9th Petroleum Conference of the South Saskatchewan Section, Petroleum Society of CIM, in conjunction with the 9th Williston Basin Horizontal Well Conference, held in Regina (April 29–May 1, 2001).

A Comparison of CO2 Minimum Miscibility Pressure Determination for Weyburn Crude Oil, *Dong, M., Huang, S., Dyer, S.B., and Mourits, F.M.:* Journal of Petroleum Science and Engineering, 31 (2001) 13–22.

Coreflood Studies of Tertiary CO2 Flood in Naturally Fractured Midale Formation in Southeast Saskatchewan, *Dong, M., Huang, S., and Srivastava, R.:* Journal of Canadian Petroleum Technology, 41, No. 2 (February 2002) 41–46.

Horizontal Well Technology – Research and Applications, *Kristoff, B.J., Gillies, R.G., Liebe, H.R., McKibben, M.J., and Shook, C.A.:* Phase Two Year Five Final Report, SRC Publication No. P-110-542-C-01 (2001).

Fine Solids in Oilfield Production and Refinery Operations: A Characterization Study, *Renouf, G., Munoz, V.A., Kasperski, K.L., Omotoso, O., and Mikula, R.J.:* SRC Publication No. P-110-554-C-01.

Baseline Study of Oil Recovery Parameters at Pre-CO2-Injection Conditions, *Zhang, P.Y., Freitag, N., and Huang, S.:* Weyburn CO2 Monitoring and Storage Study, SRC Publication No. P-110-557-C-02.

University of Regina Research Grants

Dr. M. Ayub received a NSERC grant in the amount of $74,084 for equipment set up for SAGD.

Dr. G. Huang received a grant for "Development of a mercury sampling system for its transport/fate analysis and environmental risk assessment" from Environment Canada in the amount of $12,000.

Dr. G. Huang received a grant for "Modeling of uncertainties and risks in petroleum waste management systems– an integrated simulation, optimization and risk-assessment approach" from NSERC in the amount of $26,000/year for 4 years.

Dr. G. Huang received a grant for "Remediation of subsurface contaminated by petroleum hydrocarbon" from SaskEnergy – TransGas in the amount of $7,000 in 2001 and $14,000 in 2002.

Dr. M. Ayub received a grant for "Cocurrent and countercurrent fluid in porous media." from NSERC in the amount of $26,400/year for four years.

Dr. M. Dong received a NSERC grant in the amount of $27,500/year for four years to study multi-phase flow in porous media.

Publications by NRCan Research Professors and by professors with PTRC Grants

Asghari, K., 2001. "Performance and properties of KUSP1-boric acid gel system for permeability modification purposes." Journal of Petroleum Science and Technology, accepted for publication.

Peng, Y., L. Chen, C., Chan, and K. Asghari. "Knowledge acquisition and ontology development for construction of an expert system from control and monitoring an oil production facility," presented at the 5th International Conference on Engineering Design & Automation, Las Vegas, 2001.

Ayub, M. and R. G. Bentsen. "An apparatus for simultaneous measurement of relative permeability and dynamic capillary pressure." Petroleum Science and Technology, in press.

Ayub, M. and R. G. Bentsen. "Experimental testing of the interfacial coupling parameter." Revue de l'Institut français du pétrole, accepted, November 2001.

Dullien, F. A. L. and M. Dong. 2002. "The importance of capillary forces in waterflooding – an examination of the Buckley-Frontal Displacement Theory." Journal of Porous Media, 5 (1), 1-15.

Dong, M., S. Huang, and R. Srivastava. 2001. "A laboratory study on near-miscible CO2 injection in Steelman Reservoir." Journal of Canadian Petroleum Technology, 41 (2), 53-61.

Dong, M. and I. Chatzis. 2001. "Oil layer flow by gravity drainage in SAGD and VAPEX," Paper CIM 2001-129, 52nd Annual Technical Meeting of the Petroleum Society, Calgary, June 12-14, 2001.

Dong, M. and S. Huang, "Flue gas injection for heavy and medium oil recovery." CIM 2001-229, Ninth Petroleum Conference of the South Saskatchewan Section, Petroleum Society of CIM, Regina, April 29-May 2, 2001.

Gu, Y. 2001. "Drop size dependence of contact angles of oil drops on a solid surface in water: Colloids and Surfaces A." Physicochemical and Engineering Aspects, 181, 215-224.

Gu, Y. 2001. "Experimental determination of the Hamaker Constants for Solid-Water-Oils Systems." Journal of Adhesion Science and Technology, 15, 1263-1283.

Yang, D., Q. Zhang, and Y. Gu. 2002. "Integrated optimization and control of the production-injection operation systems for miscible flooding reservoirs." Journal of Petrolium Science Engineering, in press.

Gu, Y. and D. Li. 2002. "Deposition of spherical particles onto cylindrical solid surfaces, I. Numerical simulations." Journal of Colloid Interface Science, 248, 315-328.

Gu, Y. 2002. "Contact angle measurement techniques for determination of wettability." Encyclopoedia of Surface and Colloid Science. A. Hubbard and S. Barbara, eds. New York: Marcel Dekker Inc., 1213-1228.

Gu, Y. 2002. "Interfacial properties of glass surfaces." Encyclopoedia of Surface and Colloid Science. A. Hubbard and S. Barbara, eds. New York: Marcel Dekker Inc., 2799-2812.

Gu, Y. 2002. "Deposition of liquid drops onto solid surfaces." Encyclopoedia of Surface and Colloid Science. A. Hubbard and S. Barbara, eds. New York: Marcel Dekker Inc., work accepted.

Liu, L., G. H. Huang, and G. A. Fuller. 2001. "A GIS-supported remote sensing technology for petroleum exploration and exploitation." Journal of Canadian Petroleum Technology, 40 (11), 9-12.

Chen, Z., G. H. Huang, and A. Chakma. 2001. "Simulation and assessment of subsurface contamination caused by spill and leakage of petroleum products – a multiphase multicomponent modeling approach." Journal of Canadian Petroleum Technology, 40 (9), 43-49.

Li, J. B., G. H. Huang, and G. M. Zeng. 2001. "An integrated decision support system for the management of petroleum-contaminated sites." Journal of Environmental Science and Health – Part A, 36 (7), 1163-1186.

Geng, L. Q., Z. Chen, C. W. Chan, and G. H. Huang. 2001. "An intelligent decision support system for management of petroleum-contaminated sites." Expert Systems with Applications, 20 (3), 251-260.

Idem, R. O. and H. H. Ibrahim. 2002. "Kinetics of CO2 induced asphaltene precipitation from various Saskatchewan crude oils during CO2 miscible flooding" Journal of Petroleum Science and Engineering, accepted, 2002.

Zhao, G. et al. "Transient pressure respone of fluvial reservoir with branching channel and splay." Paper SPE71032, SPE Annual Technology Conference and Exhibition, New Orleans, Septemner 3-October 3, 2001.

Zhao, G. et al. "Transient pressure analysis of bounded communicating reservoirs." SPE 71032, SPE Rocky Mountain Petroleum Technology Conference, Keystone, May 21-23, 2001.

Zhao, G. et al. "Transient pressure analysis for reservoir with discontinuous non-sealing faults." Paper CIM 2001-93, CIM Petroleum Society's Canadian International Petroleum Conference, Calgary, June 12-14, 2001.

The University of Regina-PTRC Research Highlights

1. A knowledge based expert system for oil battery (Project Leader: Dr. Koorosh Asghari, Status: Ongoing) Oil batteries are located at remote areas and A Knowledge Based Expert System (KBES) can be used in order to observe the operations of such a battery by production engineers through office computers via Internet. A KBES has been developed and tested with test data files. Also, an interface between the program and Internet has been developed to facilitate transfer of data from Internet to the KBES.

2. CO2-foam for mobility control (Project Leader: Dr. Koorosh Asghari, Status: Ongoing) This projects aims at testing surfactants and investigating the application of injecting surfactant solution along with carbon dioxide for generating foam and reducing the mobility of carbon dioxide. Flow experiments at reservoir conditions were completed and an optimum foam composition and quality were determined. Also, effects of a variety of parameters such as pressure, temperature and brine concentration were studied.

3. Application of gels for CO2 conformance control (Project Leader: Dr. Koorosh Asghari, Status: Ongoing) This project is funded by both PTRC and EnCana (formerly PanCanadian). The goal of this project is to develop gel systems that would be used for blocking the unwanted pathways of carbon dioxide in the reservoir. Two different gel systems were developed and tested for blocking the pathways of carbon dioxide. Suitable gel composition was determined and tested.

4. Study the Mechanism of Selective Permeability Reduction with Polyacrylamide Polymers (Project Leader: Dr. Koorosh Asghari, Status: Ongoing) High molecular weight polyacrylamide was tested for its effect on reducing the permeability to water. A few experiments were conducted and it was shown that even in a porous medium of very high permeability, polyacrylamide could effectively reduce the permeability of water.

5. Effects of CO2 Injection on the wettability of the oil-water rock systems (Project Leader: Dr. Peter Gu, Status: Ongoing) During the period of injecting carbon dioxide into a reservoir, such as Weyburn, many physical properties of the rock from which the reservoir is made of might change. One of these important parameters is wettability. This project studies any effect injection of carbon dioxide might have on the wettability of reservoir.

6. CO2 storage monitoring through Material Balance Equation (Project Leader: Dr. Gary Zhao, Status: Ongoing) One of the major concerns during any carbon dioxide storage project is the fate of injected carbon dioxide. This project utilizes the material balance techniques for a reservoir under carbon dioxide flooding in order to determine how much CO2 stays in the reservoir.

7. Mobility control under bottom water conditions (Project Leader: Dr. Ezeddin Shirif, Status: Ongoing) Many reservoirs in Saskatchewan are under active bottom water conditions. An experimental set up has been designed and built to study the ways that make it possible to produce more oil from these reservoirs without producing excessive amount of water.

8. Detection and recycling of chemicals (Project Leader: Dr. Peter Gu, Status: Ongoing) In many chemical flooding processes some of the injected chemicals are produced along with the produced oil and water at the production wells. This projects aims at developing practical methods to measure the concentration of the produced chemicals and reuse them in the chemical flooding process.

9. Development of biosurfactant-enhanced technologies (Project Leader: Dr. Gordon Huang, Status: Ongoing) Surfactants can be used to reduce the interfacial tension between water and oil in bioremediation projects. This project aims at developing specific microorganisms that once injected into soil produces surfactants in-situ.

10. Displacement of Heavy Oil through Interfacial Instability (Project Leader: Dr. Ming Dong, Status: Ongoing) Waterflooding of heavy oil reservoirs leads to minimal incremental oil recovery due to the very high viscosity of heavy oil compared to water. However, addition of some chemicals, such as surfactants, can lead to instability of the interface between water and heavy oil and consequently lead to increased oil recovery. This project aims at investigating such a possibility.

11. Development of biological technologies for remediation (Project Leader: Dr. Gordon Huang, Status: Complete) On one the most effective methods of dealing with hydrocarbon spills is bio-remediation. In this project, mechanisms and different types of microorganisms have been tested in order to develop an effective biological technology for hydrocarbon remediation.

12. Expert system for remediation technologies (Project Leader: Dr. Gordon Huang and Dr. Christine Chan, Status: Complete) The variety and types of contaminations are so diverse that it is important to have an automated system to help environmental engineers in assessing the most effective type of remediation for the specific contaminated site characteristics. In this project an Expert System was developed to be used as a quick screening tool for the environmental engineers.

13. Electromagnetic heating as a means of wax deposition inhibition/remediation (Project Leader: Dr. Koorosh Asghari, Status: Ongoing) One of the innovative methods of preventing the wax precipitation is the application of electromagnetic waves. An experimental set up has been designed and built that allows us to study this possibility in PTRC laboratories.

14. Developing an underground sonar radar for monitoring CO2 flooding (Project Leader: Dr. Raman Paranjape, Status: Ongoing) One of the biggest unknowns during any type of miscible or immiscible flooding in oil reservoirs is the location of the interface between different fluids in reservoir. This project aims at developing a technology based on underground sonar techniques for this purpose.

15. Characterization of Carbonate Reservoir Systems (Project Leader: Dr. Hairuo Qing, Status: Ongoing) Many Saskatchewan oil fields produce from carbonate formations. The purpose of this project is to develop a better understanding of the Ordovician reservoirs, their extent and geological properties.

16. Separation of produced fluids using a Coalescer column (Project Leader: Dr. Peter Gu, Status: Ongoing) The purpose of this research project is to develop a coalescer column capable of improving treatment of produced wellhead emulsions.

Petroleum Technology Resources Centre 2001 consolidated

financial statements

Auditor's Report

To the Members of Petroleum Technology Research Centre Inc.

We have audited the balance sheet of Petroleum Technology Research Centre Inc. as at March 31, 2002 and the statements of operations and unappropriated net assets and cash flow for the year then ended. These financial statements are the responsibility of the Centre's management. Our responsibility is to express an opinion on these financial statements based on our audit.

We conducted our audit in accordance with Canadian generally accepted auditing standards. Those standards require that we plan and perform an audit to obtain reasonable assurance whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation.

In our opinion, these financial statements present fairly, in all material respects, the financial position of the centre as at March 31, 2002 and the results of its operations and changes in its cash flow for the year then ended in accordance with Canadian generally accepted accounting principles.

REGINA, Saskatchewan
May 7, 2002

Mintz & Wallace
Chartered Accountants

Balance Sheet

As At March 31, 2002

Statement A

	Capital Fund	Operating Fund	2002 Total	2001 Total
ASSETS				
CURRENT ASSETS				
Cash	$ -	$ 565,186	$ 565,186	$ 146,682
Money market and savings	1,000,000	907,441	1,907,441	1,823,163
Accounts receivable	-	700,576	700,576	3,428,601
Prepaid expenses	-	3,220	3,220	2,931
	1,000,000	2,176,423	3,176,423	5,401,377
CAPITAL ASSETS - Note 2	-	13,529	13,529	17,761
	$ 1,000,000	$ 2,189,952	$ 3,189,952	$ 5,419,138
LIABILITIES AND NET ASSETS				
CURRENT LIABILITIES				
Accounts payable and accrued liabilities	$ -	$ 2,275,341	$ 2,275,341	$ 2,901,040
	-	2,275,341	2,275,341	2,901,040
UNDER EXPENDED FUNDS - Statement D				
Research building and equipment	1,000,000	-	1,000,000	1,000,000
Equipment projects	-	85,000	85,000	85,000
Innovation projects	-	77,206	77,206	1,274,863
Incubation projects	-	31,237	31,237	49,686
	1,000,000	193,443	1,193,443	2,409,549
	1,000,000	2,468,784	3,468,784	5,310,589
NET ASSETS				
Appropriated for executive compensation	-	100,000	100,000	100,000
Unappropriated - Statement B	-	(378,832)	(378,832)	8,549
	-	(278,832)	(278,832)	108,549
	$ 1,000,000	$ 2,189,952	$ 3,189,952	$ 5,419,138

See accompanying notes

Approved on behalf of the Members'

David V. Bernard Director

Laurie Lehmann Director

Statement of Operations and Unappropriated Net Assets

For The Year Ended March 31, 200

Statement B

	Capital Fund	Operating Fund	2002 Total	2001 Total
REVENUE				
Annual Funding				
- Saskatchewan Energy & Mines	$ -	$ 250,000	$ 250,000	$ 250,000
- Natural Resources Canada	-	890,344	890,344	980,000
Project Funding - current				
- Saskatchewan Energy & Mines	-	-	-	55,000
- Natural Resources Canada	-	1,523,957	1,523,957	51,253
- Province of Saskatchewan	-	-	-	400,000
Project Funding - deferred from 2001				
- Saskatchewan Energy & Mines	-	85,000	85,000	-
- Natural Resources Canada	-	50,000	50,000	-
- SPRI	-	479,740	479,740	-
- Other	-	794,809	794,809	-
Interest		50,598	50,598	86,527
Sundry	-	4,939	4,939	-
	-	4,926,887	4,926,887	4,423,468
OPERATING EXPENSES				
Advertising and promotion	-	9,355	9,355	10,999
Amortization	-	4,233	4,233	4,028
Bank charges and interest	-	540	540	906
Conferences	-	8,199	8,199	2,756
Consulting fees	-	39,501	39,501	42,997
Dues and subscriptions	-	1,833	1,833	1,022
Insurance	-	6,310	6,310	2,792
Legal and accounting	-	32,688	32,688	24,727
Miscellaneous	-	14,533	14,533	14,560
Office	-	19,708	19,708	11,544
Rent		53,769	53,769	44,484
Salaries and benefits	-	212,200	212,200	215,686
Supplies	-	4,963	4,963	7,169
Travel	-	33,402	33,402	22,673
	-	441,234	441,234	406,343
PROJECT EXPENSES				
Research building	$ -	$ -	$ -	$ 400,000
Equipment projects	-	-	-	205,022
Incubation projects	-	41,449	41,449	31,557
Innovation projects	-	4,638,142	4,638,142	3,417,292
	-	4,679,591	4,679,591	4,053,871
EXCESS OF EXPENSES	-	(193,938)	(193,938)	(36,746)
OVER (UNDER) EXPENDED FUNDS - RESEARCH PROJECTS - Statement D	-	(193,443)	(193,443)	-
NET LOSS	-	(387,381)	(387,381)	(36,746)
UNAPPROPRIATED NET ASSETS - beginning of year - statement A	-	8,549	8,549	45,295
APPROPRIATIONS -	-	-	-	
UNAPPROPRIATED NET ASSETS - end of year - statement A	$ -	$ (378,832)	$ (378,832)	$ 8,549

See accompanying notes

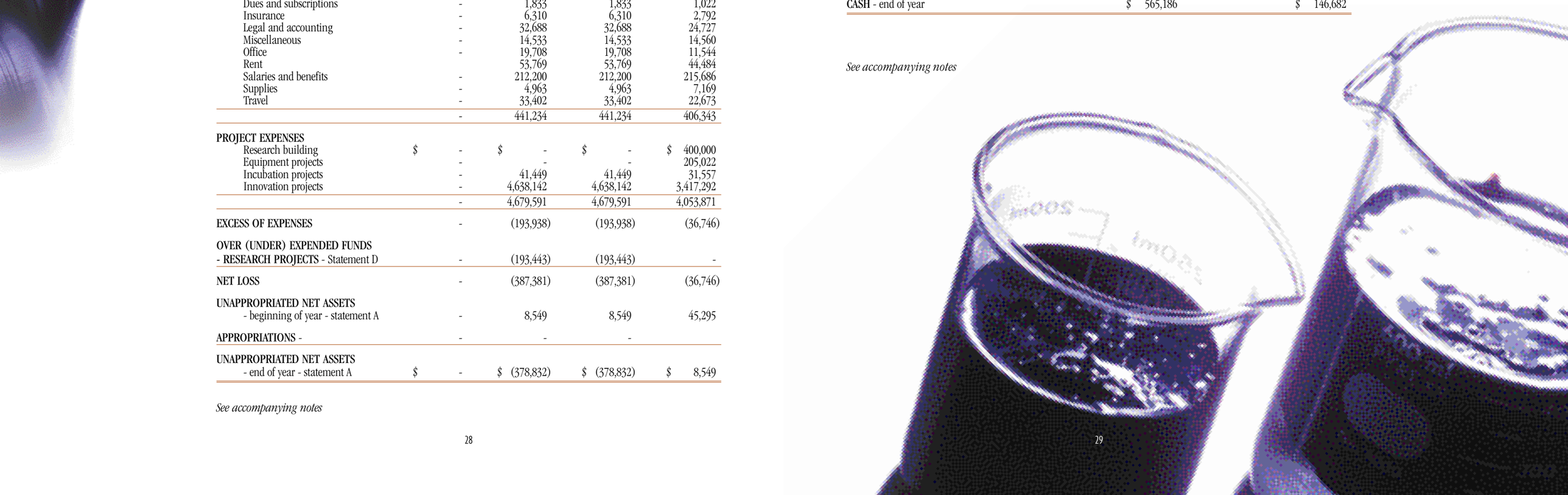
Statement of Cash Flow

For The Year Ended March 31, 2002

Statement C

	2002	2001
OPERATING ACTIVITIES		
Excess of expenses	$ (387,381)	$ (36,746)
Item which does not affect cash outlay:		
- amortization	4,233	4,028
	(383,148)	(32,718)
Net change in non-cash current assets	2,643,458	(3,498,036)
Net change in non-cash current liabilities	(625,699)	2,751,453
Net change in non-cash (over) under expended funds	(1,216,107)	898,987
Net cash from operating activities	418,504	119,686
INVESTING ACTIVITY		
Purchase of capital assets	-	(12,668)
Net cash from investing activities	-	(12,668)
INCREASE IN CASH RESOURCES	418,504	107,018
CASH - beginning of year	146,682	39,664
CASH - end of year	$ 565,186	$ 146,682

See accompanying notes



Continuity of (Over) Under Expended Project Funds

For The Period Ended March 31, 2002

Statement D

	(Over) Under Expended Funds April 1, 2001	Budgeted Allocations 2002	Actual Expenditures 2002	(Over) Under Expended Funds March 31, 2002
CAPITAL PROJECTS – C000				
Research equipment	$ 1,000,000	$ -	$ -	$ 1,000,000
RESEARCH PROJECTS				
Equipment Projects - E000				
Saskatchewan Energy & Mines	$ 85,000	$ -	$ -	$ 85,000
Innovation Projects				
AI Water/Oil - 006	-	30,000	31,050	(1,050)
Air/oxygen injection - 008	-	-	(10,350)	10,350
IEA Weyburn Co2 - 016 - Schedule 1	972,249	2,329,644	3,634,889	(332,996)
Carbonate reservoir system - 017	20,000	30,000	53,329	(3,329)
Expert remedial system - 018	-	12,064	(12,329)	24,393
Co2 foam control - 019	-	38,709	51,475	(12,766)
Bio-tech for mediation - 020	-	26,000	26,000	-
Intelligent systems - 023	669	80,143	82,809	(1,997)
Expert system for oil battery - 024	-	42,000	22,850	19,150
Co2 conformance control - 025	12,990	15,000	2,037	25,953
Mobility control - 026	-	25,000	37,904	(12,904)
Co2 Storage - 027	-	10,600	(9,525)	20,125
Co2 Injection - 028	-	37,800	9,986	27,814
Electromagnetic heating - 029	-	42,755	(13,775)	56,530
Selective permeability - 030	6,951	30,000	32,295	4,656
Vapex III - 031 - Schedule 2	262,004	-	212,154	49,850
Underground sonar - 032	-	43,900	26,910	16,990
ASP Flood SE Sask - 033	-	105,000	72,450	32,550
Immiscible Co2 flooding - 034	-	90,000	72,450	17,550
Detection of chemicals - 035	-	36,300	-	36,300
Coalescer column - 036	-	54,100	22,600	31,500
Water treatment options - 037	-	50,000	51,750	(1,750)
AI project - 039	-	20,000	12,220	7,780
Biosurfactant enhanced technologies - 040	-	-	-	-
Interfacial instability displacement - 041	-	-	-	-
Key Focus Area Study - 042	-	291,470	228,963	62,507
	1,274,863	3,440,485	4,638,142	77,206
Incubation Projects				
Gel Sand Control - I007	1,620	-	-	1,620
Bioprospecting II - I008	9,210	-	8,551	659
Vertical wells - I009	913	-	(1,000)	1,913
Asphaltene project - I010	17,143	-	17,143	-
Microbials in concrete - I011	14,800	-	8,648	6,152
3D Visualizations - I012	6,000	8,000	-	14,000
Unplugging oil wells - I013	-	-	-	-
Magnetic fluids - I014	-	15,000	8,107	6,893
	49,686	23,000	41,449	31,237
Total Research Projects - Statement B	$ 1,409,549	$ 3,463,485	$ 4,679,591	$ 193,443
TOTAL	$ 2,409,549	$ 3,463,485	$ 4,679,591	$ 1,193,443

See accompanying notes

Notes to the Financial Statements

March 31, 2002

1. SIGNIFICANT ACCOUNTING POLICIES

Nature of Organization

The Centre is an internationally recognized innovative leader in the petroleum research and development area that delivers world class basic and applied research for the benefits of the people of Saskatchewan, Canada and their customers around the globe. The Centre is incorporated under the Non-Profit Corporation Act and is exempt from income taxes on its income.

Measurement Uncertainty

The preparation of financial statements in accordance with Canadian generally accepted accounting principles requires management to make estimates and assumptions that affect the reported amount of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amount of revenues and expenses during the reported period. These estimates are reviewed periodically, and, as adjustments become necessary, they are reported in earnings in the period in which they become known.

Fund Accounting

The accounts of the Centre are maintained in accordance with the principles of fund accounting. For financial reporting purposes, accounts with similar characteristics have been combined into the follow major funding groups:

i) Operating Fund

The operating fund reflects the primary operations of the Centre including revenues received from Sask. Energy & Mines, the federal government Dept of Natural Resources Canada and Industry to fund its operations and research projects. Expenses are for the daily operation of the Centre.

ii) Capital Fund

The capital fund reflects the commitment of the Provincial Government to assist in funding a Petroleum Research Building on the campus of the University of Regina. These funds are restricted to be used to construct a building ($ 400,000) and equipment ($ 2,600,000).

Revenue Recognition

Restricted contributions related to general operations are recognized as revenue of the operating fund in the year in which the related expenses are incurred. All other restricted contributions are recognized as revenue of the appropriate restricted fund.

Unrestricted contributions are recognized as revenue of the operating fund in the year they are received or receivable if the amount to be received can be reasonably estimated and collection is reasonably assured.

Temporary Investments

Investments consist of money market mutual funds. They are stated at cost which approximates their fair market value.

Capital Assets

The capital assets are stated at cost and are amortized using the declining balance method at the rates indicated in Note 2. Half a year's amortization is taken in the year of acquisition.

2. CAPITAL ASSETS

	2002 Cost	2002 Accumulated Amortization	2002 Net Book Value	2001 Net Book Value	2001 Rates
Computers	$ 11,223	$ 6,460	$ 4,763	$ 6,803	30%
Office furniture	12,175	3,409	8,766	10,958	20%
	$ 23,398	$ 9,869	$ 13,529	$ 17,761	

3. CONTINGENT LIABILITY

A reserve fund of $ 100,000 has been approved to cover termination costs for the General Manager. This fund will only be used if funding from the Federal and Provincial Governments end in 2003.

4. ECONOMIC DEPENDENCE

The Centre has received funding commitments from the Department of Natural Resources Canada and Saskatchewan Energy & Mines for the years 1999 through 2003 for its operating and research projects:

Funding 2002 - 2003 - $ 1,150,000

The Research Centre will be seeking additional funding for its research projects from the Petroleum Industry.

Accumulated Schedule of IEA Weyburn CO_2 Project

As at March 31, 2002

Schedule 1

ACCUMULATED BUDGETED FUNDING

Funders	Booked	Total Commitment
Alberta Environment	$ 75,000	$ 300,000
Alberta Science and Research	75,000	300,000
ENAA	150,000	300,000
PTRC	105,000	105,000
Encana	100,000	100,000
SEM	105,000	105,000
NRCAN	2,567,916	5,850,000
SaskPower	150,000	300,000
Amoco	154,186	300,000
Transalta	150,000	300,000
Nexen	150,000	300,000
Dakota	75,000	300,000
SPRI	2,062,720	2,062,720
Totalfinaelf	150,000	300,000
Other	13,604	13,604
	$ 6,083,426	$ 10,936,324

		Budget Commitment
ACCUMULATED ACTUAL EXPENDITURES		
Cumulative expenditures by task		
Task 1 – Collection of Field Data and Samples	$ 1,550,276	$ 1,880,226
Task 2 – Geoscience Framework	229,404	679,981
Task 3 – Geochemical Sampling, Monitoring & Prediction	530,761	644,697
Task 4 – Seismic Surveys	2,971,319	3,303,862
Task 5 – Sequestration Engineering	617,237	825,503
Task 6 – Co2 Storage Economics	11,385	24,410
Task 7 – Project Control	506,040	485,894
	$ 6,416,422	$ 7,844,573
OVER EXPENDED PROJECT FUNDS - Statement D	$ (332,996)	-

The Weyburn project is over expended due to the nature of the funding process involved. Funding is provided to PTRC once the details of the expenditures are submitted for review.

Accumulated Schedule of Vapex III Project

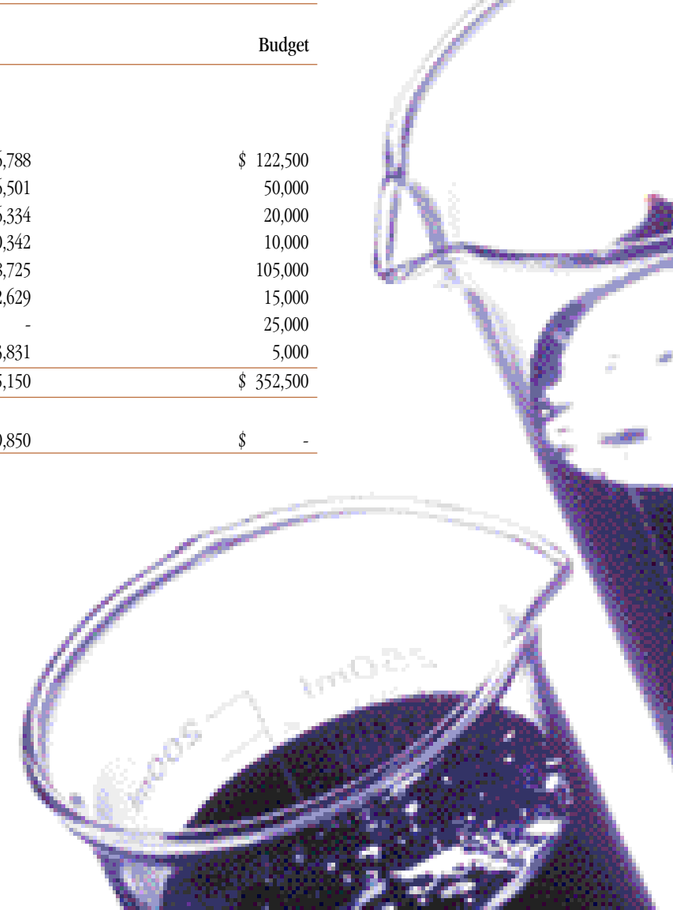
As at March 31, 2002

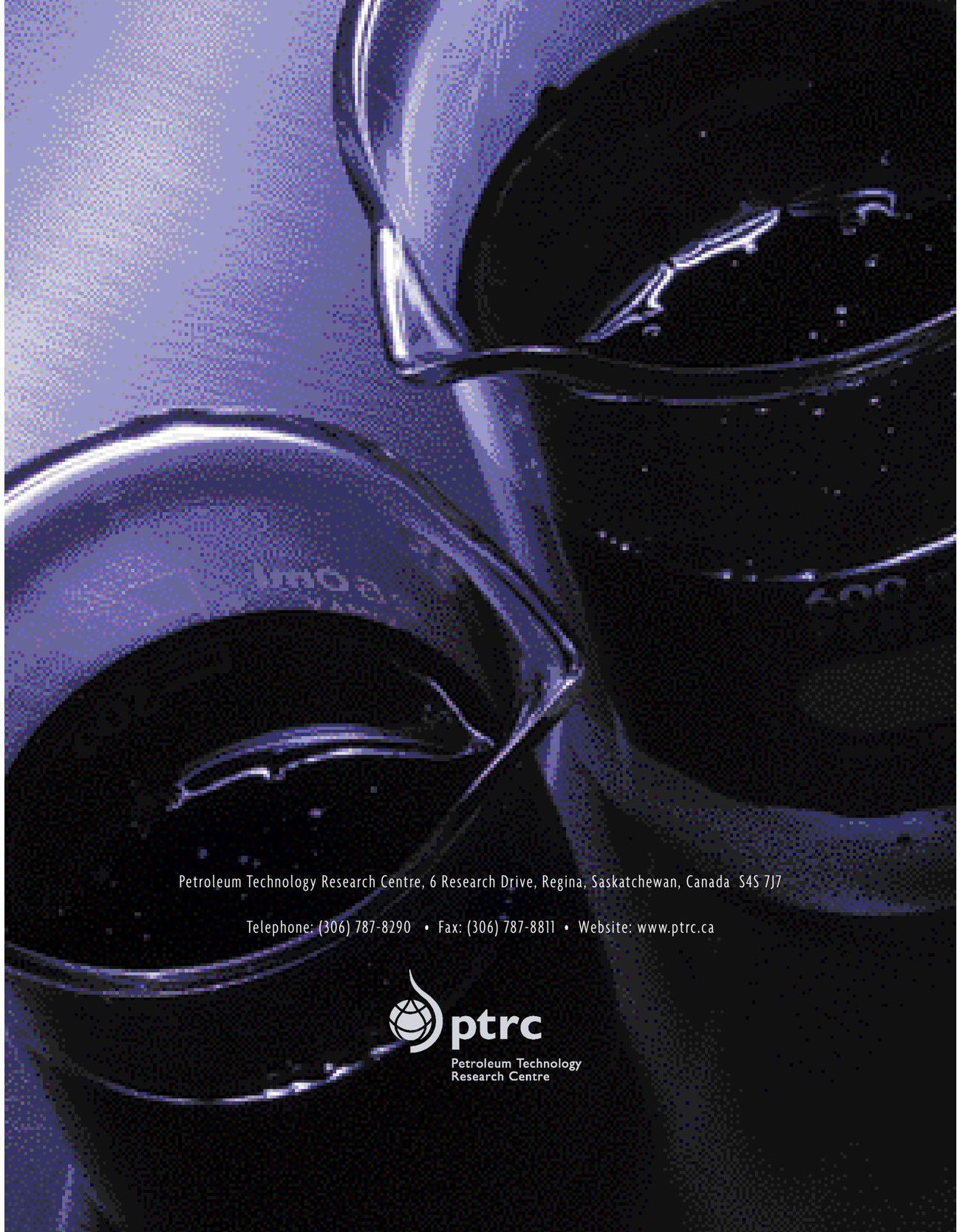
Schedule 2

ACCUMULATED BUDGETED FUNDING

Funders	
ExxonMobil	$ 25,000
Chevron	25,000
Anadarko	25,000
Conoco	25,000
Husky	25,000
Marathon	25,000
Petrovera	25,000
Nexen	25,000
Encana	25,000
NCUT	50,000
AERI	50,000
PTRC	50,000
	$ 375,000

		Budget
ACCUMULATED ACTUAL EXPENDITURES		
Providers		
ARC	$ 126,788	$ 122,500
Arkil	46,501	50,000
Nordic	6,334	20,000
NCUT	10,342	10,000
SRC	108,725	105,000
Fractional Solutions	12,629	15,000
CERI	-	25,000
Other	13,831	5,000
	$ 325,150	$ 352,500
UNEXPENDED PROJECT FUNDS - Statement D	$ 49,850	$ -





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