

NORWESTER

NORWEST
CORPORATION

NEWS | OPINIONS | EVENTS | RESOURCES AND MORE

30 Years and Counting...

by Kirk Weber

The world faces considerable challenges today, but we at Norwest are no strangers to such challenges as we celebrate our 30th anniversary. News headlines in 1979 ran the gamut: oil prices set new records, the U.S.S.R. invaded Afghanistan, 63 Americans were taken hostage in the Tehran embassy, "Three Mile Island" became a household phrase, and inflation in the U.S. ran at a rampant 11.2% rate. Amid this backdrop, a group of five young engineers and geologists had the fortitude to form NorWest Resource Consultants (the predecessor of Norwest Corporation). These founders simultaneously opened rather austere offices in Calgary and Salt Lake City. According to one of the original founders, it was a "pretty rough start" given the state of the economy and mining industry at that time.

The name "NorWest" was selected by the founders to recognize the geographic location of the company's initial client base (northwest North America's coal industry). As many of you remember, the marketplace was not kind to the domestic coal industry in the early 1980s. This necessitated diversifying the company both geographically and industry sector-wise. Norwest's first major international project became a reality in 1981 with the Ombilin Feasibility Project, a multi-million dollar engagement for a major underground coal mine in Indonesia. This project established Norwest in both the international arena and

with a major banking client (World Bank). The founders had now truly placed Norwest "on the map" internationally and were instrumental in making the Ombilin Project a reality. This diversification into international work helped Norwest survive the initial "ups and downs" of the North American coal industry.

The second major break for the fledgling company came with the award of a detailed feasibility study for Getty's Twentymile Park Mine in Colorado. Since its inception, the Twentymile Mine has become one of the world's most productive longwall coal mines. Closely following the successes at Twentymile, Norwest was awarded a contract to engineer and manage the Underground Test Facility near Fort McMurray, AB. This unique project combined underground mining techniques with steam-assisted gravity drainage ("SAGD") to recover heavy oil in the Athabasca oil sands region. Norwest was now established in the Canadian oil sands industry, a position which we later successfully expanded into the rapidly growing oil sands surface mining industry. Our first entry into the surface-mineable oil sands business occurred in the mid-1990s, when Norwest mining engineers developed mine plans for Shell's Muskeg River Mine. Muskeg River has evolved over the years into a 165,000 barrel per day bitumen producer. Closely following this success, Norwest was engaged to provide full geological support, mine design, geotechnical analysis, and tailings disposal management design services for the Fort Hills Project. Today the Canadian oil sands business represents the single largest industry sector served by Norwest, and at last count Norwest was involved with at least eight clients on the various stages of oil sand projects, from resource delineation to operational support.

Despite Norwest's early successes, the minerals industries faced tough times through the 1980s and well into the 1990s. Our initial involvement with the World Bank opened a door to apply our expertise to a new group of clients - financial institutions. Norwest's services to



An early client success: Norwest's innovative designs to stabilize old underground workings also resulted in the development of a new golf course.

the financial community have grown from the initial base of feasibility study work to a broad range of mergers and acquisitions support. Our realistic approach and reputation for being innovative, reliable, accurate, and impartial gave impetus to our working for most of the largest international financial institutions with stakes in the mining industry. Norwest's due diligence services have supported financial placements numbered in the billions of dollars.

Over the past 30 years our experience base has grown to the major mining regions of North America, Australia, Asia, South America, and Europe. Norwest's mergers with Questa Engineering (2003) and Applied Hydrology Associates (2004) expanded our offerings to the oil and gas industry and our capabilities in environmental and hydrology services.

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Norwest offers complete exploration, resource evaluation, mine planning and tailings management services to the growing oil sands industry.

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John Campanella Named President of Norwest's Oil & Gas Division

by Tiffany Storrs

With more than 25 years of petroleum engineering experience as a reservoir and production engineer, John D. Campanella, B.Sc., P.E. was named President of Norwest's Oil & Gas division in December 2008.

Since 2002, Campanella has served Norwest's Oil & Gas division (formerly Norwest Questa Engineering Corp.) as a senior petroleum project manager.

"As President of Norwest's Oil & Gas division, I plan on continuing to assist our clients in managing the ups and downs of the petroleum business. I'm also working with the Golden team to expand our international business," says Campanella.

An expert in reservoir simulation, Campanella has performed conventional oil and gas and coalbed methane reservoir studies, analysis, and simulation with an emphasis on reservoir characterization, 3-D geomodeling, and oil recovery (EOR, IOR, and HPAI).

Campanella is a registered professional engineer and holds a B.Sc. in chemical engineering. He is also a short course instructor for Norwest's Mature Oil Fields and Oilfield 101.

John is a member of the Society of Professional Engineers and the Denver Well Logging Society. He has published numerous industry papers and is an active public speaker within the energy sector.

Campanella rejoined Norwest's Board of Directors in December 2008, after having previously served from January 2006 to December 2007.

Assisting Clients in Managing the Ups & Downs of the Oil Market

by John Campanella

Norwest Corporation's Golden, CO business unit has been helping clients over the last few years take advantage of the upswing in oil prices. Now with the worldwide drop in oil prices, Norwest is assisting clients managing the down turn as well.

In the spring of 2002, John Campanella, recently appointed President of Norwest's Oil and Gas division, began working on a full-field simulation project (Cedar Hills) for independent oil company Continental Resources Inc. (Continental), based in the U.S. mid-continent.

Cedar Hills, located on the Montana – North Dakota border, was discovered in the early 1990s and had been developed using open-hole completions in mile-long horizontal wells on 640-acre spacing (see Field Location Map).

Primary recovery from a 10' carbonate reservoir with low oil saturation was driven by rock and fluid expansion. Production peaked in 1998 and began to plummet thereafter. To

optimize recovery, Continental decided to investigate high-pressure air injection and infill drilling using a field simulation model. Reservoir simulation was considered vital to the project's success as decline curve techniques could not accurately predict the oil rate response during transient periods in which new wells were being drilled and selected producers were being converted to injectors. The relatively complex development and investment strategy called for numerical modeling.

Due to tight reservoir rock and low oil saturations throughout most of the field (except along the unit boundary where water injection has been used successfully), Continental felt that air would sweep the reservoir more efficiently than water and at a lower cost than CO₂, of which there was no local source. Norwest used nine years of available production history to calibrate the simulation model. In addition, a field to the south of the project area had been injecting air for 20 years, and thus Norwest used it as an analog to create relative permeability curves that also went into the model. Working iteratively with the client to clarify the reservoir geology and tweak the model to account for water lost into the formation during drilling (not otherwise factored into historical water and oil produc-

tion), Norwest was able to achieve an excellent history match.

The simulation model was subsequently used to optimize the timing and sequence of infill

"The trickiest part of the simulation is getting the early response right when you're changing operations. You have to get a combination of factors correct in order to forecast production. By successfully predicting the response rates over that one-year period, we're pretty confident we can predict the peak oil rate and ultimate recovery in this field."

drilling, as well as the conversion of existing wells to air injection. Initially, as new wells were drilled on 320-acre spacing, oil production spiked. For a period in 2003 during which some wells were converted for air injection, field production dropped off, as expected, then rapidly rose again as air began to sweep the reservoir more efficiently. The model was tuned and validated to reflect drilling and conversion activity through the fall of 2004, including 21 months of high-pressure air injection. Then, for the next four years, measured water and oil production rates were compared with the forecast. How accurate were they? "The predictions and actuals matched within 10%," says Campanella. "We're pretty proud of that, especially because it was during a huge transient phase when things were changing rapidly. I think it shows what an engineer can accomplish by properly using a sophisticated numerical simulator."

"The trickiest part of the simulation," adds Norwest's client, "is getting the early response right when you're changing operations. You have to get a combination of factors correct in



John Campanella is an expert in large-scale simulation and CBM modeling.

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Workplace Safety

by John Pilgrim

Safety in the workplace continues to evolve as an integral part of Norwest's corporate culture. Our Canadian operations applied for an Alberta government sponsored Certificate of Recognition (COR) to validate the quality of our health and safety program and to meet the expectations of many of our clients.

Having successfully passed our initial audit in 2005, Norwest recently completed the renewal process conducted by a certified external auditor. An exceptional pass mark of 96 percent reinforces our belief that we are on the right track.

Congratulations are extended to all staff as we would not have achieved such remarkable results without the commitment of everyone – well done!

Bone Marrow Registry Drive Inspires Hope, Compassion

by Diane Dolt

Matt Kascak, a Norwest GIS Specialist, recently hosted a Bone Marrow Registry Drive in the Denver office for a long-time friend diagnosed with Leukemia/Lymphoma who is awaiting a transplant.

Following extensive research on the bone marrow donation process, Matt teamed up with The Colorado Marrow Donor Program to sponsor a tissue-typing for employees who were interested in donating. Matt's efforts helped qualify 15 Norwest employees as potential donors.

"Nearly 1 out of every 12 potential donors are called upon to donate, making it a good possibility that one donor could be from our office!" said Kascak.

Thank you to all employees who participated in this great cause and kudos to Matt for organizing the drive!

Trekking the Abode of Snow in Nepal

by Gordon Daniel

Every year, thousands of people visit the Rocky Mountains of Canada and the United States. Both tourists and locals alike marvel at the grand scale of these enormous beauties, the highest of which tops out at around 4,400 meters. However, they are mere mole-hills in comparison to the magnificent Himalayas of South Asia.

The Himalayas are an impressive mountain system containing over 100 peaks that exceed more than 7,200 meters. In Nepal alone, they claim eight of the world's ten highest summits.

Despite their size, the Himalayas are relatively young in geologic age. Mountain building began about 60 million years ago when the Indo-Australian plate collided with the Eurasian continent. This spectacular example of plate tectonics is still occurring and the mountains grow taller at a rate of about five millimeters a year.

Himalaya is a Sanskrit word meaning "the Abode of Snow" and was coined by the pilgrims of ancient India who traveled these mountains. The area encompasses a region of deep religious and cultural traditions and an amazing diversity of people. There are still only a limited number of roads extending deeply into the hills. The best way to experience the remote regions is the slowest and most intimate – walking.



Another 8000+ meter monster - always watching!

While trekking through remote mountain villages, I witnessed a lifestyle that has not significantly changed for generations. I met plenty of friendly locals who were rarely in a hurry to do anything. Their culture and traditions seem to exemplify many of the attributes we have lost in our headlong rush for development in the West.

The people of Nepal truly live off the land and use only a small assortment of manufactured goods. These goods are carried for days into the mountainous regions by porters wearing cheap flip-flops. The loads are astonishingly heavy, often in excess of 75 kg, with the bulk of the weight carried by a strap around the forehead. At a popular rest stop on my trek, I befriended some porters who asked if I wanted to try on their packs. Just donning the pack was like wrestling with an elephant. Although I was eventually able to stand unaided, it was quite clear I wasn't cut out for the job!



Left: Ledtar - a tiny outpost in the shadow of a giant

Above: Attempting to carry a porter's heavy pack

Right: Summiting Thorong La Pass at 5416 meters, the highest point of the Annapurna Circuit



The Daily Grind has been Left Behind John & Jane Wright Retire from Norwest

by Tiffany Storrs

With more than 50 years of combined leadership experience in the workforce, John and Jane Wright formally retired from Norwest Corporation in December 2008.

After all these years, initially with Questa Engineering, and then with Norwest, this was no doubt a difficult decision for John and Jane to make. They have always felt that what they were part of was more a "family" than a business enterprise.

"The oil and gas team in Golden is by far the best professional team I have ever had the opportunity of working with," said John.

John graduated from the Colorado School of Mines (CSM) with a Professional Degree in Petroleum Engineering in 1969 and a Ph.D. in Petroleum Engineering in 1985. After a short stint with a major oil company and some graduate studies, he helped found a petroleum engineering firm in Golden, CO in 1975. He returned to CSM as a professor of Petroleum Engineering in 1980 and then purchased Questa in 1988. At the time, Questa consisted of some office space, some files, one ongoing litigation job, and one employee - a bookkeeper.

Jane came from an educational background, working initially as a Vocational Education teacher. Later in her career Jane spent 7 years as the Principal of Warren Tech vocational high school where she raised enrollment from 600 students to

over 1000 students in a 3-year period. At the same time she ran Warren Tech, Jane was also the Director of K-12 Vocational Education for the entirety of Jefferson County, CO with responsibility for overseeing programs at 17 high schools and 20 middle schools in a county with more than 70,000 students.

Together, John and Jane were the "management team" at Questa, with John bringing in the projects and Jane keeping the business machinery functioning. One of the areas of expertise they developed was coal bed methane (CBM). Ultimately, it was that CBM capability that became the area of common interest between Questa and Norwest.

"Importantly for me, today I am retiring from Norwest, not from life. I plan on spending more time with family and friends and really embracing the future," said Jane Wright. "I look forward to traveling and enjoying new experiences and of course trying my hand out at knitting. I am so pleased with the dynamic oil and gas team we've helped create and that is so well respected within the industry," she added.

"John and Jane acted as a dynamic leadership team for Norwest's Golden office." It is of paramount importance to both of them that a balance of professional and personal harmony be respected for every employee. We have all benefited from that priority," said Katherine Wolf, Office Administrator.



John and Jane Wright

John and Jane became part of the Norwest family when Questa and Norwest merged in 2003. At that time, they both became directors and shareholders of Norwest. Over the past five years, they contributed to the growth and development of the larger organization and continued to manage the oil and gas division in the Golden office.

"I cannot imagine the effort it took to create Questa Engineering, but I do know that I'm grateful John and Jane took it upon themselves to expend it," commented Norwest Oil & Gas President John Campanella.

We have an ongoing working relationship with John and plan on keeping him involved on a more part-time basis as an independent contractor supporting the Golden, CO office. A BIG thank you to John & Jane for their hard work and unwavering dedication to their employees!

Integrating Disciplines to Help our Clients

by Sean Ennis

Over the last 30 years, Norwest has weathered numerous up and down cycles in the mining and energy industry. Having just come off of a period of incredible growth (2003 - 2008) marked by high resource prices, we currently find ourselves, again, in a cycle where margins are thin and fiscal control is a priority for energy companies worldwide. Despite the ebb and flow of the energy industry, at Norwest we take pride in our ability to help clients add value to their projects in good times and in bad by offering integrated services that help keep operational costs down.

Over the years Norwest has broadened our core expertise of geology, mining, and process engineering to incorporate more diverse disciplines such as geotechnical, hydrological, and reservoir engineering as well as hydrogeology and environmental permitting capabilities. Our ability to configure cross-disciplinary work teams

has helped our clients address the complex challenges of the modern mining industry. Yet even with our integrated services, we've never lost sight of the fact that our clients need practical economic solutions they can implement.

An example of our ability to help clients improve their bottom line is the help we gave a client to achieve additional coal recovery from a pit that was nearing its final depth due to pit wall stability constraints. Norwest was able to blend its mining and geotechnical expertise to develop a rock bolting and monitoring program which allowed for mining to continue to greater depths and achieve significant additional coal release.

Another example is Norwest's completion of a waste rock pile design for a client in the gold industry facing multiple constraints including a tight footprint, a need for progressive reclamation and dynamic water management planning. The client is currently

facing a significant increase in the waste rock volume to be stored. However, the footprint cannot be expanded and the original goal of progressive reclamation still has to be met. Norwest's mine planners, geotechnical, and geo-environmental engineers worked with the client to develop an updated rock pile design adding the needed storage capacity while still meeting original design constraints that do not disrupt on-going operations.

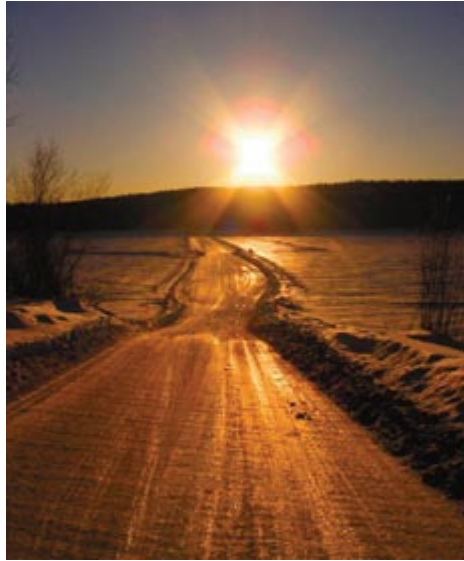
Reclamation and the closure of mining operations is yet another prime example of the need for a multi-disciplinary approach. Norwest is currently involved in several reclamation and closure projects involving coal, metals, and oil sands properties. In each case, we have worked with our clients to assemble a project team with customized skill sets that each unique property and situation requires, essentially saving the client both time and money.

30 Years and Counting...

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Today Norwest is one of the world's most integrated energy consultancies with offices in Calgary, Vancouver, Salt Lake City, Denver, Golden, Charleston (WV), Grand Junction (CO), Newcastle (NSW), and Kolkata.

The March 2004 edition of the Norwester reported that on our 25th anniversary we employed 110 professionals and support staff - a number which seems small now compared to our current complement of nearly 250 full-time employees. Much of this growth is attributed to our basic commitment to excellence on all of our projects. How do we achieve this commitment from our employees? In the early 1990s the founders decided that they would benefit more by owning a smaller share of a larger company. This led to offering ownership to key employees (the original five owners have expanded to nearly 100 employee shareholders currently). So for us, this is not just a job. We take pride in ownership, and serving clients is not just our duty, it's our privilege. Ownership has vested our employees in the success of the company - which is only achieved through the success of our clients.



Exploration in the Athabasca oil sands region requires innovative techniques such as the construction of ice bridges for access.

Among Norwest's other key competitive advantages is our broad, real-world experience base. All of our senior professionals have extensive industry experience prior to entering the consulting business. Accordingly, we understand the opportunities, pressures, and constraints facing the industries we serve. Our innovative, experienced-based approach is focused on assisting our clients achieve world class performance standards. Norwest's client base has grown to include the world's leading energy and mining companies, electric power producers, financial institutions, governments, legal firms, and regulatory agencies.

We at Norwest are confident in the ability of the industries we serve to meet and succeed in today's challenging business conditions. We stand ready to assist you with the quality consulting services you have come to expect from the Norwest reputation and our outstanding people. Thanks to all our clients, past and present, for a very interesting and mutually successful ride these past 30 years.

Three of the Original Norwest Founders

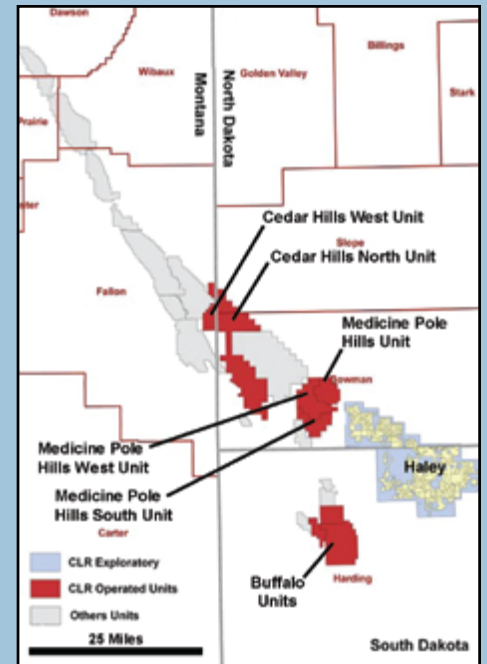


Can you name all of them?

Gerry Stephenson • Geoff Jordan
Donovan Symonds • Donovan Symonds

Assisting Clients in Managing the Ups & Downs of the Oil Market

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Cedar Hills, located on the Montana - North Dakota border, is the 13th largest onshore oilfield in the lower 48th. It is being developed using horizontal wells and high pressure air injection.

order to forecast production. By successfully predicting the response rates over that one-year period, we're pretty confident we can predict the peak oil rate and ultimate recovery in this field."

Since 2005, up to three drilling rigs have been active in the field and new infill wells were being drilled on 160-acre spacing. Along the way, revised field development plans were driven by the results of reservoir simulation created by Norwest. Current estimates based on the simulation model indicate field recovery will more than double during the 40+ year life of the field. Estimated primary recovery was only 8 to 10% of original oil-in-place; now Continental is predicting recovery of 24%.

With the current downturn in oil prices, Continental is investigating the possibility of a hybrid air and water injection program which would essentially eliminate or defer new well drilling and reduce operating expenses without damaging ultimate oil recovery. The simulation model created by Norwest is a key component in this process since it allows the different strategies to be tested and the economic impacts quantified before any action is taken which could ultimately damage the client's asset. "Helping clients like Continental manage the ups and downs of the oil business is what we're all about", says John Campanella.

Norwest Newbie Wins PCMIA/SME Student Design Award

Rosalyn de la Peña, a recent Virginia Tech graduate who joined the Calgary office as a mining engineer in July 2008, has been named the winner of the 2008 National PCMIA/SME Student Design Competition. In presenting the award, the Pittsburgh Coal Mining Institute of America (PCMIA) and the Society for Mining, Metallurgy, and Exploration (SME) recognized de la Peña and her senior design team, "Mole Mining Limited," as "Best in the Next Generation of Mining Engineers".

Rosalyn and her team are the first all-female team to win the competition since its inception in 1993. Their capstone design project included a detailed feasibility study on a potential open-pit taconite operation in Hibbing, Minnesota.



Rosalyn de la Peña

The competition, established jointly by PCMIA and SME, is open to all mining universities in the United States. Nominees for the contest are selected by each university's faculty members.

Managing Director's Message

by Joe Aiello

"Nothing in life is certain but death and taxes" (Benjamin Franklin), or a recent revision, "Nothing in life is certain except debt and taxes" (a California political blog) both provide an accurate representation of what has been going on in the world economy since the fall of 2008 (or earlier). How to respond to that uncertainty is a concern for most people on a personal level – for business managers and leaders it also has a corporate component.

For those of us who have been in the natural resources sector for at least a decade or two, the "boom and bust" cycle is familiar territory. We can rely on our experiences in those cycles to help us make decisions on the ways we respond to the current situation. For most of us, the number one imperative is to reduce costs to make our organizations "recession proof" as quickly as possible. Where and how we target our cost-cutting initiatives could have consequences for the long-term viability of our industry.

While salary and other employment-related costs are often one of the first areas scrutinized for reductions, caution needs to be exercised. Inappropriate cutting increases the risk of impairing our ability to attract and retain talented employees, perhaps not in the near-term, but certainly in the long-term as the economy recovers. It is a matter of balancing short-term business results with our ability to successfully execute our long-term strategies.

This is truly an industry issue. Looking at the mining industry, for example, we are challenged not only by the current softness in commodity markets. We also have demographics working against us, as a significant number of the people in the industry are in the 55+ age bracket with retirement in mind (notwithstanding the deterioration of pension and 401K plans). Universities are only providing six mining engineering graduates for every ten retiring. We need new people coming into the industry just to maintain the status quo – and more if we want it to grow. And how are we going to attract those new people unless our industry is seen as a viable and relatively stable career option?

At a minimum, we must retain our base of technical and operational excellence. We can



Joe Aiello

achieve this in a number of ways, by retaining our top talent and by supporting the university programs that help generate the new talent pool. We need to hire summer students, interns, and graduates from those programs to demonstrate that there are stable and rewarding careers in our industry. If we do not, there will not be any engineers and geoscientists graduating when we need them. There are no quick fixes when programs shrink; a strategy to resuscitate the mining program at the University of Alberta took almost 20 years to increase the number of graduates from 2 to 40. This success was a result of a concerted effort and dedication by the industry and the university administration, augmented by the good fortune of coming about during the recent commodity boom. Gains like these will be easily lost if we do not continue to support these initiatives with action. Every organization should consider how it will respond to this challenge to the sustainability of our talent base.

At Norwest, we look at this as a time of opportunity – a time when we will hire key experienced individuals on a strategic basis, and a time when we will continue our active support for the technical disciplines that represent the core of our business through the recruitment of new grads and students. Norwest intends to provide the top quality service that its clients expect during this period of uncertainty, and beyond. We are here for the long-term.

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