FINANCIAL HIGHLIGHTS

At December 31 or for the years then ended (Dollars in millions, except per-share amounts)	2002	2001	Percent change
CONSOLIDATED FINANCIAL DATA			
Operating Revenues	$ 6,020	$ 7,730	-22.1%
Net Income	$ 591	$ 518	14.1
Net Income Per Share of Common Stock:			
Basic	$ 2.88	$ 2.54	13.4
Diluted	$ 2.87	$ 2.52	13.9
Weighted Average Number of Common Shares Outstanding (diluted, in millions)	206.1	205.3	0.4
Total Assets	$ 17,757	$ 15,080	17.8
Common Dividends Declared Per Share	$ 1.00	$ 1.00	0.0
Debt to Total Capitalization	60.4%	59.5%	1.5
Book Value Per Share	$ 13.79	$ 13.16	4.8
Capital Expenditures	$ 1,214	$ 1,068	13.7
STATISTICS			
Natural Gas Throughput[1] (in billions of cubic feet)	982	1,131	-13.2
Electric Energy On-System Sales[1] (in billions of kilowatt hours)	17.7	17.5	1.1
Number of Customers[1] (in millions of meters served)			
Natural Gas	6.1	6.1	0.0
Electricity	1.3	1.3	0.0
Return on Common Equity			
Sempra Energy	21.4%	19.5%	9.7
SoCalGas	16.2%	16.0%	1.3
SDG&E	18.2%	16.5%	10.3
Number of Employees	12,197	11,511	6.0

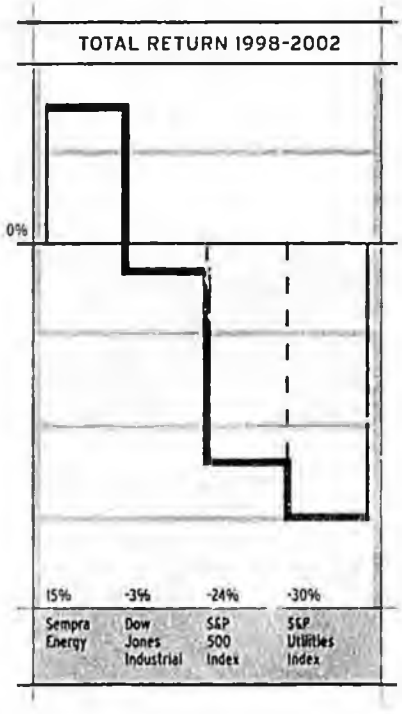
[1] California utilities

[2] Excludes contract and part-time employees

FELLOW SHAREHOLDERS

WE HAVE A FOCUSED AND DISCIPLINED STRATEGY FOR GROWING OUR BUSINESS.

Over the past year, Sempra Energy has distinguished itself in a number of important ways. First, we've performed when others in our industry have not. Our company posted strong financial and operating results in 2002. Earnings were $591 million, up from $518 millior .001. Earnings per diluted share were $2.87, a 14-percent increas over last year. In fact, since 1998, Sempra Energy's earnings per share have grown, on average, by 23 percent annually. In a challenging stock market, our total return to investors was better than the major stock indexes and our industry peer group in 2002.



When we formed Sempra Energy in 1998, we combined two companies with century-long histories of financial stability, excellent customer service and corporate responsibility. Our name – from the Latin word that means "always" – reflects our commitment to manage and grow a business that is straightforward, reliable and well-grounded.

Delivering results

Sempra Energy continues to deliver excellent financial results, despite difficult conditions in the energy sector. We maintain a balanced portfolio of businesses with a solid balance sheet and strong investment-grade credit ratings.

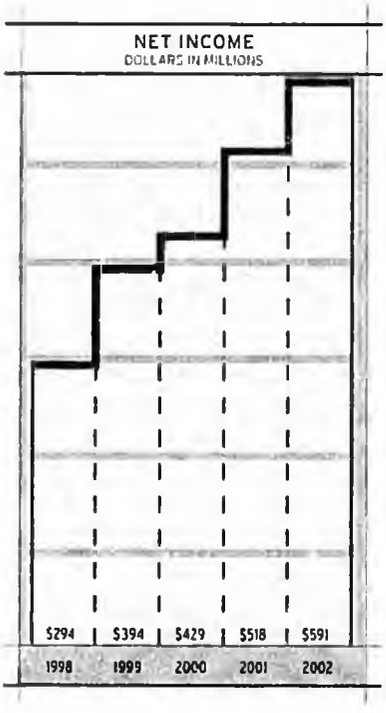
This financial performance has enabled us to return reliable dividends to our shareholders and to produce earnings growth.

Our focus on risk management has caused us to succeed in difficult times. This focus distinguishes us from others in our industry.

Sempra Energy Utilities contributes to shareholder value by providing strong and predictable earnings and cash flow – the bedrock for Sempra Energy's growth. Southern California Gas Company and San Diego Gas & Electric performed well in 2002, exceeding their authorized return on equity.

At the end of 2002, SDG&E and SoCalGas filed with the California Public Utilities Commission a rate application that will determine their cost and rate structures beginning in 2004. We expect the CPUC to issue a decision by the end of 2003.

To accommodate customer growth and improve the reliability of our utility systems, our California utilities continue to invest in infrastructure improvements. In 2002, we invested approximately $731 million in utility capital expenditures, upgrading their gas and electric delivery networks.



A prudent growth strategy

While the past year has been disastrous for many wholesale and retail energy providers, Sempra Energy Global Enterprises has prospered.

The market exit by some competitors has created new opportunities. A good example is the liquefied natural gas (LNG) project in Hackberry, La., our new Sempra Energy LNG Corp. unit agreed to acquire in February 2003. After final regulatory approvals, the LNG receiving terminal being developed there could begin commercial operation by 2007 with daily processing capacity of up to 1.5 billion cubic feet of gas. With natural gas supplies tightening in North America, we believe that LNG will be a critical part of the supply mix over the next decade.

Also, in October 2002, Sempra Energy Resources acquired a 305-megawatt coal-fired Texas power plant, which we have renamed "Twin Oaks Power." As natural gas prices rise, this plant has the potential to become more valuable in the deregulated Texas power market, especially in comparison to gas-fired power plants there.

23% average annual growth

IN EARNINGS PER SHARE
SINCE SEMPRA ENERGY
WAS FORMED IN 1998.

Sempra Energy Resources has three state-of-the-art gas-fired power plants under construction – near Bakersfield, Calif., Phoenix, Ariz., and Mexicali, Mexico – that will begin operating by the summer of 2003. These will be among the cleanest power plants in North America, meeting some of the most stringent environmental standards. More than 80 percent of the peak-generating capacity of Sempra Energy Resources' fleet of power plants is hedged or under contract. This strategy to build or acquire power plants only when we have a predictable market for their output is designed to mitigate our risks.

Underlying the development of the three power plants in the Pacific Southwest is a long-term energy-supply agreement Sempra Energy Resources signed with the California Department of Water Resources in May 2001. California agencies have challenged our and other suppliers' agreements at the Federal Energy Regulatory Commission (FERC) and in state court, even though these contracts have brought stability to California's energy market. We expect the validity of our contract to be upheld in all venues.

The recently acquired Twin Oaks power plant provides Sempra Energy Resources with fuel diversity and entry into the Texas power market.

In a tough market, Sempra Energy Trading recorded another profitable year, operating a low-risk business with products and services to mitigate large wholesale energy customers' exposure to market volatility. Our trading business differs from others because we manage our price and credit risk carefully, while keeping our transactions relatively short in term. More than half our unrealized marked-to-market earnings become cash within 12 months and, more than 85 percent, within three years.

In April 2002, Sempra Energy Trading enhanced its earnings and their consistency through the acquisition of Enron's base metals trading and warehousing businesses.

Sempra Energy International's pipeline, Gasoducto Bajanorte, began operations in September 2002 with a capacity of approximately 500 million cubic feet per day of natural gas and full subscription

for more than 20 years. We have engineered the pipeline to more than double its capacity for the future transportation of natural gas produced from LNG landed on the coast of Baja California, Mexico.

Development continues on our Costa Azul LNG terminal in Baja California. The facility is in the permitting stages and should be operational by 2006.

Finally, Sempra Energy Solutions has been successful where others have failed – providing energy-management solutions and outsourcing options to large commercial, industrial and institutional customers. I am particularly proud that Sempra Energy Solutions increased its net income to $21 million in 2002 from $1 million in 2001.

Looking ahead

In the wake of the many scandals in corporate America over the past year, I am frequently asked by investors and others: "How is Sempra Energy guarding against similar problems?" With the exception of myself, no other member of our board of directors is a current or former employee of Sempra Energy. We have an internal audit function that reports directly to our board's Audit Committee. Ethical business conduct is a key element in our company's ongoing success. We have a strict business code of conduct and affiliate-compliance rules in place, as well as rigorous employee training programs in both areas.

Furthermore, we are committed to producing clear, accurate and timely financial statements for our investors and other key stakeholders. Like many other CEOs, in August 2002, I submitted my personal certification to the Securities and Exchange Commission as to the accuracy and completeness of our financial reports. This certification process continues on a quarterly basis.

CORPORATE GOVERNANCE & ETHICS

Measures to ensure good corporate governance and ethical conduct at Sempra Energy:

- No current or former employees on the board of directors, except for the CEO.
- An internal audit function reporting directly to the board of directors.
- Adherence to strict affiliate-compliance rules separating the activities of the California utilities from the growth businesses.
- Establishment of a Chief Ethics Officer, as well as an ethics "helpline" for employees.
- Regular training for employees on compliance with the business-conduct code and affiliate rules.

#2 best company

ON *FORTUNE'S* LIST OF AMERICA'S BEST COMPANIES FOR MINORITIES IN 2002.

"Straightforward" not only accurately describes how we govern and operate our company, but also how we approach our workforce. We are proud that, across the Sempra Energy companies, we have employees who – from top to bottom – reflect the diversity of the markets we serve. Creative problem solving and more thoughtful decision-making often are the result of a diverse workforce. We were pleased when – for the fifth consecutive year – *Fortune* magazine heralded Sempra Energy as one of America's best companies for minorities. We earned tne No. 2 ranking in 2002 and have been recognized among *Fortune's* top five companies each year since the magazine began publishing its list in 1998.

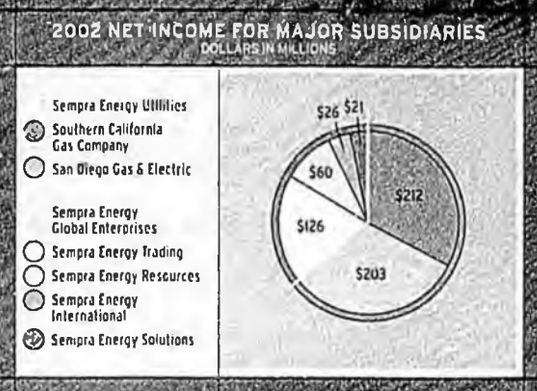
Sempra Energy remains a vital part of communities in which we operate. In 2002, Sempra Energy and its employees contributed more than $9 million and 30,000 hours of volunteer time to worthy causes.

We have a sound strategic plan in place to deliver solid financial results. We accept only those risks we can fully understand and manage. These factors will continue to differentiate us in the market and reward our value-focused investors. On behalf of all of us at Sempra Energy, thank you for your continued support and confidence.

Sincerely,

Stephen L. Baum
Chairman, President and Chief Executive Officer

In August 2002, SDG&E workers battled difficult conditions to replace power poles and other equipment damaged in a fire that burned more than 60,000 acres in eastern San Diego County.



A BALANCED BUSINESS PORTFOLIO

SEMPRA ENERGY'S FORMULA FOR SUCCESS IS BASED ON THE SOLID FOUNDATION OF ITS CALIFORNIA UTILITIES AND THE FOCUSED GROWTH OF ITS OTHER BUSINESSES.

Sempra Energy Utilities

Southern California Gas Company

The nation's largest natural gas distribution utility serves 18.9 million consumers through 5.3 million meters. Service territory encompasses 23,000 square miles.

San Diego Gas & Electric

Serves 3.1 million consumers through 1.3 million electric meters and more than 780,000 natural gas meters. Service area spans 4,100 square miles.

Sempra Energy Global Enterprises

Sempra Energy Trading

Provides marketing and risk-management services to customers that require natural gas, power, petroleum products and base metals, worldwide.

Sempra Energy Resources

Acquires, develops and operates power plants and energy infrastructure for the competitive market.

Sempra Energy International

Develops, owns and operates energy projects in international markets. The company currently is involved in joint or solo ventures that provide natural gas and electricity service to more than 2.6 million customers.

Sempra Energy Solutions

Provides commercial and industrial businesses throughout the United States with energy-management and consulting services.

The new Sylmar compressor station is part of an aggressive expansion program at SoCalGas that increased capacity and supply of natural gas into Southern California by 11 percent in 2002.

Edwin A. Guiles
Group President

Sempra Energy Utilities

A SOLID FOUNDATION

IN 2002, SEMPRA ENERGY UTILITIES CONTINUED TO PERFORM, PROVIDING SOLID EARNINGS, STRONG CASH FLOW AND EXCELLENT CUSTOMER SERVICE.

2002 SEMPRA ENERGY UTILITIES PROFILE	
Assets	$9.2 billion
Operating revenues[a]	$4.5 billion
Employees	10,360
Service territory	27,100 sq. miles
Population served (millions)	21.9
Gas	
Meters (millions)	6.1
Pipes (miles)	108,104
Throughput[a]	982 billion cu. ft.
Storage capacity	118.1 billion cu. ft.
Electric	
Meters (millions)	1.3
Wires (miles)	22,897
Power delivery[a]	17.7 billion kWh

[a] Excludes intercompany sales.

Southern California Gas Company
San Diego Gas & Electric

In 2002, Southern California Gas Co. (SoCalGas) and San Diego Gas & Electric (SDG&E) successfully completed the integration and streamlining of their management. For the year, the two utilities exceeded their authorized return on equity and continued to invest for the future.

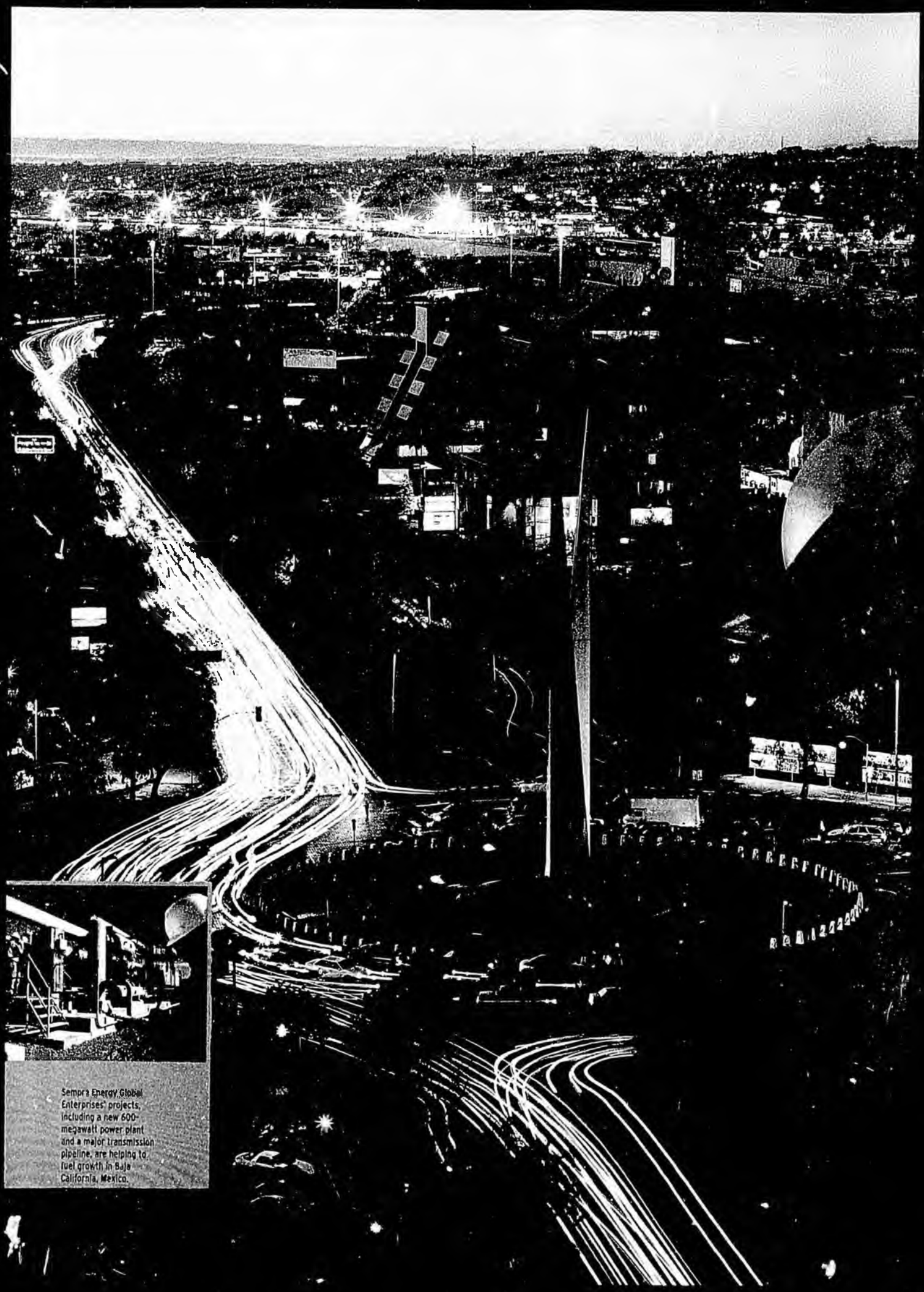
Sempra Energy Utilities invested $731 million in capital expenditures for upgrades in gas and electric delivery networks, including additions to serve the utilities' expanding customer base. SoCalGas completed four major expansion projects to its gas transmission system, increasing capacity and supply of natural gas into Southern California by 11 percent, or 375 million cubic feet per day. This new capacity is enough to fuel the equivalent of more than five new power plants, producing electricity to light about 2.8 million homes. SoCalGas added 61,000 customers in 2002, bringing its total metered customer base to 5.3 million.

SDG&E invested in new electricity substations and expansion of existing ones, and replaced 80 miles of electric distribution cable. These improvements translated into improved electric system reliability. SDG&E extended service to some 14,000 new gas and 20,000 new electric customers in 2002, resulting in a total of 1.3 million metered electric and 789,000 gas customers.

SDG&E's balance of undercollected power costs from California's energy crisis in 2000 and 2001 was reduced to $215 million at year-end. The balance, which peaked at $747 million in March 2001, is expected to be completely recovered by 2005. The company remains on solid financial footing and, beginning in 2003, is returning to its role as a power purchaser to cover the amount of electricity not being provided through state energy contracts.

As has been their tradition for more than a century, SoCalGas and SDG&E continued to provide exceptional customer service. SoCalGas earned the highest customer satisfaction ranking for residential gas utility service in the Western United States in the 2002 J.D. Power and Associates study.

The expansion of SDG&E's Talega substation in San Clemente, Calif., in 2002 added state-of-the-art equipment to improve the overall reliability of service to the utility's 1.3 million electricity customers.



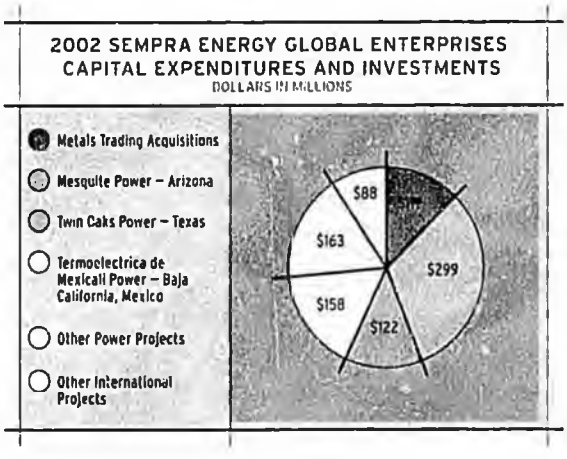
Sempra Energy Global Enterprises' projects, including a new 600-megawatt power plant and a major transmission pipeline, are helping to fuel growth in Baja California, Mexico.

Donald E. Felsinger
Group President

Sempra Energy Global Enterprises

GROWTH BUSINESSES

THE SEMPRA ENERGY GLOBAL ENTERPRISES GROUP OF BUSINESSES SUCCESSFULLY NAVIGATED THE DIFFICULTIES OF THE ENERGY INDUSTRY IN 2002 AND PRODUCED SOLID RESULTS.



Sempra Energy Global Enterprises is implementing a critical part of Sempra Energy's strategy: to develop a broad energy footprint in key markets, with power plants, natural gas transmission pipelines, supply facilities, and energy products and services.

Sempra Energy Trading

Prospering through tight risk co ols and geographic and product diver. ty

In a year when many energy companies eliminated or significantly reduced their energy-trading operations because of financial or regulatory problems, Sempra Energy Trading maintained a consistently profitable operation and charted a stable course for the future.

A leader in energy trading, the company gained additional market share as competitors exited the business.

In 2002, Sempra Energy Trading completed the acquisition of London-based Enron Metals Limited, the leading metals trader on the London Metal Exchange, as well as associated metals concentrates and warehousing businesses. The group of acquired companies has been renamed Sempra Metals Group Ltd.

Sempra Energy Trading differs from its industry peers by carefully managing its price and credit risk, and concentrating on shorter-dated transactions that convert into cash relatively quickly in a competitive market.

The majority of Sempra Energy Trading's business originates from large wholesale energy customers that require risk-management services. The company has further stabilized its earnings base by cultivating a diverse product mix, including natural gas, power, oil and base metals. With business in 20 countries, Sempra Energy Trading also benefits from geographic diversity.

Sempra Energy Resources

Supplying clean, efficient, reliable power for North American markets

Sempra Energy Resources is building natural gas-fired power plants near Phoenix, Ariz., Bakersfield, Calif., and Mexicali, Mexico. All are on schedule to begin operations in the summer of 2003.

In October 2002, Sempra Energy Resources acquired the 305-megawatt, coal-fired Twin Oaks power plant in Bremond, Texas, from Texas-New Mexico Power Company. The facility, which utilizes "clean coal" technology, diversifies the fuel mix for Sempra Energy Resources' fleet of power plants.

By the end of 2003, Sempra Energy Resources will have invested more than $1.5 billion in generating facilities, producing 2,660 megawatts. More than 80 percent of the peak-generating capability of these facilities already is hedged or under contract, providing more stable and predictable earnings and cash flow.

33%

OF 2002 TOTAL NET INCOME CONTRIBUTED BY SEMPRA ENERGY GLOBAL ENTERPRISES.

THE SEMPRA ENERGY GLOBAL ENTERPRISES GROUP BRINGS BALANCE AND GROWTH POTENTIAL TO SEMPRA ENERGY'S BUSINESS PORTFOLIO.

Sempra Energy Trading recorded another profitable year by continuing to employ a low-risk business model and by helping customers mitigate exposure to market volatility.

Sempra Energy International

Developing new energy infrastructure to increase economic growth and improve quality of life in Latin America

Sempra Energy International is pursuing new projects in Northern Mexico that will increase energy supplies on both sides of the U.S.-Mexico border.

The company's Gasoducto Bajanorte pipeline began operations in September 2002. The 145-mile natural gas transportation pipeline, which originates at the U.S.-Mexico border and crosses Baja California, Mexico, has a capacity of approximately 500 million cubic feet per day of natural gas to serve power plants and industrial customers. The pipeline is fully subscribed for the next 20 years.

Sempra Energy International also continued development of a liquefied natural gas (LNG) terminal in northwest Mexico. The company has purchased a site for the facility and has filed an application with Mexican regulators. If the application is approved, the facility could be operational by 2006 and help diversify the energy-supply mix in the region.

Sempra Energy International also has partnerships in gas and electric utilities in Chile, Peru and Argentina.

Sempra Energy Solutions

Helping large customers optimize their energy management

Sempra Energy Solutions provides an integrated mix of energy services that helps large commercial, industrial and institutional customers manage risks and reduce costs.

With several of its competitors exiting the retail energy market, Sempra Energy Solutions has employed an expansion strategy to become a market leader. The company generated net income of $21 million in 2002, up significantly from $1 million in 2001.

As one of the few major national players focusing on the large commercial and industrial marketplace, Sempra Energy Solutions provides customers with a broad range of energy services. These include commodity procurement, risk management and optimization, energy-efficiency consulting and facilities management.

The London-based Sempra Metals Group was acquired in 2002, enhancing earnings of Sempra Energy Trading.

SENIOR MANAGEMENT TEAM

Sempra Energy Corporate

Stephen L. Baum
Chairman, President and
Chief Executive Officer

Michael W. Allman
Vice President, Audit Services

Dennis V. Arriola
Vice President,
Investor Relations

Frank H. Ault
Senior Vice President
and Controller

Diana L. Day
Vice President and
Associate General Counsel

Joseph A. Householder
Vice President, Corporate Tax

Frederick E. John
Senior Vice President, External
Affairs and Communications

John R. Light
Executive Vice President
and General Counsel

Charles A. McMonagle
Vice President and Treasurer

Randall B. Peterson
Vice President,
Human Capital Services

Mark D. Randle
Vice President,
Energy Risk Management

G. Joyce Rowland
Senior Vice President,
Human Resources

Thomas C. Sanger
Corporate Secretary

Thomas S. Sayles
Vice President, Governmental
and Community Affairs

Neal E. Schmale
Executive Vice President
and Chief Financial Officer

Richard S. Shapiro
Vice President and
Associate General Counsel

W. Davis Smith
Vice President and
Associate General Counsel

Sempra Energy Utilities

Edwin A. Guiles
Group President

Debra L. Reed
President and
Chief Financial Officer

James P. Avery
Senior Vice President,
Electric Transmission

J. Chris Baker
Vice President,
Chief Information
Technology Officer

Steven D. Davis
Senior Vice President,
Customer Service and
External Relations

Pamela J. Fair
Vice President,
Customer Operations

Terry M. Fleskes
Vice President and Controller

Margot A. Kyd
Senior Vice President,
Business Solutions

Richard M. Morrow
Vice President, Customer
Services, Major Markets

Roy M. Rawlings
Senior Vice President,
Distribution Operations

William L. Reed
Senior Vice President,
Regulatory Affairs

Lee Schavrien
Vice President,
Regulatory Affairs

Anne S. Smith
Vice President, Customer
Services, Mass Markets

Lee M. Stewart
Senior Vice President,
Gas Transmission

**Sempra Energy
Global Enterprises**

Donald E. Felsinger
Group President

Robert N. Dickerman
President,
Sempra Energy Solutions

Darcel L. Hulse
President,
Sempra Energy International

Michael R. Niggli
President,
Sempra Energy Resources

Steven J. Prince
Chairman and
Chief Executive Officer,
Sempra Energy Trading

David A. Messer
President,
Sempra Energy Trading

Mark A. Snell
Chief Financial Officer

BOARD OF DIRECTORS

Stephen L. Baum
Chairman of the Board,
President and
Chief Executive Officer,
Sempra Energy
San Diego, California

Hyla H. Bertea
Community Leader
Co- na del Mar, California

James G. Brocksmith Jr.
Former Deputy Chairman
and Chief Operating Officer,
U.S. Operations, KPMG Peat
Marwick LLP
Naples, Florida

Herbert L. Carter, DPA
Executive Vice Chancellor
Emeritus and Trustee,
Professor of Public
Administration, California
State University System
Long Beach, California

Richard A. Collato
President and Chief
Executive Officer, YMCA
of San Diego County
San Diego, California

Wilford D. Godbold Jr.
Former President and
Chief Executive Officer,
Zero Corporation
Los Angeles, California

William D. Jones
President, Chief Executive
Officer and Director, CityLink
Investment Corporation
San Diego, California

Richard G. Newman
Chairman and
Chief Executive Officer,
AECOM Technology Corp.
Los Angeles, California

Ralph R. Ocampo, M.D.
Physician and Surgeon
San Diego, California

William G. Ouchi, Ph.D.
Sanford and Betty Sigoloff
Professor in Corporate Renewal,
Anderson Graduate School
of Management, University
of California, Los Angeles
Los Angeles, California

William C. Rusnack
Former President and Chief
Executive Officer, Premcor Inc.
St. Louis, Missouri

William P. Rutledge
Chairman, Communications
and Power Industries
Palo Alto, California

Thomas C. Sickel
Chairman, Chief Executive
Officer and Founder, University
Ventures Network and Virtual
Capital of California LLC
San Diego, California

Diana L. Walker
Partner and General Counsel,
O'Melveny & Myers LLP
Los Angeles, California

CORPORATE INFORMATION

Transfer Agent

EquiServe Trust Company, N.A.
P.O. Box 43069
Providence, RI 02940-3069
Telephone: 877-773-6772
Hearing Impaired (TDD):
1-800-952-9245
Internet:
http://www.equiserve.com

Shareholder Services

Investors with general questions regarding Sempra Energy, San Diego Gas & Electric, Southern California Gas Co. or Pacific Enterprises securities should contact the company at:
Sempra Energy
Shareholder Services
101 Ash Street
San Diego, C. 92101
Telephone: 877-736-7727
Fax: 619-696-2374
E-mail: investor@sempra.com
Internet:
http://ww..sempra.com

News and Information

To hear corporate news reports and stock updates or to request materials, call 877-773-6397. Sempra Energy's annual report to the Securities and Exchange Commission (Form 10-K) is available to shareholders at no charge by writing to Shareholder Services.

Information also is available on the company's Web site at http://ww. .sempra.com.

Investor Relations

Security analysts, portfolio managers and other members of the financial community should contact:
Dennis Arriola
Vice President,
Investor Relations
Telephone: 619-696-2901
Fax: 619-696-2374

Stock Exchange Listing

Sempra Energy Common Stock:
Ticker Symbol: SRE
New York Stock Exchange
Pacific Stock Exchange

Sempra Energy Trust
Preferred Securities:
New York Stock Exchange

Sempra Energy Income
Equity Units:
New York Stock Exchange

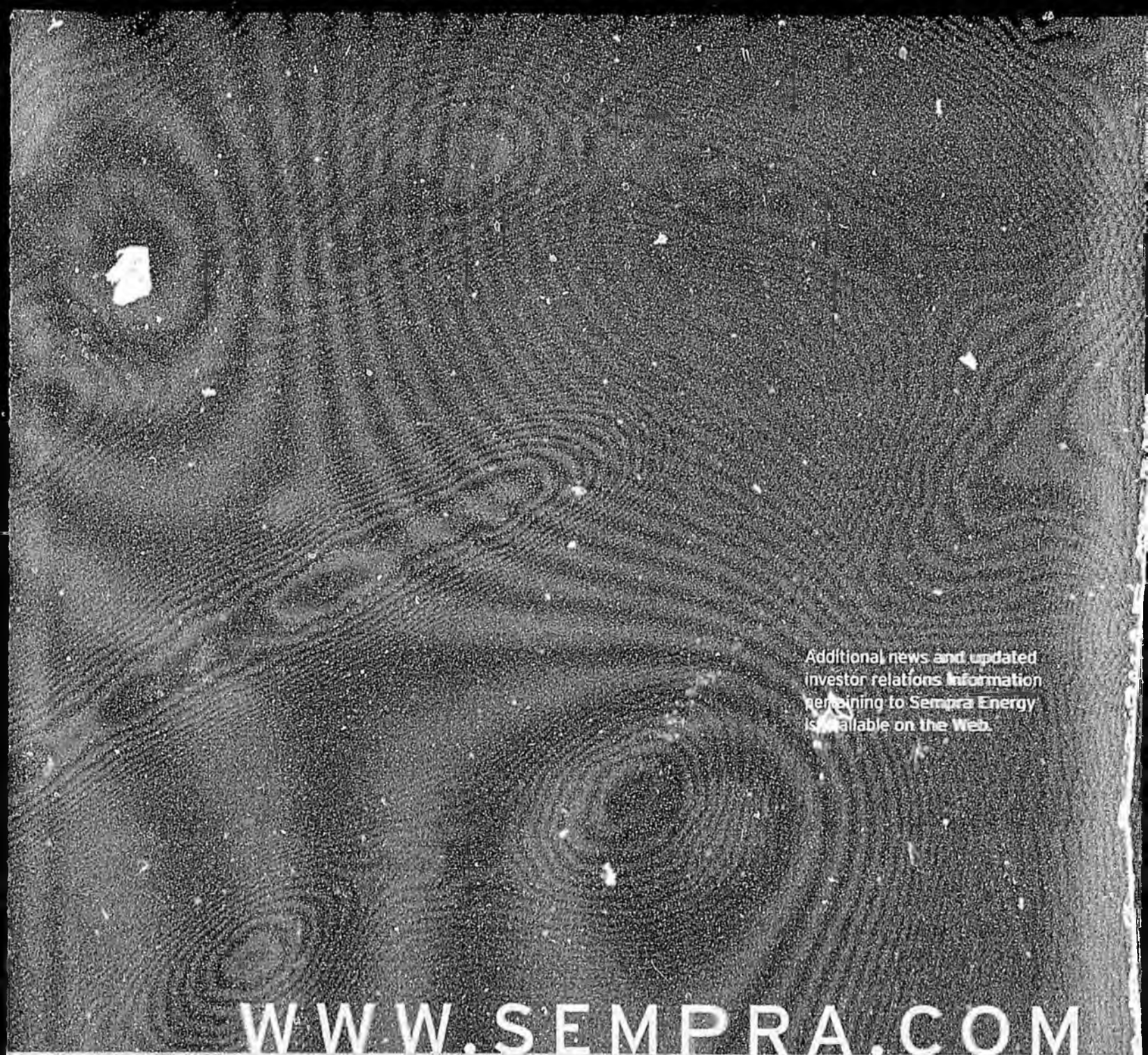
Pacific Enterprises
Preferred Stock:
American Stock Exchange
Pacific Stock Exchange

Southern California Gas
Preferred Stock:
Pacific Stock Exchange

San Diego Gas & Electric
Preferred Stock:
American Stock Exchange

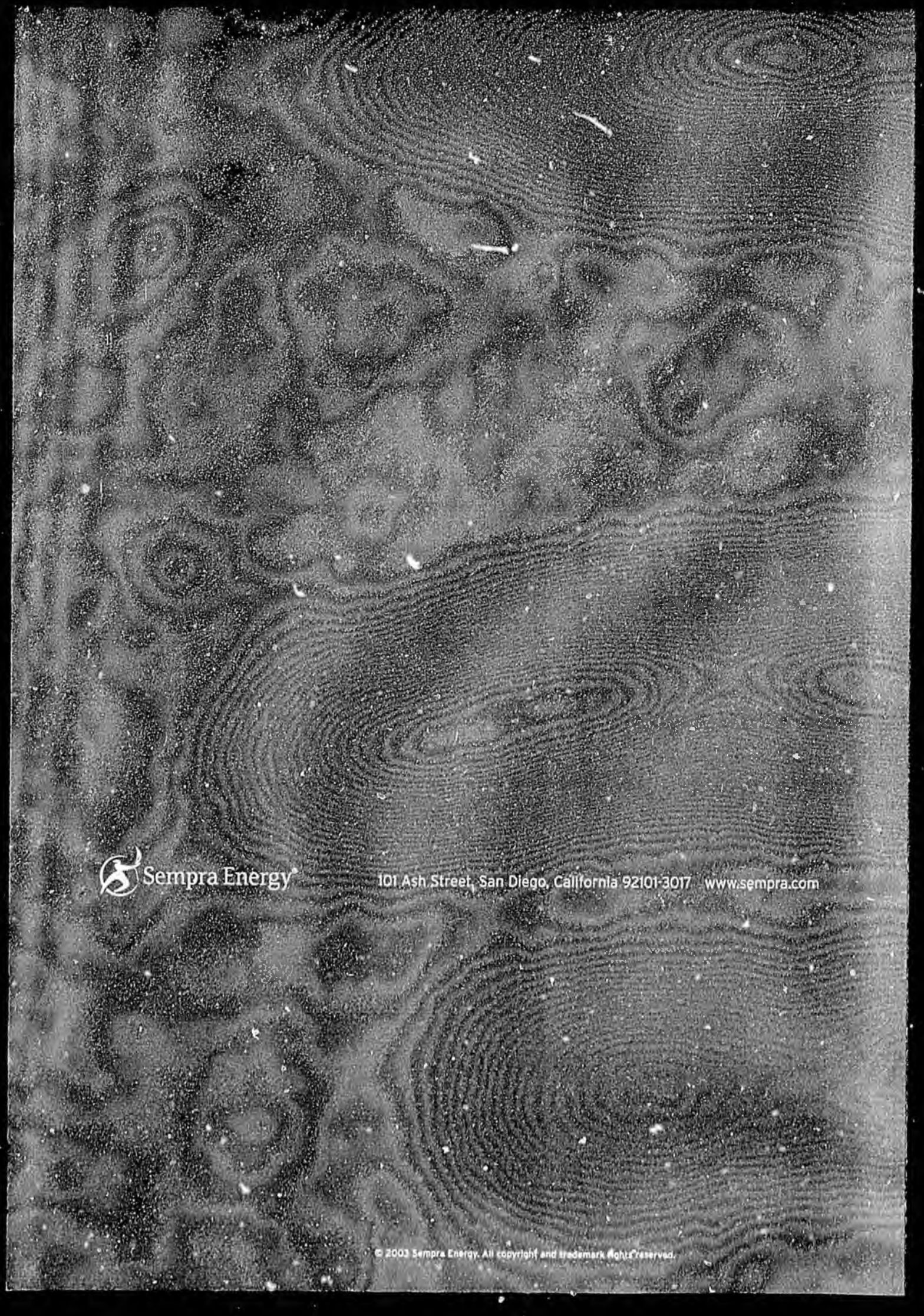
Direct Common Stock Investment Plan

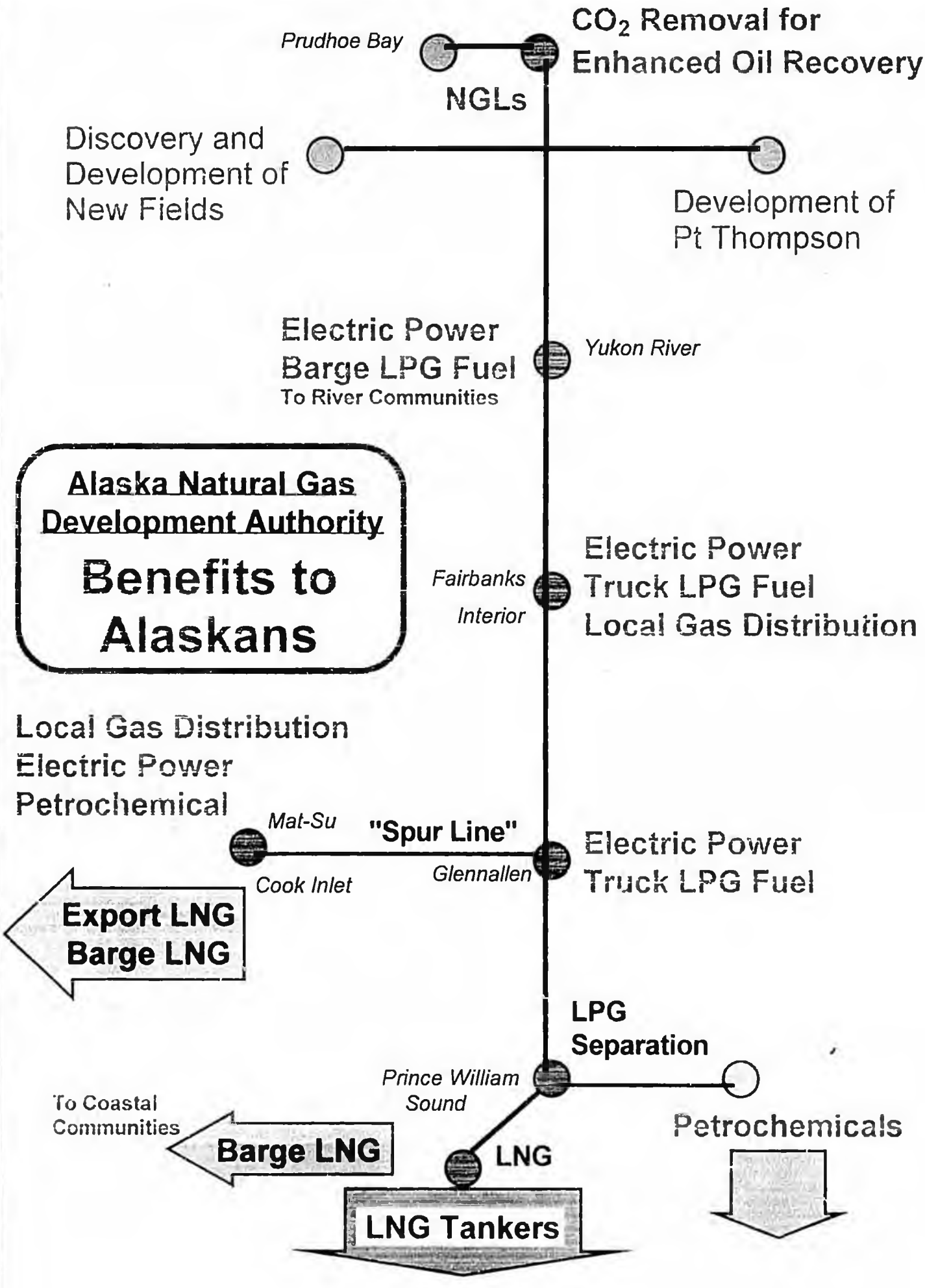
Sempra Energy offers a Direct Common Stock Investment Plan as a simple, convenient and affordable way to invest in the company. Cash dividends from a participant's account can be reinvested automatically in full or in part to purchase additional shares, or participants may choose to receive all or a portion of their cash dividends electronically or by check. Participation in the Plan requires an initial investment of as little as $500. The Plan allows optional cash investments of as little as $25 up to a maximum of $150,000 per calendar year. Nonshareholders pay a $15 fee for the initial cash investment in Sempra Energy. Brokerage commissions incurred in the purchase of shares will be paid by Sempra Energy. The Plan is offered only by the means of a prospectus, which can be obtained by calling the Plan Administrator, EquiServe Trust Company, N.A., at 877-773-6772, or through the Internet at http://www.equiserve.com.



Additional news and updated investor relations information pertaining to Sempra Energy is available on the Web.

WWW.SEMPRA.COM




Prudhoe Bay
CO_2 Removal for Enhanced Oil Recovery
NGLs
Discovery and Development of New Fields
Development of Pt Thompson
Electric Power
Barge LPG Fuel
To River Communities
Yukon River
Alaska Natural Gas Development Authority
Benefits to Alaskans
Fairbanks
Interior
Electric Power
Truck LPG Fuel
Local Gas Distribution
Local Gas Distribution
Electric Power
Petrochemical
Mat-Su
"Spur Line"
Cook Inlet
Glennallen
Electric Power
Truck LPG Fuel
Export LNG
Barge LNG
LPG Separation
Prince William Sound
To Coastal Communities
Barge LNG
LNG
Petrochemicals
LNG Tankers

STATE OF ALASKA

FRANK H. MURKOWSKI, GOVERNOR

ALASKA NATURAL GAS DEVELOPMENT AUTHORITY

411 WEST 4TH AVENUE
ANCHORAGE, ALASKA 99501
TELEPHONE: (907) 257-1347
FACSIMILE: (907) 646-5005

Senator Scott Ogan, Senator Lyda Green, Senator Gary Wilken, and Representative John Harris
Joint Senate/House Finance Committee
Legislative Information Office
716 W 4th Avenue
Anchorage, AK 99501

September 10, 2003

SUBJECT: Proposal to Conduct Conceptual Study

Dear Legislators:

This letter and attachments contains a proposal to conduct a conceptual study for the Alaska Natural Gas Pipeline from Prudhoe Bay to Valdez.

The contents of the proposal will be presented at hearings before the Senate Natural Resources Committee on September 10, 2003 and the Senate Finance Committee on September 11, 2003.

The proposal states the reasons for conducting the conceptual study, the costs of preparation, how the study will be conducted, and the benefits to the State of Alaska. It is planned to present the results of the conceptual study to the Governor and the Legislature when the Legislature convenes in January 2004 and will indicate the costs for proceeding to the next phase of the project.

This study will be conducted by a team of experienced Alaska contractors or internationally recognized experts familiar with Alaska conditions who have been assigned elements of the project as follows:

- Pipelines, Compressor Stations and Spur Line—VECO Alaska, Inc.
- LNG Plant—ASRC Energy Services.
- Marine Facilities at Valdez—Peratrovich, Nottingham & Drage, Inc.
- In-State Uses & Benefit Analys--Northern Economics, Inc.
- Marketing/Competitor Analysis—Wood Mackenzie

The proposals from the team members for conducting their part of the study are included as attachments to this letter.

The cost of developing the conceptual study is estimated at $2.5 million for which we are requesting funding. A breakdown of the conceptual study costs appears as an Attachment. We will proceed with the study immediately upon approval of the funding and will complete the work by January 7, 2004.

Please call me at 257-1347 with any questions you may have.

Sincerely,

Harold C. Heinze, Chief Executive Officer

ATTACHMENTS:

- PowerPoint Presentation
- Summary Contractor Cost and Scope Proposals
- Proposal from VECO Alaska. Inc. for Pipelines and Compressor Stations
- Proposal from ASRC Energy Services for LNG Facilities
- Proposal from Peratrovich, Nottingham & Drage for Marine Facilities
- Proposal from Northern Economics for In-State Uses & Benefit Analysis
- Proposal from Wood Mackenzie for Marketing/Competitor Analysis
- Project Synopsis and Task Analysis of Project Components
- Letters to Yukon Pacific Corporation and Alaska Gasline Port Authority requesting permission to use data

Accelerated Funding Request

- Satisfy statutory requirements in January instead of June next year
- Design funding is focused on new concepts and increased Alaska benefits
- Closes engineering gap with recent highway gasline design of producers
- Significant work value contributed (free)
- Contractors & spending focused in Alaska

ANGDA Design & Benefits Study

• Design & Execution Plan	
– Pipelines	$500 k
– LNG	$900 k
– Marine	$400 k
• In-State Uses & Benefit Analysis	$150 k
• Marketing / Competitor Analysis	$200 k
• Specialized Legal Opinions	$150 k
• Staff & Administrative	$200 k
TOTAL	**$2,500 k**

ANGDA Design & Benefits Study

- **Contributed Studies** (Donated Information)
  - Yukon Pacific
  - Alaska Gasline Port Authority
  - Tanker Design & Cost
  - Training in Alaska & Alaska Hire
  - Gas Compositions & Conservation
- **State In-House Expert Consulting**
  - Revenue Projection & Tariff Modeling
  - Social & Environmental Responsibility
  - Permitting & Land Use / Planning

Benefits in Design Concept

- Spur line to Cook Inlet provides future residential & industrial gas supply in area
- Study of barge mounted LNG plant would allow multi-$B fabrication in Cook Inlet
- LNG thermos bottle barges can supply coastal communities
- Expanded Kenai LNG & urea plant options
- Propane content in gas line key to Yukon River supply and petrochemical plants

ANGDA Funding Request

- ANGDA Board respectfully requests accelerated funding of up to $ 3 million now to finish conceptual design, cost estimate, schedule, benefits analysis, and marketing by Jan '04
- Demonstrated Legislative support to fund this request when session reconvenes would allow ANGDA to "borrow" the money now ($2.5 million)

ANGDA Project Concept & Cost

Project Elements	Size	Cost
Treatment	2 BCFPD share of plant	$ 2 B
Pipelines	54" & 36"	$ 4 B
Liquefaction	4 trains @ 4 M tn/yr	$ 4 B
Tankers	10 LNG @ $200M/ship	$ 2 B
Total Export	**16 M tn/yr**	**$ 12 B**

NOTIONAL Cost of Service

(For Different ANGDA Financial Assumptions)

	High ROR Commercial	Not Taxable	Benefit Driven Infrastructure
Pipeline	1.40	1.00	0.75
LNG	1.50	1.20	0.90
Total Cost of Service	**$2.90**	**$2.20**	**$1.65**

Does **NOT** Include Wellhead Purchase Price

ANGDA Approach to Project Risk Elements

Wellhead Price	Fixed Purchase Price
Construction	Overruns -- Tariff ?
Market Volume	Minimal -- Marketer
Market Price	Basket of Prices
Fiscal Changes	Not Applicable

High-Level ANGDA Strategy

- Support producer-led highway gas line (prefer their investment at risk) & define compatible Alaska benefit projects
- Keep wellhead price of gas high (lower cost of service) to encourage development of new reserves and higher current revenues
- Use margin to support public purposes

Why is ANGDA Getting into Gas Business ?

- Authority will work out commercial terms with a producer-led highway pipeline for gas delivery to maximum Alaska benefit
- LNG based all-Alaskan project is economic and competitive for non-taxable Authority
- Alaska's portfolio of other gas or LNG projects is limited
- Alaska doesn't have multiple shots at a dynamic Pacific Rim market

ALASKA NATURAL GAS AUTHORITY
CONCEPTUAL STUDY

SUMMARY CONTRACTOR COST & SCOPE PROPOSALS

COMPONENT	MAN HOURS	LABOR COST	OTHER COSTS	TOTAL $
Pipelines (VECO Alaska, Inc.)	2,317	$286,925	$39,675	$326,600
Spur Line Glennallen to Anchorage (VECO Alaska, Inc.)	773	$99,725	$13,225	$112,950
LNG (ASRC Energy Services)	7,630	$858,000	$123,000	$981,000
Marine (Peratrovich, Nottingham & Drage)	3,493	$326,455	$173,210	$499,665
LNG Tankers				Contributed
In-State Uses & Benefit Analysis (Northern Economics)	1,480	$151,100	$500	$151,600
Marketing/Competitor Analysis (Wood Mackenzie)	Unkown	$120,000		$120,000
Specialized Legal Opinions	Unkown	$150,000		$150,000
Staff & Administrative (ANGPA)	2,260	$157,400	$42,600	$200,000
TOTAL STUDY COSTS	**17,953**	**$2,202,505**	**$392,210**	**$2,594,715**

Proposal for Engineering Services:

Pipeline and Compressor Stations

Submitted to:

Alaska Natural Gas Development Authority

September 8, 2003

TABLE OF CONTENTS

Letter of Introduction

8 September 2003

Alaska Natural Gas Development Authority
411 West 4th Avenue,
Anchorage, AK 99501

Attention: Harold Heinze, CEO

Subject: Proposal for Engineering Services: Pipeline and Compressor Stations

Gentlemen:

Based upon our meeting of August 26, we are pleased to respond to your request for a proposal to review, analyze, validate, and update the Yukon Pacific TAGS model for an LNG Export Project.

We understand you are breaking the project into several large pieces for engineering review:

1. North Slope Gas Treatment Facility
2. LNG Export Pipeline and Compressor Stations
3. South Central Natural Gas Spur Pipeline System
4. LNG Plant
5. Tankers

VECO Alaska is well qualified to assist with both the Pipeline/Compressor Station System and the North Slope Gas Treatment Facility. We also can be of assistance to an LNG Plant designer in the capacity of advisor for modularization of that facility.

The attached proposal is limited to Item Nos. 2 and 3, the LNG Export Pipeline and Compressor Stations and the South Central Natural Gas Spur Pipeline System. We have completed three similar studies in the past two years, one for the Alaska Gas Producers Pipeline Team for whom we analyzed and estimated costs for a dense phase system delivering 4+ BCFD along two separate routes to move North Slope Gas from Prudhoe Bay to the Edmonton, Alberta area; and two separate studies for the Mackenzie Delta Explorers Group for whom we analyzed and estimated costs for one route and three separate cases where the variables were throughput volume, product phase, and hydraulic pressure.

Our recent experience in this type engineering study and analysis is unmatched, as is our ability to dedicate the time of the same key individuals who produced the recent studies cited above. We look forward to answering any questions you may have and are available to meet at your convenience.

Very truly yours,
VECO Alaska, Inc.

for Wesley P. Nason

Section 1 Executive Summary

VECO Alaska, Inc. has assembled an experienced Team of in-house experts and third party consultants for the purpose of reviewing, updating, and reporting on the design criteria, capital cost estimates, and operating cost estimates for an LNG Export Pipeline System running from a gas treatment plant at Prudhoe Bay to a gas liquefaction plant near Valdez. The results of this study will provide the Alaska Natural Gas Development Authority with a basis for analyzing project economics using updated estimates based on 2003 costs.

The study will also provide independent review and verification of concepts and assumptions made by other conceptual studies of the Alaska LNG Export Project.

In addition to reviewing and updating the Alaska LNG Export Project, the study will provide a conceptual design and cost estimate for designing, building, and operating a spur pipeline from the vicinity of Glennallen to a tie-in point on the Cook Inlet natural gas pipeline grid. In conjunction with estimating costs for transferring natural gas from the Export Pipeline to the Cook Inlet gas distribution grid, the study will look at options for local uses of the natural gas liquids which are contained in the dense flow stream of the Export Pipeline.

Section 2 Study Objectives and Deliverables

We have reviewed your verbal request for proposal and confirm our understanding of the study objectives and deliverables as stated below:

i) Study Objectives

Key objectives of this study are to determine the cost and constructability of a pipeline system that:

- Provides an economic solution for delivering Alaska North Slope gas to Pacific Rim customers by providing an identifiable rate of return on investment to the State of Alaska, an identifiable net back price to the suppliers of natural gas throughput, and quantifiable revenues to the State of Alaska.
- Maximizes jobs for Alaskans and access to gas for Alaskans.
- Provides lowest total-cost-of-ownership solution i.e. sensible CAPEX-OPEX tradeoffs.
- Economically accommodates initial volumes.
- Is easily/economically expanded i.e. optimizes the system's long-term expansion capability.
- Delivers spec gas to market.
- Is operationally sound and provides industry-standard sparing philosophies and reliability.
- Satisfies Alaska's unique environmental requirements.

The scope of the proposed study as outlined in the proposal is to:

- Review and comment on hydraulic pipeline design.
- Review the State's current projections for gas sales and if substantially different from the Yukon Pacific Model, re-run the hydraulics and re-size the line and compressors based on the new throughput and operating pressure variables.
- Review and comment on design assumptions with respect to geotechnical and thermal conditions.
- Review geothermal analysis and civil design of pipeline and compressor stations.
- Review and validate assumptions of Yukon Pacific Corporation's (YPC) pipeline and compressor station construction cost estimate, and if necessary, update cost components and construction variables based on a new throughput scenario.
- Update estimated Capital Expenditure (CAPEX) for pipeline and compressor stations based on current year (2003) cost elements for labor, equipment, and other identifiable variables.
- Assess potential for utilization of unmanned compressor station facilities.
- Update estimated Operating Expenditure (OPEX) for pipeline and compressor stations based on current year (2003) cost elements and for remote, semi-attended or unattended operation.
- Identify long lead items and validate project schedule, including the feasibility/practicality of a two-year construction schedule.
- Research potential for using Alaskan resources to the fullest extent possible.

- Develop conceptual design and cost estimate, including hydraulic analysis, preliminary routing, route characterization, system descriptions for pipeline and compressors, and CAPEX estimate for a small diameter spur line from Glenallen to the south central Alaskan distribution grid.
- Analyze the options for extracting natural gas liquids from the spur line throughput and either re-inject them into the main export line, or capture them for local use at either Glennallen or Palmer.

ii) Deliverables

VECO's Team will provide analysis and validation of the YPC Export Pipeline Model and for the South Central Spur Pipeline, including suggested improvements and alternatives, including:

- System descriptions for all systems, initial and expanded. This will include the following items: pipeline diameters, wall thickness, material selection, and reasons for choices e.g. location of compressor stations.
- Conceptual illustration of all systems overlaid on top of a map of Alaska.
- Block Flow Diagrams of transmission system (pipeline and compression).
- Process Flow Diagram of a typical compressor station.
- Pipeline profiles. Distance vs. elevation, liquids holdup, temperature, pressure etc.
- Capital cost estimate for engineering, procurement, construction and installation of new equipment to +/-30% accuracy or better. Crewed-up cost estimates for pipeline construction and ICARUS facility cost estimates for compressor stations.
- OPEX estimate for all pipeline systems including basis for calculations.
- Pipeline compression horsepower and fuel gas consumption estimates, initial and expanded.
- High-level project schedule and expenditure profile.
- Recommendation of best overall system to meet the objectives.
- Per Client request, Toll Estimates will not be required as part of this study.
- Draft study report and summary presentation (hard copies and electronic format).
- Final study report and summary presentation (hard copies and electronic format).

Section 3 Execution Plan

VECO Engineering brings specific expertise applicable to the scale and complexity of this study from:

- Recent front-end definition and feasibility study experience on two similar arctic gas pipeline projects.
- Recent front-end definition, route selection, and cost estimate for South Western Alaska Power Project, including a 325 mile, small diameter, spur pipeline from Cook Inlet to Donlin Creek.
- Monetization studies, tolls and tariffs analysis, execution planning and project management for multi-party execution of multi-billion dollar scale projects.
- Unparalleled construction / constructability and fabrication experience in Alaska's Northern/Arctic environment.
- Logistics capability for major scale projects in Arctic environments.
- Pipeline hydraulics optimization and design expertise, including applications on major global pipelines.
- Geotechnical and route characterization skills and personnel spanning thirty years of arctic projects.
- Industry leading cost estimating and toll modeling capabilities that are already in place and proven.

The pipeline hydraulics and process engineering form a major part of the subject study and we have taken this opportunity to describe below in detail the strengths we have in this area and the approach we will adopt.

i) Execution

Step 1 – Scope Definition

The first step will be to meet with the Alaska Natural Gas Development Authority (the Client) to determine the gas sales/pipeline throughput case upon which to base the Export Pipeline Study. We will also need to establish throughput needs for the South Central Spur Pipeline Study. We will need to obtain relevant data from the Port Authority Study and YPC's past work, including proposed route alignments, gas analyses, the phase behavior for the range of gas compositions involved, including critical pressure, critical temperature, cricondetherm and cricondebar pressure values, in order to determine the conditions under which liquid formation will occur.

Preliminary hydraulics will then be run to understand the potential variability in line size for the desired throughput.

Step 2 – Facility Design

The second step will be to review the individual blocks that make up the alternatives arrived at in Step 1.

For the Export Pipeline this will include:

- Review and validation of the final YPC Route alignment.
- Review of all YPC plans including alignment sheets.
- Review and verification of YPC's design to ensure that current codes and practices in Northern regions are met.
- Review and recap of YPC's route characterization from a topographical, geological, and geotechnical perspective.
- Review and validation of YPC's proposed construction modes for the pipeline right-of-way and ditch. Examples of Typical modes are shown in Figures 1 and 2.
- Review of YPC's mile by mile design to validate that the proposed construction modes conform to topography and soil conditions.
- Review and verification of YPC's estimated construction quantities.

For the Export Pipeline compressor stations VECO's tasks will include:

Review and validation of YPC's process flow diagrams (PFD's). If needed, VECO will prepare or revise the diagrams.

- Review and verification of YPC's proposed size for major equipment, utilities, offsites and support infrastructure.
- Review of all YPC plans including preliminary plot plans.

For the South Central Spur Pipeline this will include:

- Review and summarize route topographic, geotechnical, and seismic data available in the public domain for the terrain between Glennallen and Palmer.
- Establish preferred route taking into account land ownership, geotechnical criteria, and thermal design.
- Establish design criteria using current codes and practices in Northern regions are met.
- Summarize route characterization from a topographical, geological, and geotechnical perspective.
- Establish Construction Execution Plan including construction seasons, number of spreads, and proposed construction modes for the pipeline right-of-way and ditch.
- Summarize estimated construction quantities.

For the South Central NGL Processing Facility this will include:

- Evaluate design criteria for gas liquids extraction and disposition and for compressor station, based on the following:
  - Processing requirement for Anchorage and South Central Railbelt population.
  - Dense phase gas composition
  - Desirable products from the South Central processing facility - C1, C2/C3, NGL's etc.
  - Dense Phase pipeline operating pressure and temperature
  - Dense Phase pipeline capacity
  - South Central Sales Gas Delivery pressure
  - South Central Sales Gas Specifications

- Assumed Facilities:
  - Inlet separation and liquid handling facility
  - Dehydration Facility
  - Deep Cut Facility - probably Turbo Expander Unit capable of making a C1 product
  - Recompression Facilities to boost pressure of Gas to suitable sales gas pressure.
  - NGL storage facilities on site
  - NGL pumps to transfer product back into the Dense Phase line or to a dedicated NGL line
  - Inlet liquids metering facilities
  - Sales Gas and NGL metering facilities

- The Glennallen or South Central processing facility would see the gas dehydrated. The gas stream would then be separated by cryogenic distillation into a methane-rich stream for sales into the existing South Central domestic gas distribution system. The NGL stream could either be transported to an end user directly as NGL or reinjected back into the dense phase pipeline for transportation to the next location and further processing/transportation.

Snow / Ice Pad

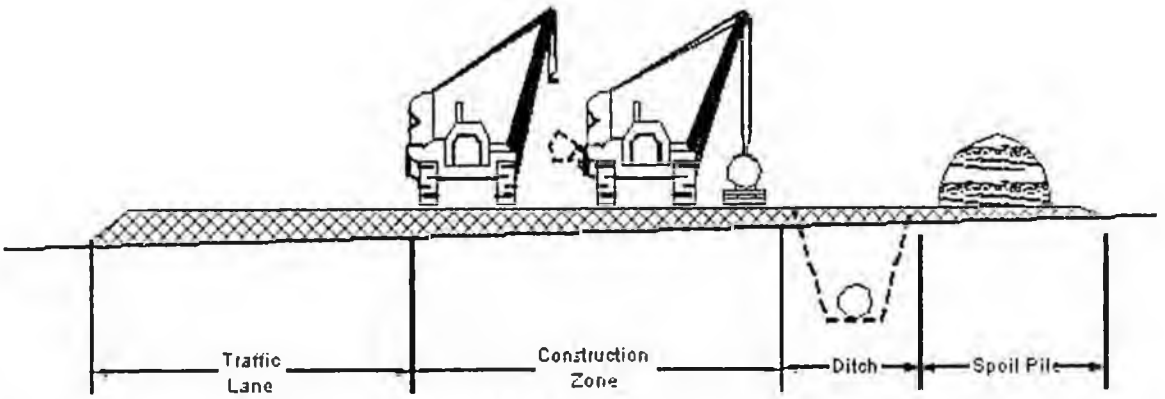


Figure 1 - Typical Work Pad Construction Mode

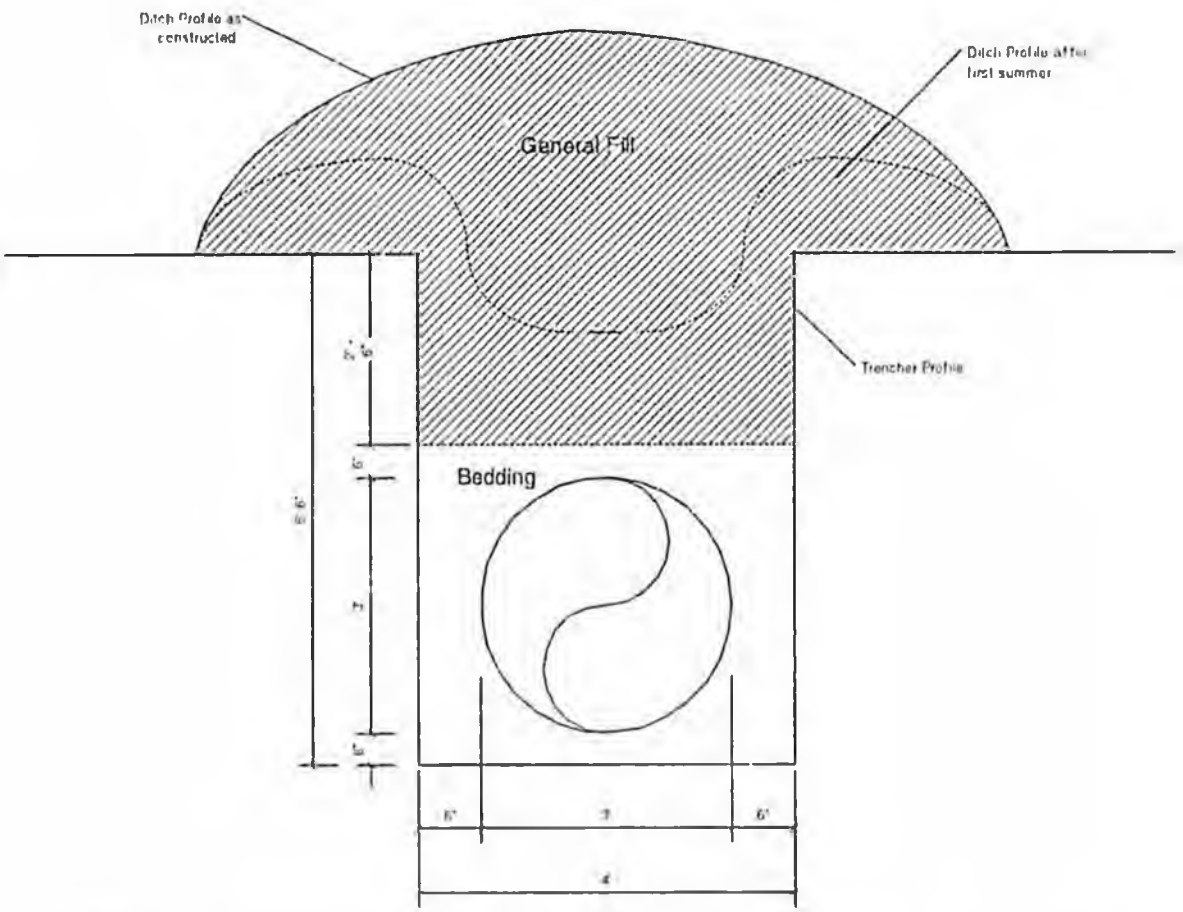


Figure 2 - Typical Ditch Mode: Continuously Excavated with Chain Trencher in Cold Permafrost

Step 3 – Export Pipeline and Compressor Station and Spur Line Cost

The third step will be to review and verify YPC's costs for the various building blocks that make up the alternatives defined in Step 1.

For the Export Pipeline, VECO will:

- Review and validate YPC's estimate for the equipment and manpower required to construct the line along with appropriate unit costs.
- Review and validate YPC's estimate of the crews required to build the pipeline.
- Review and validate YPC's estimate of construction crews from a manpower and equipment standpoint. A typical example is shown in Table 1.
- Review and validate through industry benchmarking, YPC's estimated crew productivities based on terrain, subsurface, and weather factors.
- Review and validate YPC's estimate of the duration of construction seasons along the route.
- Review and revise as necessary, YPC's Construction Execution Plan (CEP) along with associated support and logistics requirements. A typical example is shown in Table 2.
- Prepare a crewed up cost estimate using YPC's input (as revised) and the North of 60 Pipeline Estimating Model. An example of a typical pipeline section is shown in Table 3.
- Evaluate and estimate utilization of Alaska resources.

For the Export compressor facilities VECO will:

- Obtain budgetary quotes for major equipment and compare with YPC estimates and update as required.
- Review and revise as needed, YPC's Construction Execution Plan and assess opportunities for modularization.
- Develop a factored construction estimate using VECO's ICARUS Estimating Model, based on equipment cost.
- Evaluate potential for utilizing Alaskan resources wherever possible.

For the South Central Spur Pipeline, VECO will:

- Establish unit costs for labor, equipment, and other cost components.
- Establish construction crew size, composition, and productivity required to build the pipeline, through industry benchmarking, terrain, subsurface, and weather factors.
- Establish the duration of construction seasons along the route.
- Build Construction Execution Plan (CEP) along with associated support and logistics requirements.
- Prepare a crewed up cost estimate using the North of 60 Pipeline Estimating Model.
- Evaluate and estimate utilization of Alaska resources.

Pipeline Operation **Grade ROW**
Pipe Diameter 30 inch
Pipe Wall Thickness .656 inches

Manpower Requirements	Mainline Production	Mini Crew
Operator Foreman	1	1
Operator 1	6	6
Operator 4	1	1
Laborer 1	6	6
Laborer 2		3
Total Craft Personnel	14	17

Equipment Requirements	Mainline Production	Mini Crew
Pick-up, 4x4	3	3
Flatbed, 3 Ton	1	1
Bus, 26 Passenger	1	1
Bus, 45 Passenger		
Backhoe, 235	1	2
Backhoe, 235 w/ Hammer		
Dozer, D10 w/ Ripper		1
Dozer, D9 w/ Ripper	1	1
Dozer, D8 w/ Winch	1	2
Dozer, D6 LGP	3	
Motor Grader 14G		1
Light Plant	2	
Mobile Radio	5	5
Winch 100 Ton		1
John Henry Drill		1
Total Equipment Pieces	18	19

Table 1 – Typical Crew Makeup Sheet

Spread	Section	Milepost	Length	Season	Camp Location & Size	
A	6	MP 0 - 76	76	W1	MP 50	Swimming Point
	7	MP 76 - 143	67	W2	MP 76	Inuvik
B	8	MP 143 - 211	68	W2	MP 176	Travailiant Lake
	9	MP 211 - 281	70	W1	MP 223	Little Chicago
C	10	MP 281 - 346	65	W1	MP 301	Fort Good Hope
	11	MP 346 - 411	65	W2	MP 391	Norman Wells
D	12	MP 411 - 476	65	W2	MP 441	Fort Norman
	13	MP 476 - 541	65	W1	MP 516	Blackwater River
E	14	MP 541 - 606	65	W1	MP 576	Wrigley
	15	MP 606 - 671	65	W2	MP 636	No Name
F	16	MP 671 - 731	60	W2	MP 696	Fort Simpson
	17	MP 731 - 786	55	W1	MP 746	Mackenzie Hwy
G	18	MP 786 - 841	55	W1	MP 811	Trainor Lake
	19	MP 841 - 896	55	W2	MP 876	North Zama
H	20	MP 896 - 951	55	W2	MP 951	Highway 58
	21	MP 951 - 1006	55	W1	MP 951	Highway 58
I	22A	MP 1006 - 1056	50	W1	MP 1056	Notikewin River
	22B	MP 1056 - 1106	50	W2	MP 1056	Notikewin River
	23	MP 1106 - 1156	50	S2		None
			1,156			

Table 2 – Typical Construction Execution Plan Spread Summary

SPREAD:	A1
Route:	xyz
Pipeline Diameter (inches)	30
Wall Thickness (inches)	0.65
Labor Hours Per Shift	10
Equipment Hours Per Shift	10

												Operational Costs		
Description	Direct / Indirect	Equipment Weight (tons)	Start Date	End Date	Duration (days)	Labourers	Man-days	Operational Quantity	Units	Labour	Equipment	Tool & Supplies	Subcontracts Distribution	Materials Distribution
Survey ROW Centerline	D	6.45	1-Jun-2004	24-Mar-2005	274	5	1,220	237,600	FT	566,746	118,520	35,206	0	0
Pipe Haul to ROW Stockpiles	D	0.00	15-Nov-2004	15-Dec-2004	30	0	0	237,600	FT	0	0	0	3,430,276	0
Material Haul to Onsite Warehouse	D	0.00	15-Nov-2004	15-Dec-2004	30	0	0	2	EA	0	0	0	3,900	0
ROW Clearing - Light Timber	D	223.00	7-Jun-2004	13-Jun-2004	6	28	168	32,260	FT	83,095	47,034	4,986	0	0
Snow Fence Installation	D	27.20	15-Nov-2004	29-Nov-2004	14	11	154	28,155	FT	71,112	20,742	4,267	0	0
Snow/Ice Pad Construction	D	442.25	1-Dec-2004	2-Mar-2005	91	35	3,185	187,968	FT	1,575,383	1,662,768	94,523	0	0
Gravel Pad Road Construction	D	805.85	1-Dec-2004	13-Mar-2005	102	41	8,323	608,561	CY	4,197,350	6,957,827	251,841	0	0
Ditch Excavation - Trencher	D	1,464.20	22-Jan-2005	19-Mar-2005	56	43	2,408	227,040	FT	1,199,920	2,939,962	71,815	0	0
Ditch Excavation - Backhoe	D	1,125.90	22-Jan-2005	19-Mar-2005	56	34	102	10,560	FT	51,000	89,977	3,060	0	0
Ditch Excavation - Drill & Shoot	D	668.75	22-Jan-2005	19-Mar-2005	56	38	114	10,560	FT	56,402	45,583	3,384	0	0
Load, Haul, & String Pipe	D	906.40	15-Jan-2005	24-Mar-2005	46	31	1,564	237,600	FT	763,889	723,002	45,830	0	0
Bend & Set-up Pipe	D	184.05	17-Jan-2005	4-Mar-2005	46	16	736	237,600	FT	367,567	372,044	21,454	0	0
Rig-up Automatic Welding	D	63.40	1-Dec-2004	5-Jan-2005	35	36	1,260	1	LOT	663,873	238,648	39,832	0	0
Pipe Line-up & Root Pass	D	322.40	20-Jan-2005	7-Mar-2005	46	55	2,530	3,211	WELD	1,304,574	844,328	78,274	0	0
Fill Welding & Weld Repair	D	437.35	20-Jan-2005	7-Mar-2005	46	76	3,496	3,211	WELD	2,071,562	825,063	124,294	0	0
Bedding & Padding	D	859.30	25-Jan-2005	12-Mar-2005	46	39	1,794	237,600	FT	900,652	1,926,121	54,039	0	0
Field Coat Pipe Welds	D	100.20	22-Jan-2005	9-Mar-2005	46	22	1,012	3,372	WELD	488,110	230,402	29,287	0	0
Lower-in Pipe	D	575.65	24-Jan-2005	11-Mar-2005	46	33	1,518	237,600	FT	759,746	610,283	45,585	0	0
Pipe Tie-ins	D	959.60	24-Jan-2005	11-Mar-2005	46	56	3,128	237,600	FT	1,633,467	1,091,839	98,008	0	0
Set-on Pipe Weights	D	85.90	24-Jan-2005	7-Feb-2005	14	12	168	1,000	EA	79,273	40,694	4,756	0	0
Backfill & ROW Clean-up	D	616.25	26-Jan-2005	13-Mar-2005	46	40	1,840	237,600	FT	888,082	802,305	53,285	0	0
Rig-up Cleaning & Testing Crew	D	118.70	1-Mar-2005	15-Mar-2005	14	18	252	1	LOT	137,963	35,765	8,278	0	0
Clean, Test, & Dry Line	D	574.60	15-Mar-2005	4-Apr-2005	20	45	900	4	SECTION	520,856	520,718	31,251	500,000	0
Pipe Spool Fabrication (Valve Sta.)	D	77.20	1-Dec-2004	10-Dec-2004	9	16	144	900	DI	86,496	18,188	5,190	0	0
Install Block Valves & Spools	D	247.35	12-Feb-2005	18-Feb-2005	6	24	144	2	VALVE	75,222	39,621	4,513	0	0
Valve Vault Foundation Concrete	D	98.40	1-Feb-2005	5-Feb-2005	4	13	52	2	VALVE	24,916	14,765	1,495	0	0
Valve Vault Building Installation	D	154.55	16-Feb-2005	2-Mar-2005	12	19	228	2	VALVE	114,328	52,067	6,860	0	0
Restore ROW & Access Roads	D	332.10	27-Jan-2005	14-Mar-2005	46	32	1,472	237,600	FT	774,045	535,621	43,443	0	0
Weld NDE Inspection	D	11.15	20-Jan-2005	11-Mar-2005	50	8	400	237,600	FT	155,172	25,080	9,310	0	0
As-Built Survey	D	17.45	1-Jul-2004	13-Mar-2005	255	19	3,953	237,600	FT	1,557,032	141,559	93,422	0	0
Special Civil Construction	D	0.00	27-Jan-2005	14-Mar-2005	46	0	0	237,600	FT	0	0	0	1,663,200	0
Gravel Pit Development Close-out	D	415.00	1-Jun-2004	21-Oct-2004	142	20	900	3	LOT	442,859	654,709	26,572	0	0
Mine Process Gravel Material	D	628.65	10-Jun-2004	15-Oct-2004	127	33	21,252	3,216,355	CY	10,560,312	16,832,453	633,619	0	3,216,355
Work Pad Maintenance	I	213.60	10-Jan-2005	15-Mar-2005	54	16	1,024	237,600	FT	514,015	609,850	30,841	0	0
Construction Support	I	568.00	15-Jan-2005	15-Mar-2005	59	66	3,935	237,600	FT	2,153,433	1,700,913	129,206	0	0
Construction Support	I	368.40	1-Jun-2004	30-Oct-2004	151	42	6,342	237,600	FT	3,549,257	2,067,960	212,955	0	0
Environmental Support	I	12.30	15-Jan-2005	15-Mar-2005	59	6	354	237,600	FT	163,572	45,844	9,814	0	0
Pipeline Testing Support	I	196.10	15-Mar-2005	4-Apr-2005	20	14	280	237,600	FT	154,973	110,716	9,298	0	0
Move-On & Move Off	I	315.40	15-May-2004	11-Apr-2005	331	40	2,240	1	LOT	1,104,858	564,672	66,291	0	0
Safety Orientation and Drug Testing	I	0.00	15-May-2004	18-Apr-2005	336	0	0	1	LOT	0	0	0	0	0
Craft Non-Hourly Wages (Bonuses)	I	0.00	15-May-2004	18-Apr-2005	336	0	0	1	LOT	0	0	0	0	0
Construction Supervision	I	47.20	1-Nov-2004	18-Apr-2005	168	25	4,200	168	DAYS	1,866,640	376,493	0	0	0
Construction Supervision (PSI)	I	40.10	15-May-2004	1-Nov-2004	170	21	3,570	170	DAYS	1,598,000	321,452	0	0	0
Camp Mobilization	I	332.10	1-May-2004	31-May-2004	30	33	990	1	LOT	494,031	270,380	29,642	0	0
Camp Operations	I	261.10	15-May-2004	18-Apr-2005	336	31	10,478	1	LOT	4,933,661	3,985,522	296,019	0	0
Contractor Onsite Facilities	I	153.05	15-May-2004	18-Apr-2005	336	3	1,014	336	DAYS	563,074	613,143	33,784	0	0
Contractor Offsite/Home Office Facilities	I													
Air Freight Support	I													
Camp Rent	I													
Camp Catering	I													
Equipment Mobilization	I													
Equipment Demobilization	I													
Personnel Airfare (Mob/Demob/R&R)	I													
Contractor Overhead	I													
		15,550.20	1-May-2004	18-Apr-2005	352	1,279	130,377			66,516,314	73,270,002	3,723,160		

Table 3 – Typical Pipeline Estimating Model Section Cost Summary

Step 4 - Alternative Assessment

Export Pipeline System

Once the YPC Model design and cost estimates have been reviewed, validated and updated, the Team will then assess other potential options defined and mutually agreed upon with ANGDA in Step 1, establishing the pros and cons based on cost, tariff and future expandability. The results any such analysis, along with recommendations, will be reviewed with the Client. Having reviewed the alternatives, the Team and Client will decide to either keep YPC's base case or to select one alternative for further optimization.

South Central Spur Pipeline System

Once the Spur Pipeline Model design criteria and cost estimates have been agreed upon, the Team will then assess other potential options defined and mutually agreed upon with ANGDA to establish the pros and cons for natural gas liquids extraction/disposition and future expandability. The results any such alternative analysis, along with recommendations, will be reviewed with the Client. Having reviewed the alternatives, the Team and Client will decide to either keep the base case or to select one alternative for further optimization.

Step 5 – Optimization

Export Pipeline System

If a system alternative other than the YPC base case is selected in Step 4, it will then be optimized. Three or potentially four variables will be considered in the optimization analysis:

- Throughput
- Line Size
- Operating Pressure
- Compressor Station Driver Horsepower

Various permutations and combinations of the alternate system will be analyzed. The proposed methodology and results are shown in Figure 5.

South Central Spur Pipeline and NGL Processing System

If a system alternative other than the base case is selected in Step 4, it will then be optimized. Five variables will be considered in the optimization analysis:

- Point of NGL extraction
- Throughput
- Line Size
- Operating Pressure
- Compressor Station Driver Horsepower

Various permutations and combinations of the alternate system will be analyzed. The proposed methodology and results are shown in Figure 5.

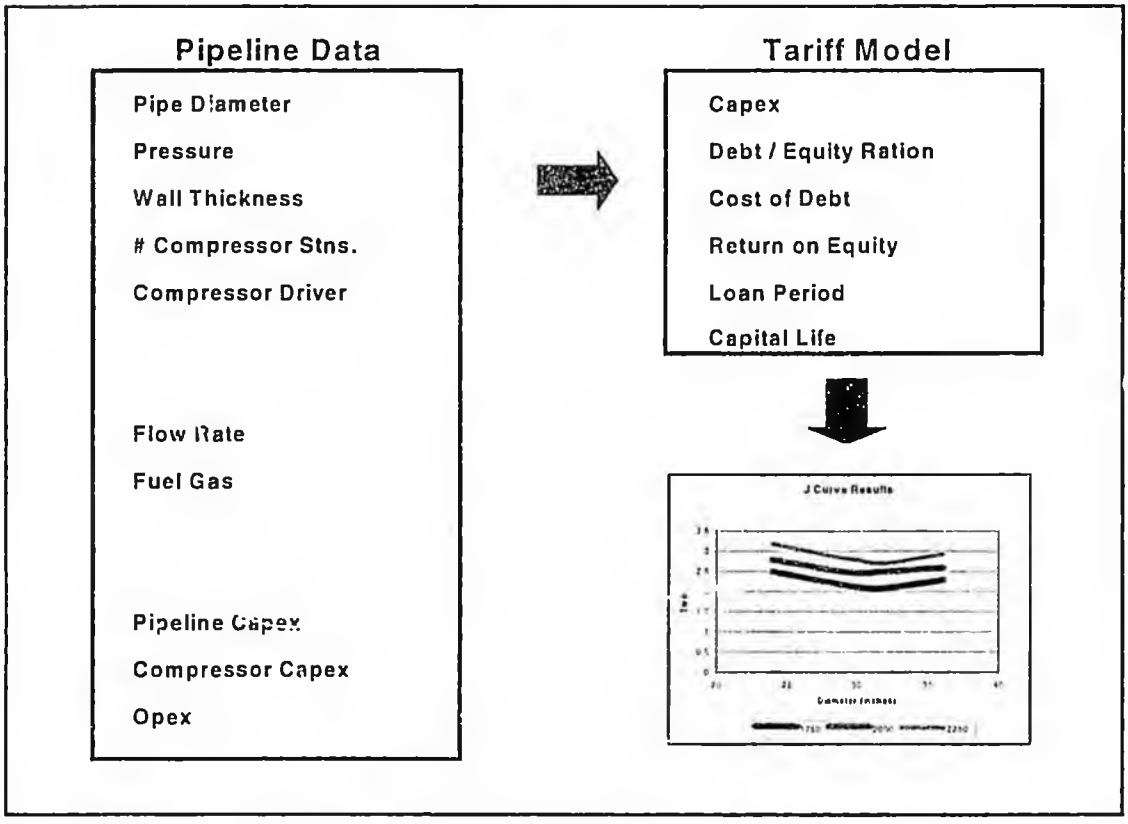


Figure 5 - System Optimization

Step 6 - Documentation

Having completed the optimization work, the final step in the study will be to document and present the results to the Client. Documentation will include:

- A final report summarizing the methodology and the results of the Export Pipeline System Study.
- A final report summarizing the methodology and the results of the South Central Spur Pipeline System
- An overview presentation.

The VECO Team will provide documentation in both paper and electronic form.

ii) Systems and Tools

We will utilize proven systems directly applicable to the scale and complexity of the project:

- Integrated Project Management Systems.
- Use of proven estimating tools suitable for a multi-billion dollar scale project.
- Proprietary computer modeling software for design and operational analysis of single and multi-phase gas systems. This software can be used to quickly develop detailed steady state and dynamic simulations of complete systems containing centrifugal and reciprocating compressors with appropriate drivers, piping, heat exchangers, control valves, etc. It was recently used to optimize the pipeline systems being evaluated by the Alaska Gas Producers and the Mackenzie Delta Explorers.

iii) Offices

The VECO Team presents an Alaskan based solution. with a Team that will execute the work primarily from VECO's Anchorage office.

Three work stations complete with computer, phone and network connections to VECO's server will be provided for client use and are included in the cost.

Support activities, as needed, will be provided John Wolflik from Las Cruces, NM for hydraulics, North of 60 Engineering out of Calgary, AB for programming and cost estimating support, and the VECO, Calgary office for compressor station design verification and cost estimating.

iv) Conclusion

Our Team proposal is based on:

- A world-class project team comprised of the very best personnel who bring key expertise, direct knowledge and experience gained from Northern pipeline projects.
- Our use of proven models for northern pipeline design, cost estimating and optimization.
- Our expertise in hydraulic modeling and facilities design.
- Our focus on HSE and pacesetter project performance.

We are:

- Particularly well qualified to undertake this study through relevant Northern experience.
- Able to start work immediately with a Team that has this specific relevant experience.
- Committed to providing high quality results that are fit for purpose and meet the Client's needs in all respects, including schedule and budget.

Section 4 Study Schedule

The following project execution schedule indicates preliminary results available by the middle of November with issuance of the final reports by January 15th, 2004.

The following are the key milestones identified in the project execution schedule:

Project Award	September 15, 2003
Kick Off Meeting	September 18, 2003
Scope Review Meeting	September 25, 2003
Optimization Review	October 1, 2003
Preliminary Compression Estimate Review Meeting	October 16, 2003
Preliminary Pipeline Estimate Review Meeting	November 13, 2003
Draft Report Issued	December 18, 2003
Final Report Issued	January 15, 2004

Section 5 Study Cost

i) Cost by Discipline

SUMMARY ESTIMATE	$US
LNG EXPORT PIPELINE & FACILITIES	
Project Management	$ 39,500
Process Engineering	47,300
Export Pipeline Engineering	74,500
Export Facilities Engineering	25,000
Constructability	29,500
Route Characterization	24,750
Environmental	14,500
Estimating	52,050
Drafting	5,000
Project Controls, admin assistance Document control, accounting	14,500
SUB-TOTAL LNG EXPORT SYSTEM	$326,600
SOUTHCENTRAL SPUR PIPELINE & FACILITIES	
Process Engineering	43,200
Pipeline Engineering	15,000
Constructability	10,000
Estimating	20,000
Route Characterization	24,750
SUB-TOTAL SPUR LINE SYSTEM	$112,950
Two work stations/one office rental with phone, computer and network access (Four months)	14,400
Reproductions	15,000
Software	3,500
Travel expenses	20,000
SUB-TOTAL MISC & UNALLOCABLE COSTS	$ 38,500
TOTAL	$492,450

ii) Cost by Deliverables

SUMMARY ESTIMATE	$US
LNG EXPORT PIPELINE & FACILITIES	
Systems descriptions for all systems, initial and ultimate flows	$ 16,800
Conceptual illustration of all systems, map overlay	5,000
PFD's for the pipeline, compressor stations, and plants	14,300
Pipeline profiles and hydraulic output	25,100
Capex cost estimate	114,700
Opex cost estimate	20,100
Horsepower & fuel consumption estimates, initial and ultimate	5,600
Project schedule and expenditure profile	20,700
Recommendation of best overall system	23,000
Draft study report	51,500
Final study report	29,800
Sub-Total	$326,600
SOUTHCENTRL SPUR PIPELINE & FACILITIES	
Systems descriptions for all systems, initial and ultimate flows	4,800
Conceptual illustration of all systems, map overlay	2,000
PFD's for the pipeline, compressor stations, and plants	4,000
Pipeline profiles and hydraulic output	11,950
Capex cost estimate	39,700
Opex cost estimate	8,000
Project schedule and expenditure profile	7,200
Recommendation of best overall system	7,500
Draft study report	17,800
Final study report	10,000
Sub-Total	$112,950
Two work stations/one office rental with phone, computer and network access (Four months)	14,400
Software	3,500
Reproductions	15,000
Travel expenses	20,000
Grand Total	$492,450

iii) Fee Schedule

Rates and estimated hours for key individuals ($US/MH)

	Rates	Est. MH's
Wes Nason	$130	350
Chris McArthur	$110	250
Bill Ediger	$110	250
Jim McDougall	$140	350
Kurt Stangl	$120	350
Jeff Sherman	$120	350
John Wolflick	$250	100
William Tetz	$110	40
Gulshan Dua	$100	200
John Hutchings	$100	350
Gene Kulawik	$150	100
Dale Morris	$150	100
Route Characterization Specialist	$165	300

Note: Individual charge out rates are all-inclusive with the exception of reproduction costs and travel expenses if required. Reproductions will be reimbursed at cost ($US).

Section 6 Experience

i) Engineering Capabilities

Our Team also brings significant northern and Arctic engineering experience. "THE TEAM" has been providing engineering, construction and operation/maintenance services to the North Slope of Alaska as well as to the Mackenzie Delta and Northern Canada for over 25 years, and brings the required northern engineering expertise for the study.

"THE TEAM" has a combined staff in Alaska which exceeds 1000 personnel and has available the necessary highly skilled engineering, estimating, process; financial, construction, environment and regulatory planning resources to undertake this study. Our recent experience demonstrates our ability to provide conceptual and front-end engineering services on projects of this nature.

We have also been instrumental in planning, design, approval, construction and start-up of gas development and production in the Fort Liard area. Fort Liard is currently the largest gas-producing field in the Northwest Territories, and we have been integrally involved in its development.

Lessons learned from these projects will be readily accessible to our Team, thus bringing the best current and global technical and execution expertise into the study.

ii) Project Team

Key project personnel include:

Wes Nason – Construction Manager brings more than 25 years of successfully completed Arctic pipeline and facility construction projects. His Arctic construction expertise will drive construction-focused cost estimating and execution planning to capitalize on opportunities related to "beginning with the end in mind".

Chris McArthur – Compressor Station Manager Chris is a highly experienced technical manager with current experience as Compression Station Manager. Chris brings engineering and owner experience for gathering and transmission pipelines and facilities in Northern Canada. He is highly regarded in the industry as a leader, as shown by his current role as President of the Canadian Gas Processors Suppliers' Association.

Bill Ediger – Pipeline Design Lead Bill brings experience in engineering and owner roles for large diameter Canadian Pipelines & Facilities. He brings expertise on all aspects of pipeline design including working knowledge and experience in integration of design, regulatory and execution priorities.

Jeff Sherman – Construction Lead brings over 25 years of successfully completed Arctic pipeline and Lower 48 mainline pipeline big-inch construction projects. Jeff's comprehensive experience with construction management, quality control, and environmental science brings a unique and comprehensive perspective to the analysis of building pipelines in Alaska and Arctic/sub arctic regions.

Kurt Stangl – Geotechnical Lead brings more than 25 years of participation and successfully completed Arctic pipeline and oilfield projects and studies. He has had direct technical involvement with pipeline frost heave studies, arctic pipeline trenching trials, mechanical trenching feasibility studies along potential pipeline routes to Valdez and arctic terrain analysis.

Gulshan Dua – Gulshan is the Manager of Process Engineering at VECO and has over 30 years worldwide experience on oil and gas projects. This includes arctic experience in the area of gas pipelines and facilities.

Gene Kulawik – Civil Construction Lead – Over 40 years experience in heavy civil and arctic construction, Gene has participated in most major Alaska pipeline studies over the past 30 years and has personal experience with and knowledge of granular resources along the pipeline route.

Dale Morris – Pipeline Labor & Equipment Resources – Over 40 years experience in mainline pipeline construction and arctic pipelines, Dale also has a depth of experience with labor, equipment, and contractor capacity issues which will be a valuable addition to the analysis provided during the constructability study.

John Hutchings– Compressor Stations Estimator – Over 20 year's domestic and international experience in project controls and estimating covering a broad range of industries including, oil production facilities (wellsites, gathering, batteries, pumping, and pipelines – domestic & international, including Arctic), and gas production facilities (wellsites, gathering, metering, dewpoint control, compression, complete gas plant facilities, and pipelines – domestic & international, including Arctic)

Jim McDougall – North of 60's Principal has over 25 years engineering experience in the North. While with Imperial Oil Limited he was directly involved in their earlier efforts to develop Mackenzie Delta Gas and participated in the early design of the Norman Wells to Zama pipeline. He has participated in numerous studies to assess the feasibility of marketing Alaska and Mackenzie Delta Gas utilizing pipeline systems that have varied from 24 to 52 inches in diameter. He was the Chief Engineer and Project Manager for the Inuvik Gas Project, which included the development of the Ikhil Gas Field, associated production facilities and a 50 km pipeline to deliver the gas to the Town of Inuvik. The project received the 2000 Professional Award of Merit from The Association of Professional Engineers, Geologists and Geophysicists of the Northwest Territories.

John Wolflick – John has more than 32 years experience in the oil and gas industry. He offers a senior level perspective in the conceptual and detail design of gas systems. His experience with Allison Division of General Motors, El Paso Natural Gas Company (EPNG), Standard Oil of Ohio (SOHIO), and Atlantic Richfield Company (ARCO) has given him a broad exposure to the business. During his 12 years with EPNG, John supervised the Compressor Station Design, Pipeline Design, and Cryogenic (LNG) Groups. During his 18 years with SOHIO and ARCO, John was leader of the conceptual engineering teams for all gas production, gathering, processing, and re-injection expansions at the Prudhoe Bay oil field in Alaska.

Section 7 Relevant Projects

Mackenzie Delta Explorers Group Pipeline Study and Optimization - 2002
Reviewed two cases including hydraulic analysis, CAPEX, and OPEX for 1 BCFD to 2.2 BCFD pipeline system, dense phase flow and separate lines for gas and gas liquids.

Mackenzie Delta Explorers Group Pipeline Study and Optimization - 2003
Further optimized the 2002 study as Case 3, including hydraulic analysis, CAPEX, and OPEX for 1 BCFD pipeline system to 2.2 BCFD pipeline system, dense phase flow and separate lines for gas and gas liquids.

Alaska Gas Producers Pipeline Team Pipeline Study and Optimization – 2001 – 02
Studied two pipeline routes:

- the Northern Route from Prudhoe Bay to the Mackenzie River Delta up the Mackenzie River Valley to Alberta, and on to Edmonton.
- the Southern or Highway Route from Prudhoe Bay to the Edmonton area paralleling the TAPS to Delta Junction, then paralleling the Alcan and other Highways to the Edmonton area.

Both route cases included many engineering and construction studies and included hydraulic analysis, CAPEX, and OPEX for a 4+ BCFD pipeline system, dense phase flow.

South West Alaska Power Project – 2002 – 03
Conceptual Study for utilizing Cook Inlet natural gas delivered via pipeline to a gas-fired power plant near the Donlin Creek Mine Project. Studied three line size/line pressure scenarios and multiple pipeline routes including:

- the Northern Route from Beluga through Rainy Pass to McGrath, then to Donlin along the Tintina Mineral Belt
- the Souther Route from Beluga to Lookout Hill via Rainy Pass, then to Crooked Creek via Stony River

Section 8 Resumes

Wes Nason

Manager of Pipeline Construction

Qualifications Overview

Mr. Nason has twenty-nine years experience managing construction and maintenance of pipelines, oil field facilities, and infrastructure development in Alaska. Specific areas of experience include project management, field supervision, field engineering, estimating, project controls, and inspection.

Active in resource development advocacy groups including the Alaska Support Industry Alliance, Alaska Miners Association, and the Resource Development Council.

Highlights

VECO ALASKA, INC.

2001 - Present

Manager of Pipeline Construction. Responsible for pipeline business development, estimating, and construction input on pipeline studies. Built a team of pipeline construction professionals to determine cost and feasibility of two alternate routes for a 2,100 mile, 52" diameter, high pressure pipeline system from Prudhoe Bay, Alaska to Edmonton, Alberta. Organized and oversaw studies and workshops which resulted in professional reports on Construction Industry Capability; Skilled Labor Availability and Training Requirements; Specialized Equipment Availability, Gap Analysis, and Manufacturing Lead Time, Pipeline Technology Studies on Ice Road Construction, Pipe Bending, Automatic Pipe Welding, Ultrasonic Testing of Pipe Girth Welds, and Real Time Radiographic Examination of Girth Welds, among others.

1998 - 2001

AHTNA MINERALS COMPANY

President. Contributed to the establishment of corporate position with National Park Service with regard to their stewardship of Ahtna-selected lands within the NPS boundaries. Startup of industrial mineral export project to Mid East. Formed joint ventures with mining companies to explore Ahtna's 1.8 million acres. Formed joint ventures for drilling and mine development with Canadian firms.

1980 - 1998

H.C. PRICE CO.

Vice President/ General Manager. Responsible for business management of a major construction and maintenance firm in Alaska and of the Price/Ahtna JV, specializing in pipeline, process facility, and power plant construction. He reviewed, signed, and was responsible for contractual performance with all clients.

Responsibilities were in the areas of budgeting, cost management, marketing, administrative, contractual, labor relations, risk management, legal and oversight of major projects. Marketing efforts included establishing and maintaining contacts in resource development firms with special emphasis on oil, gas, pipeline, and mining establishments. Administrative duties included establishing staff compensation packages, establishing and managing annual G&A budgets for the Alaska Division, establishing employee review procedures, and approving staff hire rates and merit salary increases.

1975 – 1977 **BECHTEL**

and 1979-1980; Control Engineer. Worked on teams with engineers to walk down and as-built piping and pipe support systems at a nuclear power plant during a plant outage. Obtained security clearance and worked in radioactive contaminated areas.

Team leader on the TAPS, Section 3 weld record reconciliation and as-built survey to verify accurate records of work performed. Coordinated with the surveyor contractor to establish weld locations and field verified by internal inspection when required. Team leader on verification and turnover of project quality control records to Alyeska operations.

Education

B.S., Mining Engineering, Colorado School of Mines, 1971

Affiliations

The Alaska Support Industry Alliance, Board Member (1987-94), President (1993-94),

North Slope Contractors Association, President (1986-1993), Labor Co-Chairman (1989-1998)

Trans-Alaska Pipeline System Contractors Association, President (1989), Labor Co-Chairman (1989-1998)

Resource Development Council, Board (1995-2001
Knowles/Ulmer National Resources Policy Transition Team (1994-95)

Papers

"Arctic Pipeline Constructibility and Cost Trends"

ASME Energy Sources Technology Conference & Exhibition, 1987

- Details development of Arctic above ground pipeline design & construction
- Provides comparison of winter and summer construction techniques and costs

"Sliding Royalty Incentives for Alaska Marginal Field Development"

Governor Knowles Natural Resource Transition Team Position Paper, 1994

Provided model for legislation later passed to encourage development of North Star Project and Heavy Oil Development at Milne Point

Chris McArthur, P.Eng.

Manager – Gas Pipeline Systems

Qualifications Overview

Twenty-five years of professional engineering experience in the development, design, project management, and construction of natural gas and crude oil gathering, transmission, and distribution related facilities in British Columbia, Alberta, Yukon, Northwest Territories, and Alaska.

Relevant achievements include:

- project management of a variety of industrial programs including compressor stations, meter stations, process plant, and pipeline facilities;
- twenty-one (21) unit addition/grass roots compressor station projects installing over 300,000 horsepower;
- sixty-four (64) grass roots natural gas custody transfer stations including twenty-two (22) pressure reduction and metering stations for the Vancouver Island Pipeline Project and thirty-four (34) meter stations for the Alliance Pipeline Project;
- managed various EPC consultants providing project services for various gas gathering/transmission projects;
- experienced with system hydraulics and economic models for pipeline design;
- technical engineering design and operations support for mechanical/ electrical/civil systems including reciprocating and gas turbine engine compressor/generator sets;
- regulatory experience with the National Energy Board, FERC, Transportation Safety Board of Canada, Alberta Energy and Utilities Board, Alberta Boilers Branch, B.C. Gas Safety Branch;
- worked with clients and customers to ensure their business objectives were met through supply of competitively engineered products and services.

Highlights

- Alaska Gas Pipeline Project – Compressor Station and Calgary Project Office Manager for the Alaska Gas Producers Pipeline Project for the Prudhoe Bay, Alaska to Ft. Saskatchewan, Alberta segment including over $1.5 billion U.S. in facilities.
- Mackenzie Delta Explorer Group – Project Manager for a series of conceptual engineering studies of alternative gas transmission and processing scenarios to deliver gas from the Mackenzie Delta to Alberta;
- Foothills Pipe Lines - Project Manager for preliminary engineering and cost estimate development for the ANGTS Alaska Compressor Stations;
- Alliance Pipeline – Project Manager for the Laterals Facilities Project supplying project control, engineering, procurement services, and construction and commissioning assistance for 7 compressor stations, 34 custody transfer meter stations, 50

pipeline barrel assemblies, 8 automated line break pipeline valves, and 18 automated mainline pipeline tie-in valves.

- Trans Canada Pipelines Ltd. - Engineering Manager for detailed engineering and design drafting for four (4) 28 MW RB211 compressor packages and four (4) major gas after coolers;
- Alliance Pipeline - basic engineering for 29 lateral compression and 42 metering stations including NEB application support;
- Provided detailed planning and selection of facilities through use of various hydraulic and economic computer models. Projects included various LNG pipeline proposals to Kitimat and Prince Rupert, B.C., expansions to the Foothills (ANGTS) pipeline system, Vancouver Island pipeline system, and pipeline and compression expansions/additions to the Westcoast system.

Education

- B.A.Sc., Mechanical Engineering, U. of British Columbia (1978)
- Certificate, Executive Development, U. of Calgary (1994)

Affiliations

- Association of Professional Engineers and Geoscientists of British Columbia
- Association of Professional Engineers, Geologists, and Geophysicists of Alberta
- Canadian Standards Association, Subcommittee on Materials
- Pipeline Research Committee, Compressor Research Supervisory Committee, American Gas Association (1995 -1997)
- Past President, Board of Directors, Canadian Gas Processors Suppliers Association (1999 - 2003)
- APPEGA Enforcement Committee Member (2003 – 2006)

F. William (Bill) Ediger, P.Eng.

Director, Arctic Gas Projects, Pipelines & Terminals

Qualifications Overview

Twenty-five years of professional experience in the engineering and construction of facilities, of which 22 years are focused on the development, design, project management and construction of large diameter pipeline facilities.

Highlights

VECO **2000 - Present**

Director, Arctic Gas Projects, Pipelines and Terminals

- Alaska Gas Producers Pipeline Team

  VECO, in a joint venture with Fluor, was the engineering contractor for the Alaska Highway and Mackenzie Valley pipeline feasibility study, Alaska to Alberta portion. As Canadian Pipeline Coordinator responsibilities included:
  - Interface with technical personnel in Client and Contractor offices in Calgary, Houston and Anchorage;
  - Management of pipeline staff in Calgary office;
  - Management of sub-contractors and subject matter experts;
  - Participation in the multi-disciplinary evaluation and justification of route alternatives;
  - Development of technical deliverables including pipeline project plan, scope, conceptual engineering and pipeline design methodologies, HDD feasibility, commissioning plans and cost estimates;
  - Development of supporting technical documentation for potential regulatory applications to the F.E.R.C. and the N.E.B.

- Mackenzie Delta Explorer Group

  Engineering Manager for the Mackenzie Delta Explorer Group Study. The project scope is to provide sufficient preliminary engineering to deliver +/- 30% confidence level Capex/Opex Estimates, associated tolls, and other specified deliverables for gas transmission, gas-liquids extraction, and gas-liquids transmission alternatives for the Mackenzie Delta region.

- Terasen Pipelines

  Project Engineer for various studies investigating expansion proposals for the Express Pipeline crude oil system

- Anadarko Canada

  Project Engineer for various studies and projects including Netla and Arrowhead Sour Gas Gathering System near Ft. Liard, NWT, P-16 Wellsite development near Ft. Liard, NWT, and the Saddle Hills to Progress sour gas pipeline project in Alberta

- Abu Dhabi Company for Onshore Oil Operations (ADCO)

  VECO is providing project management consultancy services to ADCO North East Abu Dhabi (NEAD) Phase 1 development. The project consists of new processing facilities to handle oil, gas and water production from two fields near Abu Dhabi, U.A.E., increasing production to 110 MBOPD.

TRANSCANADA PIPELINES LTD. 1990 - 2000

- Increasing levels of management responsibility for the engineering and construction of pipeline and measurement facilities leading to the senior position of Director, Pipeline and Measurement Projects.
- Responsible for the engineering and construction of all pipeline and measurement capacity and maintenance projects for the Transmission business unit.
- Managed annual capital programs, averaging between $400-$500 million, from concept stage to commissioning.
- Major accomplishments included the successful installation of over 3500 km of large diameter pipeline facilities (primarily NPS 42 and NPS 48) valued at approximately $5 billion while managing significant staff turnover in order to support the demands for project management skills in other areas of the Company, rebuilding the majority of the Department in 1990 during head office relocation from Toronto to Calgary and integrating the former TCPL Pipeline and the Nova Mainline Departments into the Pipeline Projects Department in 1998.
- In Measurement and Valve Integrity responsible for effectively managing the societal and business risks of all gas measurement and valve facilities, all at the lowest life cycle cost.
- Scope included Measurement Facilities. Gas Quality, Valves, Data Integrity, Regional Integrity and Lab Services.

TRANSCANADA PIPELINES LTD. 1981 to 1990

- Project Leader on multiple multimiilion-dollar pipeline construction projects across the system including expansion, upgrading and maintenance projects.
- Responsible for all aspects of projects including preliminary and final design, obtaining surveys, materials, land and drawings, overseeing consultants, preparing contracts, price schedules and directing and monitoring construction activities.

Education

Bachelor of Applied Science, Civil Engineering, U. of Waterloo, 1978

Affiliations

The Association of Professional Engineers, Geologists and Geophysicists of Alberta

The Association of Professional Engineers of Ontario

Papers

Pipeline Recoating, Oil & Gas Journal, October 1988

Northern Pipelines Tutorial Co-presenter, International Pipeline Conference, September 2002

Jeffrey Sherman

Qualifications Overview

Over 25 years of pipeline construction experience including 23 years in arctic Alaska. Extensive pipeline project management experience on a wide variety of projects since 1985. Selected to manage some of the largest and most difficult hard dollar pipeline projects. Ability to plan and coordinate all aspects of pipeline construction including:

- Project Planning and Scheduling
- Material Procurement
- Logistics for Construction in Alaska
- Assessment of Equipment Requirements
- Design of Special Equipment or Tools
- Hiring of Staff and Key Craft Personnel
- Implementation of Cost Controls and Reporting
- Subcontractor Administration
- Client and Agency Relations
- Effective Supervision of Project Personnel

Highlights

- **Project Manager** for H.C. Price on Alyeska's Atigun Mainline Replacement Project; 1990-1991. Replaced 8.5 miles of the Trans Alaska Pipeline in the Atigun River with 48" diameter, concrete coated pipe during the winter. Personally designed specialized preheat ducts, forms and insulation blankets for applying concrete to field joints in winter conditions. This saved time, labor and fuel for curing the concrete field joints, achieving 3,000 PSI in three hours. Also developed a system for internally heating the buried pipe to meet Alyeska's stringent tie-in temperature requirement. H.C. Price was responsible for the logistical support of the entire project and building, maintaining and operating a 600 man camp complete with office complex, fuel farm, shop buildings and water/sewer treatment plant. This $43 million lump sum project was completed on schedule and under budget and Alyeska was presented the Project Management Institute's Project of the Year award.

- **Project Manager** for H.C. Price on PGT-PG&E Pipeline Expansion Project; 1992-1993. Laid 167 miles of 42" diameter gas line in Northern California. Two-thirds of the new line was in solid basalt requiring careful attention to blasting technique and allocation of ditching equipment to maintain production rate. Worked with multiple agencies (FERC, CPUC, USFS, CDFG, etc.) with overlapping jurisdictions. This $110 million, unit price/lump sum project was completed under budget.

- **Project Manager** for Conam on ARCO's Central Gas Facility Flare Replacement Project; 1988. The existing primary emergency flares did not have enough capacity and therefore required replacement. The original construction of the flares had taken three months. The replacement of the old flare systems with a new, much larger flare field was scheduled for a 28-day

shutdown. Personally designed special rigging that allowed the up to 600-foot long new flares to be preassembled and set in place as complete units. This project was completed in 16 days, saving ARCO 12 days of gas liquids production.

- **Project Manager** for Conam on the Endicott Breach Bridge Scour Protection Project – Phase II; 1987. This project was notable, as it required wintertime placement of thousands of yards of riprap in a causeway breach in the Arctic Ocean. This lump sum project was completed both under budget and ahead of schedule.

- **Project Manager** for Conam on the North Slope Borough Water/Sewer Project at Point Hope, Alaska; 1996-1999. In addition to construction, this $54 million project included procurement of all materials for 35 miles of buried and insulated water, sewer and glycol lines plus state of the art water and sewer treatment facilities. Application of pipeline construction techniques to this utility project cut a year off the construction schedule. A majority of the workforce was locally hired and trained Alaska Natives.

Education

1973; BA in Environmental Biology, University of Colorado

Kurt Stangl

Arctic Engineer

Qualifications Overview

Mr. Stangl has over twenty-eight years of experience in conducting and managing arctic engineering projects. He has provided senior direction to numerous field investigation and design projects for northern facilities, arctic pipelines, offshore gravel islands and drilling structures, and northern mining developments.

Highlights

Northern Pipeline Projects

- Lead Arctic Engineer for a gas pipeline feasibility study for both southern and northern routes from Prudhoe Bay to Edmonton, Alberta.
- Project Manager for a mechanical trenching feasibility study for several natural gas pipeline routes from Prudhoe Bay to tidewater in southern Alaska.
- Senior Geotechnical engineer responsible for preliminary route evaluation of the onshore Sakhalin oil pipeline in eastern Siberia.
- Conducted numerous geotechnical exploration programs for natural gas pipelines along the Alaska Highway in the Yukon and various locations in the Mackenzie Delta. Supervised several borrow materials investigations and evaluations in the area of potential petroleum development and along pipeline corridors.
- Supervised a number of major airborne geotechnical drilling and reconnaissance programs along several thousand miles of proposed pipeline routes in the high arctic. Work included terrain mapping, airphoto interpretation, and ground truthing. Projects were carried out over a period of eight years.
- Directed the geotechnical evaluation of full scale mechanical trenching tests for a buried natural gas pipeline in extremely cold permafrost conditions in the Canadian high arctic.
- Managed several extensive frost heave and thaw settlement laboratory testing projects for Yukon Pacific natural gas pipeline study. These projects included development of new test cells and testing methodologies.
- Responsible for sediment coring along a proposed 80 mile marine pipeline crossing of the Northwest Passage in 1500 ft. of water.

Large Arctic Civil Projects

- Resident Engineer during winter construction of Northstar Exploration Island, an artificial island in 45 feet of water in the Beaufort Sea, Alaska. A comprehensive construction surveillance and testing program was performed. All aspects of construction QA/QC including ice road construction and maintenance, borrow excavation, fill placement, pile installation and manufacture of concrete slope protection blocks were under his direction.
- Responsible for field crews conducting construction surveillance and field testing of earthworks and concrete foundations for the Endicott Project, Prudhoe Bay, Alaska.

General Northern Projects

- Project Manager for several offshore site investigations conducted in the Beaufort Sea for offshore exploration structures. Projects were performed utilizing heliportable, track mounted, and rolligon mounted drill rigs.
- Project Manager for geotechnical field programs for proposed mobile drilling structures (SSDC, CIDS) and gravel island sites in the Beaufort Sea. Projects included geotechnical drilling, cone penetrometer testing, and foundation conditions analyses.
- Responsible for design and installation of slope movement, settlement, and temperature instrumentation for artificial islands and several onshore projects on the North Slope of Alaska.
- Project Manager for many geotechnical site investigations and construction surveillance projects for pile supported structures in permafrost in numerous arctic communities.
- Was extensively involved with arctic geotechnical exploration programs throughout northern Canada and the Arctic Islands.
- Project engineer responsible for several offshore artificial island investigations in the Mackenzie Delta and Beaufort Sea.

Registrations

Professional Engineer, Assoc. of Professional Engineers Geologists and Geophysicists of Alberta
Nuclear Gauge Safety Training

Education

Queen's University	1972	Geological Engineering, B.Sc.(Honors)
University of Alaska	1984	Arctic Engineering

Affiliations

Member, Associated Soil and Foundation Engineers
Member, American Society of Civil Engineers
Member, American Society of Testing Materials
Member, Alaska Miners Association

Papers

"Arctic Offshore Site Investigations", with Dr. A. Mahmood, Proceedings, Arctic '85 ASCE Specialty Conference, Civil Engineering in the Arctic Offshore, San Francisco, 1985.

"Engineering Geology of Surficial Soils, Eastern Melville Island", with W.D. Roggensack and D.W. Hayley, Proceedings, 4th Canadian Permafrost Conference, 1981.

"Cavendish Township Drilling Program", Geological Survey of Canada, Open File 160, 1973.

"Arctic Stream Scour: A Case History", with J. Barrett, and M. Schlegel, Technical Council on Cold Regions Engineering Monograph, Cold Regions Hydrology and Hydraulics, edited by William L. Ryan and Randy D. Crissman, (1990) pp. 791-803.

"Use of Weathered Rock For Engineered Fill in Permafrost Regions of Alaska", with M. Schlegel, Proceedings of the Fifth Canadian Permafrost Conference, Quebec City, Quebec, Canada, 1990.

Gulshan Dua, P.Eng., MBA

Manager – Process Engineering

Qualifications Overview

Gulshan has over 30 years of experience in Process Design and Engineering, and Project Engineering management, primarily in the oil and gas production and processing industry. His experience includes both engineering and contracting companies (Bechtel and Engineers India Ltd.) and major international oil and gas operating companies (ADCO - a multinational company of ADNOC, Shell, Mobil, Exxon, BP, Partex, and QGPC).

For the last 10 years, many of Gulshan's projects total capital cost are in the range of US$2.0 billion. In the majority of these projects, the experience covers all the project phases from project initiation through to conceptual, basic engineering, detailed engineering, procurement, construction, commissioning and start-up.

Gulshan's experience has acquired him the skills to both perform "hands on" and lead a group of engineers for all phases of project implementation in the areas of process design/engineering and project engineering management.

Highlights

VECO **1999 - Present**

In addition to managing the department (up to 45 process engineers), and the development of Process / System Engineering standards and procedures for the department, have carried out the following specific projects as the Process Lead:

Alaska Gas Producers Pipeline Project

- High level process engineering support to the project process team, including as an interim process lead in the initial phase for the conceptual studies associated with the compressors stations on the dense phase pipeline, transporting over 4 billion scf/day gas from Prudhoe Bay to Alberta. The front-end studies involve gas compression, gas chilling, gas reheating and waste heat recovery systems, including drivers' evaluation.

Qatar Petroleum Halul Fuel Gas Sweetening Study/ Feed

- The study for a 20 mmscfd fuel gas sweetening and acid gas disposal system, and FEED work for the gas sweetening plant, using MDEA for selective removal of H2S to meet with the QP environmental requirements.

Foothills Pipeline Ltd, Canada

- The process design for 3.8-Billion scfd capacity Gas Compression and Chilling Station detailed construction cost estimates of the Alaska Natural Gas Transportation System.

Pluspetrol, Argentina

- The Ramos Field Gas Compression Study (400 mmscfd capacity) based on reservoir data on wellheads pressure decline.

Komi Arctic Oil Company, Russia

- The Process Study to upgrade the existing Amine Unit from 15-mmscfd capacity to 25-mmscfd capacity.

ADCO (ABU DHABI COMPANY FOR ONSHORE OIL OPERATIONS) **1989 – 1999**
Abu Dhabi, UAE **1985 - 1987**

ADNOC's Taweelah Gas Treatment Plant

- Project Engineering Manager / Process Engineering Specialist for the FEED phase of the project, with particular emphasis on all technical aspects of the basic design, including integration of the two Process Licensors designs with the rest of the facilities.

Various Oil and Gas Development Projects

QATAR GENERAL PETROLEUM CORPORATION **1987 - 1989**

- Responsible for leading conceptual process works related to Future Production Facilities, Gas Shortfall Alleviation Schemes, and upgrading of Gas LTX plants and dehydration facilities.

BECHTEL - AREC JOINT VENTURE COMPANY **1984 - 1985**

- Responsibilities included preparation of basic design process packages for ADCO's two major oil field development projects (Bu Hasa and Asab) of 650 MBD and 350 MBD oil capacity.

GAS AUTHORITY OF INDIA LTD (GAIL) **1985**

- Headed the Technical department for the Company, and carried out various technical assignments associated with the HBJ cross-country Pipeline and LPG plants along the route.

ENGINEERS INDIA LTD. (Formerly Bechtel) **1977 - 1984**

- Performed the process design activities, as well as supervised the section's process design activities.

DCM CHEMICAL WORKS **1970 - 1977**

- Worked on an array of jobs related to the Caustic-Chlorine industry including the development of High Amperage Electrolytic Diaphragm Cells, process design and installation of chlorine gas cooling, and drying and liquefaction facilities

Education

- Master of Business Administration, Durham University, UK, 1993
- B.Sc. Chemical Engineering, Punjab University, India, 1970

Affiliations

- The Association of Professional Engineers, Geologists and Geophysicists of Alberta (APEGGA).

Technical Skills

- Various process simulation packages, including Hysys, Amsim, Pipeflo, Pipesim, Pipesys and; process design and system engineering.

E.L. Gene Kulawik

Qualifications Overview

Gene Kulawik has over 41 years of construction experience, gained mainly in Alaska. Peter Kiewit & Son's, Inc. and affiliates have continuously employed Gene for over 28 years in engineering and management positions. During his tenure with Kiewit, he estimated and built many projects in Alaska including the Chena Hot Springs Road extension, the Trans-Alaska Pipeline, Prudhoe Bay Oilfield Development, Terror Lake Hydroelectric Project at Kodiak, Northwest Alaska Gas Line, Seward Highway Reconstruction, Keystone Canyon Highway Realignment, Ketchikan Airport, and the Nome Port Development. The specific project experience presented in this resume is pertinent to the oil and gas industry only.

Highlights

Relevant Oil and Gas Experience

Project Manager **1987-1995**

- Assist peak Oilfield Services as a Project Manager in the estimating and preparation of a response pertaining to the civil construction aspects to a Request for Proposal for various oilfield related projects on the North Slope.

Project Manager **1991**

- Assisted Nabors in the preparation of technical manuals pertaining to oilfield development and access in Arctic and Sub-Arctic areas. Acquired environmental and logistical data and land sat photos of project areas to assist in the development of the Komi Oilfield in Russia.

Consultant **1988- 1989**

- Consultant to Alaska Power Authority and Stone & Webster Engineering Corporation for the development of a cost estimate to install a gas line from Wasilla to Fairbanks. As a member of the three person team which performed detailed construction planning and developed cost estimates for the proposed project his duties included the management of route reconnaissance, providing alternative route advice, evaluating stream crossings, preparation of construction schedule, evaluation of geotechnical conditions and development of quantity take-offs.

Consultant **1990**

- Consultant to Houston/Kiewit assisting with preparation of cost estimate and bid proposal for the Alyeska Corrosion Repair Project at Atigun. Managed all aspects of the civil estimate.

Senior Estimator **1980- 1981**

- A Senior Estimator retained by Fluor/Northwest to prepare a definitive construction estimate for the Alaska portion of the NWAP project. This estimate used to support the costs submitted to FERC in the project filings. The assignment included participation in FERC sponsored cost conferences.

Project Manager **1977- 1978**

- Project Manager for pipe support contract for ARCO for Prudhoe Bay East gathering lines.

Chief Engineer and General Superintendent **1974-1976**

- Kiewit representative on the Joint Venture estimating team, which prepared the estimates for various sections of the Trans Alaska Pipeline Project. After the Kiewit led Joint Venture was awarded Sections 5 & 6 of project in July 1974, Mr. Kulawik served as the Chief Engineer. From August to December of 1976, he completed an assignment as the General Superintendent at Galbraith Lake for the completion of Sections 5 & 6.

Affiliations

Mr. Kulawik previously represented Kiewit on a five-member execution contractor team retained by Fluor Northwest to prepare a definitive cost estimate for the Alaska Section of the Northwest Alaska Gas Pipeline Project. He defended that estimate in proceedings before the Federal Energy Regulatory Commission (FERC).

Mr. Kulawik has been a partner of Argetsinger & Kulawik, Inc. since January of 1986, where he assists clients on various construction related problems including construction management, estimates, contract administrations, dispute resolution, scheduling, and feasibility studies. Some of this work includes service as an expert witness in construction related litigation.

R. Dale Morris

Senior Pipeline Construction Expert

Qualifications Overview

Over forty years of domestic, international, and arctic experience in the pipe line construction industry, including twenty years as a senior officer of one of the larger and more successful contractors.

Working knowledge in the management of large diameter pipe line projects throughout the United States and Overseas, arctic pipeline construction in Alaska, and arctic trenching in Alaska.

Familiar with construction estimating, cost control, equipment management, logistical support for remote locations, as well as both field and corporate management of large pipe line projects.

Over twenty years of labor relations experience in managing projects and companies, plus fifteen years of active participation in contractor associations negotiations of pipeline labor agreements in Alaska and the Lower 48.

Education

Attended University of Kentucky & Western Kentucky University – Civil Engineering

Affiliations

President, Pipe Line Contractors Association, 1996

Director, Pipe Line Contractors Association

Labor Committee, Pipe Line Contractors Association

Labor Committee, Trans Alaska Maintenance Contractors Association

Planning and Studies Committee, INGAA Foundation

John Hutchings

Principal Estimator

Qualifications Overview

Mr. Hutchings has over 18 years experience as a project controls estimator in the oil and gas industry on a wide range of medium to large sized projects.

Highlights

VECO **1999 - Present**

Principal Estimator

- Working within the Project Controls Department and under the supervision of the Chief Estimator, responsible for developing capital cost estimates in accordance with clients and engineering specifications all within VECO's estimating guidelines and procedures. The type of estimates range from conceptual, equipment factored and detailed lump sum proposals.

FLINT CANADA INC. **1993 - 1999**

Senior Estimator

- Reporting to the Vice President – Operations, responsible for the companies overall estimating and project controls systems. Worked closely with field personnel in preparing construction bids for a variety of projects

DELTA CATALYTIC ENGINEERING/CONSTRUCTION 1991 -1993

Projects Controls Specialist

- Assigned to the Caroline Gas Plant Project, initially working on monitoring costs for the offsite modularization and fabrication. Then worked onsite developing and revising budgets for the various construction work packages.

FLINT ENGINEERING/CONSTRUCTION **1985 - 1991**

Estimator

- Within the Project Division, worked with the estimating team in preparing bids for a variety of EPC and construction projects. Duties also included field assignments as cost / scheduler, coordinator and quality controller.

Superintendent Trainee - Whitecourt

- Gained valuable field experience of oilfield construction through a "hands on" approach on a variety of projects. Duties ranged form laboring, pipefitting and general supervision. Projects ranged from oil and gas facility construction, pipeline construction and plant turnarounds and maintenance.

Education

- Bachelor of Science – University of Calgary
- Certificate in Construction Administration – University of Calgary
  - Project Management
  - Cost and Scheduling
  - Contract Law and Documents
  - Corporate Controls
  - Management Communications
  - Dispute Resolutions
  - Bonding and Insurance
  - Pipeline Design and Construction
  - Effective Project Planning

Affiliations

- AACE International – The Association for the Advancement of Cost Engineering
- Canadian Construction Association – Gold Seal Certification - Estimating

Section 9 VECO Profile

Introduction

VECO History

VECO Inc., the original parent company, was formed in 1968 to support offshore oil and gas production in Alaska, U.S. In the early 1970s, VECO extended its offshore support activities to the North Sea, constructing and outfitting huge offshore platforms in Stavanger, Norway for operations in Denmark, Norway, and Scotland. In 1974, VECO pioneered oil field services for the initial development of the 10-billion-barrel Prudhoe Bay oil fields, becoming the first contractor on the North Slope to establish a permanent construction and maintenance facility. At the same time, operations expanded throughout Alaska to include numerous construction and service projects.

Today, VECO is a fully integrated engineering, procurement, and construction (EPC) company operating worldwide with over 4000 personnel. Within its field, VECO is one of North America's largest companies.

ENR Engineering News-Record THE TOP 500 DESIGN FIRMS

31 VECO Corp., Anchorage, Alaska

Using its Alaska program management expertise as a stepping-stone, VECO has grown through a series of strategic acquisitions and alliances. VECO expanded its services to other industries in the past ten years and is now active in the design and construction of projects in the following industrial sectors:

- Refining and Petrochemical
- Gas Projects
- Pipelines and Terminals
- Oil and Gas Field Development
- Mining and Metals
- Power Generation and Electrical Distribution

VECO is a solution-oriented, cost-conscious organization. Our history demonstrates that we have the experience, resources, and qualified personnel to effectively manage major projects up to several billion dollars in value. **In the last ten years, VECO has completed projects totaling over $25 billion.**

VECO is organized in regional centers located across North America and Internationally. These include:

- **VECO Alaska**
  Headquartered in Anchorage, Alaska, U.S.A.
- **VECO Canada (International Headquarters)**
  Headquartered in Calgary, Alberta, Canada
- **VECO Middle East North Africa**
  Headquartered in Abu Dhabi, United Arab Emirates
- **VECO Pacific**
  Headquartered in Bellingham, Washington, USA
- **VECO Rocky Mountain**
  Headquartered in Denver, Colorado, U.S.A.
- **VECO Gulf**
  Headquartered in Baton Rouge, Louisiana, U.S.A.

VECO Corporation
Anchorage, Alaska, USA

Execution Methods

VECO has the flexibility to provide services for a wide variety of projects and scopes of work. VECO's staff has significant project execution expertise and comprehensive systems and procedures in place to aid in ensuring effective and efficient execution of projects. Some of the execution methods and basis for working relationships that VECO has the ability to provide include:

- E, EP, EPCM, or EPC
- Lump sum turnkey
- Reimbursable
- Cost recoverable with incentive based fee
- Fixed price
- Feasibility studies
- FEED and conceptual designs
- Fast track implementations
- Specific discipline only work – project management, mechanical, pipeline, process, electrical, instrumentation, civil/structural, design/drafting, procurement, project controls (estimating, scheduling)

In the execution of any project VECO follows the basic key principles required for successful project execution. VECO's approach to successful project execution consists of the basics of project initiation and scoping, preparing a project specific plan for completion of the project, preparing a design basis memorandum (DBM) document indicating the scope of the project, technical and schedule reviews, squad checks, Quality Assurance and VECO Senior Management Project Reviews. These processes are fully defined in VECO's Procedures Manuals.

VECO Services

Engineering and Design Fields:	Services Provided:
Process and Chemical Engineering	Program & Project Management
Advanced Controls & Instrumentation	Procurement & Logistics Management Planning
Mechanical Engineering	Construction Management & Planning
Electrical Engineering	Operations & Maintenance Management & Planning
Civil/Structural Engineering	Environmental Engineering

Engineering, Procurement, and Construction Services:	
Project Design Development	Construction Execution
Detailed Engineering & Design	Planning, Scheduling & Project Controls
Materials Management	Quality Control & Inspection
Purchasing & Expediting	Safety & Risk Management
Module. Equipment & Material Transport	Contract Administration

In-House Specialists

In addition to the multi-discipline engineering personnel working at VECO, we also have the following specialists in-house:

- Rotating Equipment
- Vessels
- Fired Heaters
- Piping Stress Analysis
- HVAC
- Tanks
- Civil
- Petrochemical Process
- Environmental/Regulatory
- Electrical
- Control
- DCS/Programming

Personnel by Discipline

VECO is a worldwide company consisting of approximately 3000 personnel. The general distributions of the personnel are described in the following:

By Region:

- Alaska 1300
- Canada 1100
- Rocky Mountains 200
- Pacific 200
- Gulf 100
- Middle East North Africa 100

By Specialty:

- Engineering 1500
- Construction 1000
- Operations and maintenance 500

Health, Quality and Environmental Awareness

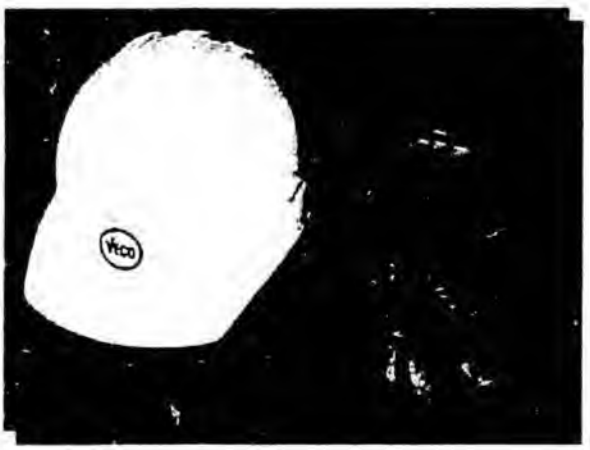
These three interdependent objectives are VECO's primary considerations in every project.

VECO has an excellent safety record, which reflects our professionalism and proves how well our employees work together as a team. It is proof of our commitment to worker safety.

VECO's approach to quality minimizes capital and operating costs while building and maintaining "fit-for-purpose" project and maintenance safety and reliability.

Through the years of experience in fragile northern environments, VECO has developed systems for addressing environmental issues in the early stages of projects. We are very cognizant of regulatory requirements, which we always meet and frequently exceed.

Safety, quality and environmental awareness are synonymous with The TEAM that DELIVERS®.



Quality Assurance

Quality Policy

it is the policy of VECO to provide products and services that meet client's requirements in an efficient, cost-effective and safe manner.

VECO is committed to implementing and maintaining as ISO 9001 program including the provision of training for its staff and the encouragement of continuous improvement at all levels in the organization.

This quality policy has the full support and commitment of VECO's management and staff.

VECO Canada Ltd. has a quality management program that is registered with the Quality Management Institute (QMI) in compliance with the requirements of ISO 9001-1994.

The ISO 9001 international standards for quality management were developed with the goal of effectively documenting the quality system elements to be implemented in order to maintain an efficient quality system. ISO 9001 has built-in flexibility, which allows it to be equally effective for both large and small projects.

Annual compliance audits are conducted by QMI to confirm continued registration to the ISO 9001 standards. Our staff is fully trained in the ISO 9001 system and all Quality Assurance and Quality Control documentation is in place.

CERTIFICATE OF REGISTRATION

VECO Canada Ltd.
#1200, 401 - 9 Avenue SW
Gulf Canada Square
Calgary, Alberta
T2P 3C5 Canada

ISO 9001-1994

Engineering, Procurement and Construction Management in the Oil and Gas, Refining, Petrochemical, Pulp and Paper and Cogeneration Industries.

003069
8711, 1389
October 13, 1994
February 9, 1999
February 9, 2002

Graham Neville
President

Environmental and Regulatory

Program Management

VECO provides a full spectrum of environmental and regulatory services, ranging from total program management to compliance reviews and permitting applications.

What differentiates VECO's service capabilities is our early identification of the pertinent environmental and regulatory issues and the integration of these into the engineering, design and construction components of the overall project. Identification and handling of these issues at the outset, enhances project results and minimizes risk of future liability.

VECO's objective is to help our clients understand the interaction of environmental and regulatory requirements within a project and provide the right level of program management support to enable a successful outcome.

Services

Environmental Planning

- Management Systems
- Issue Scoping
- Impact Assessments
- Cumulative Effects Assessments
- Construction Procedures Development
- Project Management

Regulatory Compliance

- Jurisdictional Assessment and Compliance
- Provincial, Territorial and Federal
- Emissions and Greenhouse Gases
- Gas Processing, Oil Batteries, Pipelines, Compressors

Liability Management

- Inactive Well and Facility Management
- Phase 1 and Phase 2 Site Assessments
- Spill Response Evaluation/Remediation
- Abandonment and Reclamation
- Partnership with WasteCo for Complete Facility Decommissioning Services

Procurement and Inspection Services

The VECO procurement department ensures that the needs for materials, facilities, services (including inspection) and equipment are supplied where and when required, at the lowest cost commensurate with quality and quantity specifications.

Procurement is conducted in a manner designed to build and maintain good client, supplier, interdepartmental, and community relationships. As much as possible and in accordance with client wishes, regional and national content is always maximized within the constraints of quality, price, delivery, performance, and after sales service.

VECO's significant procurement experience includes the provision of services worldwide. We have successfully provided procurement and logistical services for large programs internationally (e.g. multi-year services for Nexen in Yemen) for a complete range of materials and equipment. Services have been provided for projects in over 44 different countries consisting of wide ranges of logistical and geographical conditions.

The Procurement Department has developed the capability of supporting projects ranging from very small non-task force projects to large task force projects. The project procurement organizations are developed on a per project basis to assure that the client's requirements are satisfied in a cost-effective manner. The project specific procurement organization is derived from a standard system that is in accordance with VECO Procurement Procedures entitled "Operating Standards, Volume 2-1 and Volume 2-2", which is an ISO 9001 quality assurance system.

Document Control

VECO's document control is required to control the receipt and distribution of technical documents and data from three sources:

- The Client
- Third Parties (Vendors, Contractors, etc.)
- VECO's internally generated documents

VECO has in place ISO9001 quality assurance procedures to provide a framework for the document control systems.

As a part of VECO's document control process an in-house Document Index software package has been developed. This package enables the system users to accurately track the status and location of all technical project documents, and to archive and retrieve all project drawings upon project completion.

FILENET, Electronic Document Management System

VECO Canada Ltd. has implemented an electronic document management system EDMS, within its Calgary office called Filenet. Filenet EDMS is a system used for electronically tracking all types of documents through their lifecycle from cradle to grave. The system works on an intranet with Internet capabilities. The Internet ability offers the user secure access to all documents in the Filenet system from any computer with Internet access. Filenet is administered locally with a client installed on the users workstations for access. A standard file structure is not used within Filenet. All documents are assigned attributes that enable users to locate documents more efficiently than the current network environment.

This new collaborative environment facilitates information sharing and transferring through using such features as electronic redlining, notification and centralized storage. Increased security and version availability results in less lost document information and restricts the existence of accidental duplication of documents, which is a large problem facing all projects when compiling their deliverables

Through using EDMS such as Filenet, we hope to capitalize on the benefits such as data integrity and consistency. An EDMS system will enhance the productivity of any project whether it is a few people or a few hundred. The flexibility in design and administration allow us to easily address any unique characteristics that a project may require.

Project Reporting

Project reporting procedures are used to provide the project manager with the most recent and accurate project information. VECO has in place an ISO9001 certified set of procedures that control the project reporting functions. These procedures are customized to fit the needs of each individual project. The major components of these procedures include:

- Weekly Project Status Reports
- Task Force Meetings
- Monthly Status
- Cost Reporting
- Cost Variances
- Purchase Order Report
- Needs/Status List

Project Controls

Within VECO, the Project Controls function covers the key elements of Estimating, Cost Control, Project Planning and Scheduling, Progress Measurement and Reporting. VECO has developed, as part of its ISO 9001 registration, a comprehensive set of Project Controls standards that are contained within the VECO Operating Standards Volume 1.2, Project Procedures Manual. These standards have been employed on numerous projects with success.

The primary element to successful project control is to ensure that a clear scope of work is developed followed by an equally clear work breakdown structure. This will ensure that the work is fully understood by all members of the project team.

Facilities Cost Estimate

VECO has extensive experience in the preparation of both project capital and operating cost estimates. VECO has the capability to perform a Cost Estimate Sensitivity Study. This study will examine all components of the project to determine the optimum course of action for the development of the Facilities Cost Estimate. This examination would look at available in-house and historical data for similar recent project work in order to determine whether or not this information is suitable for use in the estimate. This will result in an identification of those components of the work that will need to be issued for bid in order to support the estimate development.

Typically, for the preparation of a +/- 10% estimate, VECO looks to develop the following items:

1. P & ID's
2. Plot Plan with piping layouts transposed
3. Civil quantities (foundations, piles, roads, etc)
4. Equipment budget pricing
5. Major piping item budget
6. Miscellaneous instruments (typically in-house pricing with P & ID markup)
7. Electrical tray routing and cable schedule
8. Major electrical equipment budget pricing
9. Home office man-hour estimate
10. Construction management man-hour estimate
11. Contractor Rates

Using these items as a general guideline, a semi-detailed estimate can be developed to meet the needs of the project.

Project Cost Control

VECO uses a proprietary system known as SIMMS or Seamless Integrated Material Management System.

Information is exported to Excel or MS Access for reporting purposes. Standard reporting templates have been developed which VECO uses with a high degree of success in providing clients with timely, accurate and complete project progress reports.

Project Planning and Scheduling

VECO uses Primavera Project Planner (or MS Project) for detailed planning and scheduling on virtually all its projects. VECO will undertake to prepare in conjunction with the project team, a high-level project master plan, outlining the major activities for each phase of the project. Identification and management to agreed project milestones is the cornerstone of a successful project. Once this schedule is developed and published, further detail development will occur. The level of detail will be determined through the review of the master schedule and identification of all deliverables required for each phase of the project.

The schedule will be "frozen" as a baseline against which all project measurement and performance will be made. Any deviation from this plan will be reflected in the forecast updates. While the formal update is made monthly, a regular schedule review is performed by the project planner and findings conveyed to the project team.

Project Risk Analysis

While VECO will undertake to perform a formal risk analysis once the estimate is complete, elements leading up to this formal process will be performed earlier during the preliminary engineering phase. It is vital that both risks and opportunities be identified, quantified and ranked in order to support the overall decision-making process. VECO regularly employs Range Estimating, also knows as REP/PC, to support this process.

Risk Analysis goes far beyond the simple application of a software package to assist with the process. It entails that the user understand the decision making process. The project team must be able to clearly identify the "soft" spots in order to assess their potential impact on the project.

VECO applies the following basic principles to risk analysis:

1. Identify elements of uncertainty
2. Assess each elements potential impact – favorable or unfavorable.
3. Assign a value to this element of risk – Cost, Schedule, Technical
4. Determine what level of risk is acceptable
5. Conclusions – Contingency.

Software

The typical desktop computer at VECO comes setup with the following software packages:

- Operating System: Windows 95, Windows 98 or Windows NT
- Workstation 4.0
- Microsoft Office 2000
- MS Word - Word Processor.
- MS Excel - Spreadsheet program.
- MS PowerPoint - Slideshow software.
- MS Access - Database program.
- MS Outlook - Email Client, we run a Microsoft Exchange Server for our email needs.
- Microsoft Internet Explorer 5
- Adobe Acrobat Reader - For viewing PDF (Portable Document Format) files.
- WinZip - File compression and extraction utility
- Primavera 3.0, MS Project 98
- On drafting workstations – AutoCAD or Microstation

VECO's CAE/CAD Systems combine leading-edge technology with broad, stable functionality, allowing us to excel in each stage of a project life cycle:

- Enabling users to share engineering data more easily across the entire enterprise
- Empowering users to control the security of their data
- Enhancing the ability to create and communicate our designs

In other words, VECO's CAE/CAD system breaks down the barriers that prevent users from meeting their productivity goals. Our systems provide the foundation for moving from individual engineering productivity to enterprise-wide engineering automation.

The following outlines the software currently in use by VECO.

CAE/CAD Software Summary

Group	Program	Version	Author	Sponsor	Custodian
CAE - Mechanical Engineering					
	FE/PIPE	4.1	Paulin Research Group	Mech	CAD/CAE
	GT-Master		Thermaflow Inc.	Mech	CAD/CAE
	HTFS		AEA Technology	Mech	CAD/CAE
	Compress Vessel Design	6.4	Codeware	Mech	CAD/CAE
	STX-HTC		AEA Technology	Mech	CAD/CAE

CAE - Civil/Structural Engineering					
	S-Frame for Windows	5.02	Softek Services Ltd.	Civil Eng	CAD/CAE
	DYNA5		University of Western Ontario	Civil Eng	CAD/CAE
CAE - Instrumentation Engineering					
	Intools	5.1	Intergraph	Instr Eng	CAD/CAE
CAE - Electrical Engineering					
	ETAP	3.0.2	Operations Technology, Inc.	Elect Eng	CAD/CAE
	SPS			Elect Eng	CAD/CAE
	DesignIT	1.5	Blue Heron Software	Elect Eng	CAD/CAE
	SKM Powertools		SKM Systems Analysis	Elect Eng	CAD/CAE
CAE – PLC Programming Software					
	ICOM PLC-5			Controls	CAD/CAE
	ICOM PLC-2			Controls	CAD/CAE
CAE - Process Engineering					
	GT-PRO		Thermaflow Inc.	Process Eng	CAD/CAE
	HYSIM		AEA Technology	Process Eng	CAD/CAE
	HYSIS - PROCESS SIMULATOR		AEA Technology	Process Eng	CAD/CAE
	HYSIS - Amine Property Package Add-on		AEA Technology	Process Eng	CAD/CAE
	HYSIS - Crude Package Add-on		AEA Technology	Process Eng	CAD/CAE
	PIPEFLO		Neotechnology Consultants	Process Eng	CAD/CAE
	SULSIM		Western Research	Process Eng	CAD/CAE
	AMSIM		DB Robinson Group	Process Eng	CAD/CAE
	STACKS 2			Process Eng	CAD/CAE
	QFLARE			Process Eng	CAD/CAE
	STONER			Process Eng	CAD/CAE
CAE - Piping Stress Analysis					
	AutoPIPE Plus	6.10	Rebis	Stress Eng	CAD/CAE
	CAESAR II	4.2	Coade Inc.	Stress Eng	CAD/CAE
CAD Engine					
	MicroStation J	7	Bentley Systems, Inc.	CAD/CAE	CAD/CAE
	MicroStation SE	SE	Bentley Systems, Inc.	CAD/CAE	CAD/CAE
	AutoCAD R14	14.01	Autodesk, Inc.	CAD/CAE	CAD/CAE
CAD – Piping					
	PlantSpace P&ID	2.1	Bentley Systems, Inc.	Piping	CAD/CAE
	PlantSpace Piping	2	Bentley Systems, Inc.	Piping	CAD/CAE
	PlantSpace Pipe Supports	2	Bentley Systems, Inc.	Piping	CAD/CAE
	PlantSpace Equipment	2	Bentley Systems, Inc.	Piping	CAD/CAE
	ISOGEN	1.0.2	Alias Limited	Piping	CAD/CAE
	Autoplant 97 – Piping	1.11	Rebis	Piping	CAD/CAE
	Autoplant 97 – Equipment	1.11	Rebis	Piping	CAD/CAE
	ProCAD AutoFlow	R14	PRO-CAD Software Ltd.	Piping	CAD/CAE
	ProCAD AutoOrtho	R14	PRO-CAD Software Ltd.	Piping	CAD/CAE
	ProCAD AutoISO	R14	PRO-CAD Software Ltd.	Piping	CAD/CAE
	PSBOM	2	VECO Canada	Piping	CAD/CAE

CAD – Schematics					
	MicroStation Schematics	2.01	Bentley Systems, Inc.	Piping	CAD/CAE
CAD - Site Planning & Roadway Design					
	Eagle Point 98	98	Eagle Point Software Inc.	Civil	CAD/CAE
	Surface Modeling	98	Eagle Point Software Inc.	Civil	CAD/CAE
	Site Design	98	Eagle Point Software Inc.	Civil	CAD/CAE
	RoadCalc	98	Eagle Point Software Inc.	Civil	CAD/CAE
	Profiles	98	Eagle Point Software Inc.	Civil	CAD/CAE
	Data Transfer	98	Eagle Point Software Inc.	Civil	CAD/CAE
CAD - Hydraulics & Hydrology					
	Eagle Point 98		Eagle Point Software Inc.	Civil	CAD/CAE
	Watershed Modeling	97	Eagle Point Software Inc.	Civil	CAD/CAE
	Water Surface Profiling	97	Eagle Point Software Inc.	Civil	CAD/CAE
CAD – Structural					
	Structural for Triforma	7	Bentley Systems, Inc.	Civil	CAD/CAE
	Frameworks Plus	3.1	Intergraph Corporation	Civil	CAD/CAE
CAD - Mapping/Hybrids					
	MicroStation Descartes	7	Bentley Systems, Inc.	Piping	CAD/CAE
	CAD Overlay	R14	Autodesk, Inc.	Piping	CAD/CAE
CAD – Reviewing					
	PlantSpace Enterprise Navigator	5	Bentley Systems, Inc.	Piping	CAD/CAE
	MicroStation Powerscope	7	Bentley Systems, Inc	CAD/CAE	CAD/CAE
	AutoDesk View	2	Autodesk, Inc.	Piping	CAD/CAE
	AutoDesk Volo View	plus	Autodesk, Inc.	CAD/CAE	CAD/CAE
CAD - Clash Detection					
	PlantSpace Interferance Manager	2	Bentley Systems, Inc.	Piping	CAD/CAE

Plotter Descriptions

Plotter ID	Description	Plotter ID	Description
HP 5SI MX	Laser Jet Postscript printer 11"x17" & 8.5"x11" Trays	HP 8000TN	Laser Jet Postscript printer 11"x17" & 8.5"x11" Trays
XEROX 4520 PS & Compaq PageMarq 20	Postscript printer 11"x17" & 8.5"x11" Trays	KIP 9010 Plotter	Flatbed printer (Xerox copier technology)36"x500' Black and White12 - D size plots/min output Connected to online scanner
KIP 3620 Plotter	Flatbed printer (Xerox copier technology) 36"x500' Black and White 9 - D size plots/min output	KIP Starprint 3000	2 Roll Plotter 36"x330' Black and White 3 - D size plots/min output
HP-1055CM Color Ink Jet	Ink Jet roll plotter 36"x200" Color or Black and White	HP-650C Color Ink Jet	Ink Jet roll plotter36"x200" Color or Black and White

Construction Management

VECO is organized and staffed to manage the execution of construction projects in their entirety, from initial concept through to commissioning and start-up.

With over 25 years of construction management experience related to oil, gas, power, pipeline and manufacturing projects, VECO has comprehensive procedures and programs for the management of safety, environmental protection, quality assurance or quality control, cost and schedule control, field contract administration, materials management and commissioning/start-up interface.

VECO can provide experienced construction managers, superintendents and inspectors to manage, supervise and control all the aspects of the construction effort. Two other roles which VECO routinely assume are:

- **Agent for the Client** – in this capacity, VECO acting for the client, will prepare, award and administer procurement and construction contracts, coordinate all construction activities and provide administrative control assistance to the client during the construction phase.

- **Client Representative** – VECO acting for the client, prepares procurement and contract documents for client approval and award. VECO coordinates all construction activities and provides administrative control assistance to the client during the construction phase.

Services

- Provide constructability input during design phase
- Develop a construction execution plan
- Provide on-site safety and environmental control management
- Manage/monitor construction budget and schedule
- Monitor and evaluate contractor performance
- Perform field engineering, inspection and quality assurance activities
- Perform field contract administration.

Construction

VECO Construction Ltd. Is a wholly owned, independently operated VECO company that has been providing full service heavy industrial construction in Western Canada, the North West Territories and the mid-west and western United States since 1989. Working closely with its clients, VECO Construction provides safe, innovative solutions to resource development, processing and distribution industries.

Areas of Expertise

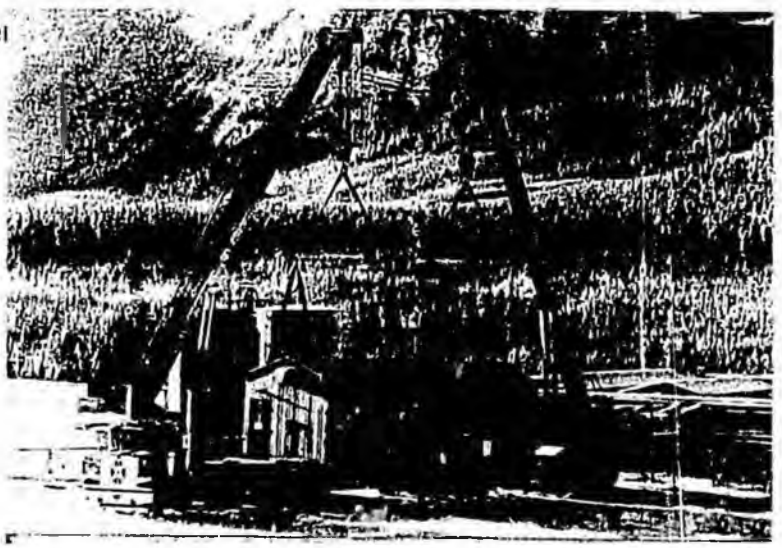
VECO Construction's principal markets include oil and gas processing, power generation and pipeline facilities. Services are provided both independently and in conjunction with other VECO companies.

In more than a decade, VECO has built a successful track record through executing the following project types:

- Compressor Stations
- Power Generation and Utilities
- Gas Storage Facilities
- Oil Batteries and Terminals
- Plant Inlet Modifications
- Water Injection Plants
- Wellsite Facilities
- Flare Systems
- Decommissioning/Dismantlement Projects
- Pump Stations and Terminals

Services

- General Contracting
- Civil and Mechanical Construction
- Equipment Installation and Dismantling
- Site Restoration
- EPC Projects
- Project Management



Project Experience

International Project Experience

VECO's project experience extends to the provision of services worldwide. In addition to coordinating international work activity through our offices in Calgary, we have offices in Abu Dhabi and Mumbai to provide local focus and contact.

We have completed projects in over 44 different countries under a wide range of logistical and geographical conditions. Tabled below is a list of countries where VECO has performed work.

VECO WORLDWIDE

Algeria	Mexico
Argentina	Mozambique
Australia	Nicaragua
Azerbaijan	Norway
Barbados	Oman
Canada	Pakistan
Chile	Philippines
China	Qatar
Croatia	Russia
Ecuador	Saudi Arabia
Egypt	Spain
El Salvador	Sudan
England	Syria
Gabon	Taiwan
Greenland	Tanzania
India	Thailand
Indonesia	Tunisia
Iraq	Turkey
Kazakhstan	United Arab Emirates
Korea, South	United Kingdom
Libya	United States
Malaysia	Yemen

.n today's international arena, it is vital that both risks and opportunities be identified, quantified and ranked in order to support the overall decision-making process. VECO is particularly well positioned to provide feasibility studies, cost estimates, and FEED support to assist our clients.

General Experience Highlights

VECO has extensive client and project experience as provided in the matrix below for ease of reference. We would be pleased to provide detailed project reference for any area, which may be of specific interest to you. We purposely intended this listing not be exhaustive, but rather provide you with an overview of our expertise

Client Name	Field Development	Compressors	Turbines	Gathering Systems	Sweet Gas Processing Facilities	Sour Gas Processing Facilities	Pipelines	SCADA & Controls Automation	Construction	Operations & Maintenance	Heavy Oil	Power Generation	Module Fabrication (Offshore)	Environmental Studies	Refineries
Abu Dhabi Oil Company (ADOC)						x						x			
Alberta Energy Company		x					x	x							
Alberta Natural Gas					x	x									
Alliance Pipeline Ltd.		x	x	x			x	x							
Alyeska Pipeline Service Co							x		x	x				x	
American Natural Resources					x		x	x							
American Resources						x									
Anardarko Petroleum		x		x	x	x									
Aramco											x				
ARCO Alaska, Inc	x			x	x	x	x		x	x		x	x	x	x
BC Gas		x		x						x					
BC Hydro		x	x		x	x									
BP Canada, Ltd	x	x	x	x	x	x	x	x	x	x	x	x		x	
BP Refining															x
BP Exploration, Alaska	x			x			x	x	x	x			x		
Canadian Natural Resources											x			x	
Canadian Occidental	x			x			x	x			x	x			
Central Alta. Midstream		x							x	x				x	
Centurion												x			
Chevron		x		x	x									x	
Consumers' CO-OP															x
Conoco	x	x				x	x	x	x				x		x
Deminex	x				x		x	x			x				
Esso Resources	x	x													
Express Pipeline Ltd.							x	x							
Exxon Ventures (CIS)	x														
FAL Oil					x	x		x							x
GASCO Gas Industries						x	x	x	x						
Island Paper Mill												x			
Japan Canada Oil Sands Limited	x			x			x	x	x		x				
Keyspan		x		x		x	x					x			
Koch Oil	x						x	x	x		x				
KomiArcticOil	x			x			x		x				x		
Mobil Oil Canada	x	x				x							x		
Nexen	x	x		x			x		x	x					
Nimir Petroleum Company							x	x	x				x		
Northwest Pipeline Corporation					x	x	x	x	x	x					
Oman Refining							x			x					x
PanCanadian Petroleum	x	x		x	x	x	x	x	x				x		
Peace Pipe Line, Ltd							x	x							
Pennzoil	x		x	x			x		x						
PetroCanada	x			x			x		x				x		
Petroleos Mexicanos (PEMEX)							x								
Phillips Petroleum Resources Ltd	x	x		x		x	x								
Primewest			x											x	
Saudi Aramco	x														
Shell Canada Ltd						x	x	x	x					x	
Shell Oil Company	x			x			x	x	x						x
Starlech Energy, Inc	x								x						
Suncor, Inc						x	x	x	x						x
Talisman Energy, Inc							x	x			x				
Tesoro	x														x
Tosco	x														x
Trans Mountain P/L Company, Ltd									x	x					
TransCanada PipeLines	x	x	x			x	x		x	x				x	
TransCanada Power			x						x			x			
UMC Petroleum	x			x				x							
Union Pacific Resources, Ltd				x				x							
Unocal, Alaska, USA												x			
Westcoast Petroleum, Ltd							x	x							
Williams Energy		x		x					x	x		x			

ASRC Energy Services
E & P Technology

A PROPOSAL FOR CONCEPTUAL ENGINEERING STUDIES FOR AN ALASKA INITIATIVE LNG SYSTEM

FOR:

Alaska Natural Gas Authority
411 West 4th Avenue
Anchorage, Alaska 99501

September 08, 2003

ASRC Energy Services
E & P Technology

September 8, 2003

Alaska Natural Gas Authority
411 West 4th Avenue
Anchorage, Alaska

Subject: Proposal for Conceptual Engineering Studies

Gentlemen:

Attached is ASRC Energy Services' proposal for preparation of Conceptual Engineering Studies for an LNG Plant in support of the Alaska-Initiative LNG Program. As a 100% Alaska Native Owned Corporation, we appreciate the opportunity to participate in this important program.

Our proposal is based on the guidelines outlined by you on August 27: a strictly controlled budget and a need for completion by mid-January 2004. It is our understanding that the study will rely heavily on previous studies, some of which were prepared by ASRC/Parsons and some by other contractors. It should be noted that ASRC Energy Services have not yet had an opportunity to review the LNG facility study prepared by Yukon-Pacific.

You will find that our proposal describes a viable execution plan and a well-qualified organization for accomplishing the work. Under this proposal, all work will be managed and directed by ASRC Energy Services. The focal point of the work will be our offices at 3900 C Street in Anchorage. Due to their in-depth knowledge of gas processing in Alaska, we proposed to employ key individuals from Parsons Energy & Chemicals under a sub-contract agreement. ASRC Energy Services and Parsons E&C have a long and successful history of working together on Alaska projects. Recent projects of note include: GHX-1, GHX-2, Point Thomson Gas Cycling Facility, Alaska Gas Producers Prudhoe Bay Gas Treatment Plant and the ConocoPhillips Alpine Development.

We believe this proposal is consistent with our discussions and offers the best utilization of the previous studies consistent with the potential budget and schedule Should you find areas that require clarification or suggestions for improvement of the effort, please contact our Manager for this proposal, Mr. Gary Clardy at (907) 339-6264.

Sincerely,

David Johnston, President
ASRC Energy Services E&P Technology

ASRC Energy Services, E&P Technology, 3900 C Street, Suite 702, Anchorage, Alaska 99503-5969
Fax: (907) 339-6276