

# **COST REDUCTION EFFORTS IN THE PETROLEUM INDUSTRY IN NORTHERN ALBERTA AND THE RESULTING TRAINING OPPORTUNITIES**

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**The Northern Labour Market Information Clearinghouse**

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**May 1996**

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## FINDINGS FROM THE REDUCING FIELD OPERATING COSTS STUDY

The most important things which operations staff do to maximize production are:

1. monitoring and surveillance of properties
2. field staff are expected to take the appropriate follow-up-action to deviations from trend or plan
3. Optimization steps to maximize production or to minimize costs are increasingly being done in the field.

A number of companies are having *operators do work of a technical nature* which involve more training and technical capability than many field operators have traditionally had. These duties include: shooting fluid levels, calibration checks, dynamometer checks, voidage calculations, and optimizing compressor curves.

Some of the changes taking place are:

- installation of computers and fax machines in the field
- cross training of operators and maintenance personnel
- hand held data collection units are being more widely used
- improved information flow to field staff.

### Training Issues

Cross training is taking place where operators are being trained to provide some basic maintenance and maintenance people trained in operations. Training is done from internal sources (on the job training), supplemented with working organizations like PITS, SAIT (SOLIS program), NAIT, or training firms. Equipment suppliers often provide specific equipment training.

*Types of training* taking place are: problem solving, continuous improvement, communication skills, safety skills, and steam ticket certification.

There is considerable interest in sharing experiences in some ways. *Workshops and focus groups* are frequently mentioned followed by lectures and seminars.



## FINDINGS FROM THE FINDING AND DEVELOPMENT COST STUDY

Companies feel that there may be opportunities to enhance finding and development performance by increasing the emphasis on technical training and education, and by increasing the use of *workstation computing* technologies.

There is considerable interest in *horizontal well technology*, both in drilling and producing. The number of horizontal wells being drilled has soared, from a mere 39 in 1989, to 1,038 drilled in 1995.

### Technology Utilization

Improved technology, used appropriately, is considered critical to the future economic health of the petroleum producing industry. As conventional exploration and development opportunities become scarcer, of smaller scale, and more complex, technology which reduces risk and improves the probability of success is needed to reduce finding and development costs. Technology breakthroughs will also increase the envelope of opportunity, allowing pursuit of prospects previously too risky.

The use of 3-D seismic has increased substantially in the past year with an average of 11 crews working versus 9 crews in 1994. The percentage of work completed with 3-D seismic actually increased from 18% in 1994 to 23% in 1995, due to an overall decrease in seismic activity. Companies are striving to understand this technique better and have a need for training. In the past year most of the 3-D work was carried out in central and southern Alberta.

*Cost effective use of technology* is the key to successful application. Technology must be applied to address specific risks or inefficiencies and realistic expectations must be held for the benefits to be gained. Our clients have reported using technology specific to each major play type, rather than using a broad standard approach. This focussed approach is required to increase certainty of success. Examples reported include the appropriate use of 2D versus 3D seismic; horizontal, slant or directional drilling; and reservoir modelling tools used precisely in complex Foothills plays as opposed to Plains area shallow gas.

Land use issues are impacting the cost and availability of seismic data gathering with pressure to reduce cut lines and minimize field disturbances. Slant, directional, and horizontal well drilling technology is reducing surface lease requirement, another land use issue, while also providing increased reservoir contact and geometry advantages. Heightened air quality issues necessitate improved formation evaluation techniques to improve drilling success and to reduce testing, using technologies such as downhole, closed chamber testing. This information is essential to the optimization of exploration and development programs. The quality of information cannot be compromised, however, in the quest for improved results.

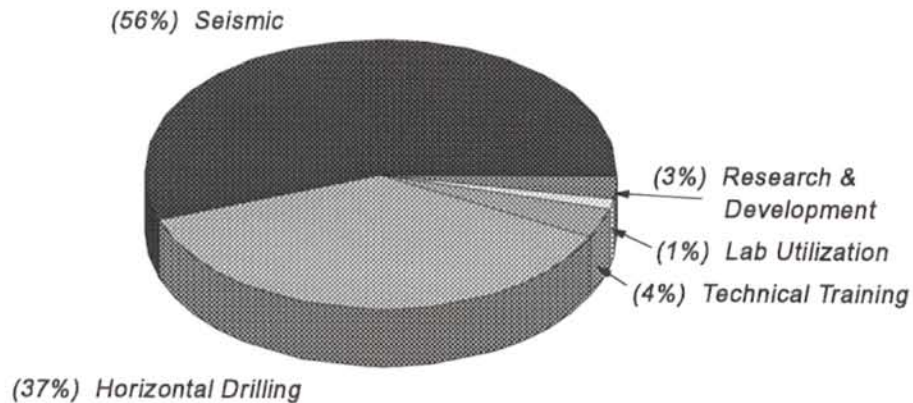


The geological screening tools such as Sequence Stratigraphy, Depositional Environment and Facies Analysis are followed by very targeted high resolution seismic. The interpretive/interactive modelling techniques, combined with the high quality data can reduce risks and improve on finding and development results. Stratigraphically keyed reservoir models, to address reservoir continuity and sweep efficiencies, hold great potential for designing optimum drilling densities, development patterns, and to maximize resource recover through low operating costs.

The 28 companies that participated in the technology survey spent \$522 MM in these six categories, up substantially from \$333 MM in 1993. This expenditure level represents 15% of the total for their capital programs. Spending on **seismic increased** by 8 percentage points to 56% of the total. **Technical training** expenditures **increased** from 2% to 4% of the total. Spending on **horizontal drilling decreased** by 6 percentage points to 37% of the total. **Research and development** expenditures **decreased** from 6% to 3% of the total. Laboratory utilization remained unchanged.

### Technology Spending - 1994

\$522 MM Total (28 Companies)



### Workstation Penetration

The number of workstations in use in 1994 by the 22 company sample, increased by 36% to 563. Increased penetration is useful for effective manipulation of expanding relational databases for both geological and engineering modelling, and especially for the integration of an expanding volume of 3-D seismic data. Exponential increases in processing power continue with Personal Computers and several functions previously handled by workstations are now handled by PCs. The *use and dependence on computing power* is therefore certainly understated by the statistics on workstations.



## FINDINGS FROM THE PEOPLE PRODUCTIVITY STUDY

### Forces of Change: People Challenges in the Late 90s

The phase of continual massive downsizing of oil and gas companies, both in people and activity, appears to be winding down. Most oil and gas companies are now increasing capital investment and production, but without significant increases in permanent staff.

Oil and gas industry executives, especially in Large companies, face new **human resources challenges** to attract, retain and motivate employees. Finding innovative ways to resolve these issues will be key to corporate success, in the late 1990s.

### Training and Development to Support Business Needs

Strategically driven training and development focusses on developing employee skills and competencies required to achieve business goals. Visible investment in developing employees can provide a solid base for attracting, developing, and supporting workers.

Companies need to identify current and future **competency requirements** within their own organization and within the industry as a whole. Workers need to understand those competency requirements and be provided with internal training, development opportunities, information and support to access outside opportunities. This enables employees to be effective and employable within their organizations or elsewhere. This represents an important part of building new "employment contracts".

Training trends include "just in time" training with a shortened cycle time from needs assessment to delivery, P.C. based training, support for self-directed learning, and increased partnership with outside institutions. New attention is required to ensure the learning from **training is transferred to the workplace** and training results are measured.

Training, practicing new skills and coaching can assist workers to function more adeptly in today's decentralized environment, and can help them to participate fully in decision making, consulting, and planning.

Companies need to recognize that changes to business strategy, structure and processes mean changes for employees in terms of the skill required for jobs, the way they work, and sometimes stress and work load. It makes good business sense, therefore, to support change with appropriate adjustments to human resources policies and practices.

Major changes in many human resource programs, however, can be very difficult to implement. For example, challenges are faced by organizations as they redesign and implement changes to their performance evaluation, reward and compensation systems in order to support creating high performance cultures. Often the old systems are out of step with the current strategy or design culture and actually discourage desired behaviours on the job. The cost of this in terms of lost productivity, low morale and turnover can be high.

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## REDUCING FIELD OPERATING COSTS 2

### PARTICIPATING COMPANIES 1995

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Alberta Energy Company Ltd.  
Altana Exploration Company  
Amerada Hess Canada Ltd.  
Amoco Canada Petroleum Company Ltd.  
Canadian Hunter Exploration Inc.  
Canadian Natural Resources Ltd.  
Canadian Occidental Petroleum Ltd.  
Chevron Canada Resources Ltd.  
Grad & Walker Energy Corporation  
Gulf Canada Resources Ltd.  
Harbour Petroleum Company Limited  
Husky Oil Limited  
Kerr-McGee Canada Limited  
Montana Power Company  
Mobil Oil Canada  
Norcen Energy Resources Ltd.  
Nugas Limited  
Ocelot Energy Inc.  
PanCanadian Petroleum Ltd.  
Pembina Corporation  
Petro-Canada  
Phillips Petroleum Resources Ltd.  
Pinnacle Resources Ltd.  
Poco Petroleums Ltd.  
Ranchmen's Resources Ltd.  
Ranger Oil Limited  
Roan Resources Ltd.  
Seagull Energy Canada Ltd.  
Shell Canada Ltd.  
Star Oil & Gas Ltd.  
Talisman Energy Inc.  
Tarragon Oil & Gas Ltd.  
Unocal Canada Ltd.  
Wascana Energy Inc.  
Wiser Oil Company Canada Ltd.



## FINDING AND DEVELOPMENT COSTS IX

### PARTICIPATING COMPANIES 1995

#### MAJOR COMPANIES (12)

Amoco Canada Petroleum Company Ltd.  
Chevron Canada Resources Limited  
Gulf Canada Resources Limited  
Husky Oil Ltd.

Imperial Oil Resources Limited  
Mobil Oil Canada  
Norcen Energy Resources Limited  
Pancanadian Petroleum Limited

Petro-Canada  
Renaissance Energy Ltd.  
Shell Canada Limited  
Talisman Energy

#### SENIOR COMPANIES (19)

Alberta Energy Company Ltd.  
Anderson Exploration Ltd.  
Bow Valley Industries Ltd.\*  
Canadian Hunter Exploration Ltd.  
Canadian Natural Resources Limited  
Canadian Occidental Petroleum Ltd.  
Chauvco Resources Ltd.

Crestar Energy Inc.  
Elan Energy Inc.  
Encor Inc.\*  
Home Oil Company Limited  
Mark Resources Inc.  
North Canadian Oils Limited\*

Numac Energy Inc.  
Poco Petroleum Ltd.  
Sceptre Resources Limited  
Suncor Inc.  
Unocal Canada Ltd.  
Wascana Energy Inc.

#### MEDIUM COMPANIES (86)

Altana Exploration Company  
Altex Resources Ltd.\*  
Amber Energy Incorporated  
Acor Resources Ltd.  
Atlantis Resources Ltd.  
Ballistic Energy Corporation  
Baytex Energy Ltd.  
Blue Range Resources Ltd.  
Cabre Exploration Ltd.  
Camberly Energy Ltd.  
Canadian 88 Energy Corporation  
Canadian Conquest Exploration Inc.  
Canadian Jorex Ltd.  
Canor Energy Ltd.  
Cimarron Petroleum Ltd.  
Co-Enerco Resources Ltd.\*  
Conoco Canada Limited  
Conwest Exploration Company Limited  
CS Resources Limited  
Cube Energy Corporation  
Czar Resources Ltd.  
DeKalb Energy Canada Ltd.  
Discovery West Corporation  
Dorset Exploration Ltd.  
Draig Resources Ltd.  
Encal Energy Ltd.  
Enron Oil Canada Ltd.  
Equis Energy Corporation  
Excel Energy Inc.

Fletcher Challenge Petroleum Inc.  
Fossil Oil & Gas Limited  
Gardiner Oil & Gas Limited  
Gascan Resources Ltd.  
Grad & Walker Resources Ltd.  
HCO Energy Ltd.  
Hillcrest Resources Ltd.\*  
Intensity Resources Ltd.  
International Colin Energy Corporation  
Inverness Petroleum Ltd.  
Jordan Petroleum  
Kerr-McGee Canada Limited  
Luscar\*  
Mannville Oil & Gas Ltd.\*  
Maxx Petroleum Ltd.  
MLC Oil & Gas Ltd.\*  
Morgan Hydrocarbons Inc.  
Morrison Petroleum Ltd.  
Newport Petroleum Corporation  
Northern Reef Exploration Ltd.  
Northstar Energy Corporation  
Nugas Limited  
Ocelot Energy Inc.  
Omega Hydrocarbons Ltd.  
Paloma Petroleum Ltd.  
Paragon Petroleum Corporation  
Paramount Resources Ltd.  
Penn West Petroleum Ltd.  
Pennzoil Petroleum Ltd.

Petromet Resources Limited  
Petrorep Resources Ltd.  
Phillips Petroleum Resources Ltd.  
Pinnacle Resources Ltd.  
Post Energy Corporation  
Quadron Resources Ltd.\*  
Questar Resources Corp.  
Ranchmen's Resources Ltd.  
Ranger Oil Limited  
Remington Energy Ltd.  
Richland Petroleum Corporation  
Rigel Oil & Gas Ltd.  
Rio Alto Exploration Inc.  
Saxon Petroleum Inc.  
Scurry Rainbow\*  
Seagull Energy Canada Ltd.  
Stamper Exploration Ltd.  
Startech Energy Inc.  
Strike Energy Inc.  
Summit Resources Limited  
Tarragon Oil & Gas Limited  
Texaco Canada Petroleum Inc.  
Torrington Resources Ltd.  
Triton Canada Resources Ltd.  
Truax Resources Corporation  
UMC Resources Canada Ltd.  
Union Pacific  
Williston Wildcatters Oil Corporation

\*Acquired or merged.





## PEOPLE PRODUCTIVITY V

### PARTICIPATING COMPANIES 1994

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#### Large (Major & Senior) Companies (10)

Canadian Occidental Petroleum Ltd.  
Canadian Hunter Exploration Ltd.  
Gulf Canada Resources Limited  
Home Oil Company Limited  
Husky Oil Ltd.  
Mobil Oil Canada  
PanCanadian Petroleum Ltd.  
Petro-Canada  
Unocal Canada Limited  
Wascana Energy Ltd.

#### Medium Companies (10)

Altana Exploration Company  
Conwest Exploration Company Limited  
Grad & Walker Resources Ltd.  
Kerr-McGee Canada Limited  
Pennzoil Petroleums Ltd.  
Phillips Petroleum Resources Ltd.  
Ranchmen's Resources Ltd.  
Ranger Oil Ltd.  
Rigel Oil and Gas Ltd.  
Tarragon Oil & Gas Limited

