

The Environmental Evolution of Norwest Corporation

By Fran Amendola

When Norwest's founders started the company over 30 years ago, the scope of practice was very different from what we have today. In the early days, the focus was mainly on coal geology, mining, and processing. With strong leadership, creative thinking, and opportunities to expand, Norwest has evolved into a diverse consulting company offering a broad range of services.

Since Norwest's early years, the environmental landscape has changed dramatically. On the environmental front in the U.S. during the late 1970's, the Clean Water Act (formerly the Safe Drinking Water Act), Clean Air Act and the Surface Mining Control and Reclamation Act (SMCRA) were in their infancy. The only older "vintage" piece of federal environmental legislation around at that time was the Hardrock Mining Law of 1872, which, amazingly, is still around some 140 years later.

At Norwest's inception, most of our clients had "coal" somewhere in their name or were in the coal business in Canada or in the U.S.

Today coal is still a major part of our business; however, it now includes coal throughout the world—China, Mongolia, India, the



Appalachian Drainage Reconstruction

Philippines, Indonesia, Mexico, South America, South Africa, Mozambique, Australia, as well as Canada and the U.S.

We have expanded our offerings to a variety of resources and industries. Norwest now provides services to major mining and energy industries and projects around the world, covering coal (underground, surface, metallurgical, and thermal), coal bed methane, underground coal gasification, shale gas, conventional oil and gas, potash, phosphates, gold, copper, oil shale, oil sands, aggregates, energy transmission lines, and cosmic ray investigations (please don't ask me to explain the last statement).

Our Environmental Services Group has evolved as well to provide support to our new client base. While many of our staff cut their teeth on SMCRA or hardrock mining regulations, we've broadened our skillset to cover the other industries represented in our client base today. We provide a full complement of environmental services to cover these new industries around the globe, encompassing a wide range of environmental disciplines including hydrology, water quality, air quality, land use, and waste management. Obviously, environmental support in permitting and compliance continues to be

one of our mainstays. You will find that our Environmental Services Group is familiar with the federal, state, and provincial regulatory programs under which our clients operate here in the U.S. and Canada, in addition to many other countries around the world. In the U.S., we work with major federal environmental agencies including the Office of Surface Mining, Bureau of Land Management, Environmental Protection Agency, U.S. Forest Service, and the U.S. Army Corps of Engineers as well as the state counterparts of these federal agencies.

Norwest's Environmental Services Group provides input at the front end of a project, allowing environmental sensitivities to be integrated into the initial project design. Providing pragmatic, experience-based input adds significant value, helps control costs, and allows project schedules to be developed and maintained. It

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Evaluating Reclamation Success for Bond Release



Passive Water Treatment

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Resource Development and the Environment



Richard Dawson
Sr. Vice President

Meeting the needs of continuously increasing energy and mineral demands in an environmentally responsible manner is one of the more challenging issues of our times. This is at the heart of the sustainable

development principle that seeks to balance social, economic, and environmental issues in an effective and responsible manner.

In North America, the mining industry has responded to the challenge through programs and practices that embrace sustainable development as a core value. Towards Sustainable Mining (TSM) is an initiative by the Mining Association of

Canada (MAC) that aims to “improve the industry’s performance by aligning its actions with the priorities and values of Canadians”. In the U.S., the National Mining Association (NMA) has adopted a Sustainable Development Pledge:

“The members of the National Mining Association pledge to conduct their activities in a manner that recognizes the needs of society and the needs for economic prosperity, national security and a healthy environment. Accordingly, we are committed to integrating social, environmental, and economic principles in our mining operations from exploration through development, operation, reclamation, closure and post closure activities, and in operations associated with preparing our products for future use.”

These programs and others like them represent a fundamental shift in recognizing the life cycle value of energy and minerals to society. At Norwest, our engineering and geological services include many aspects of resource

President’s Message By Richard Dawson

development and our services are aimed at integrating the elements of sustainability by:

- Ensuring that exploration programs under our oversight are responsive to potential environmental impacts.
- Recommending business models that provide environmental stewardship as a strategic benefit.
- Providing operational advice that encourages a culture of continuous improvement through the use of new technology, the encouragement of innovative thinking, and the application of best practices.
- Developing reclamation and closure plans that carefully evaluate risks, costs, and long-term sustainability.

This issue of the Norwest includes a range of projects that illustrate our commitment to the balance of social, economic, and environmental issues embedded in the sustainable development concept. As such, Norwest is aligned with our industry partners in embracing this important principle and the commitment to added value that it inherently includes.

Norwest Receives Small Business of the Year Award

By Angela Welch

The Norwest office located in Trinidad, Colorado, was presented with the Small Business of the Year Award at the 101st Annual Meeting of the Trinidad-Las Animas County Chamber of Commerce held on February 18, 2012. Norwest was selected for the award based on the length and extent of its civic participation in the community, its strengths within the market, overall working environment, as well as references received from organizations and individuals within the community.

Norwest’s level of community involvement increased significantly during 2011 in Trinidad. This effort, involving employees from Norwest’s Trinidad and Denver offices, has raised the company’s profile in the region, and enabled us to educate and disseminate information on industry initiatives to protect the community water supplies and the environment. Norwest employees made presentations to community groups throughout the year on a variety of topics, including water monitoring and stormwater programs.

During 2011, Norwest participated in and supported the following events and local organizations: Aguilar Fest 2011, Chamber of Commerce Business Expo, Las Animas County Fair and Round-Up, Santa Fe Trail Days, Action 22, Aguilar Source Water Protection Plan Steering Committee, Comcast Cares Day Purgatoire River Clean-Up, Las Animas County Economic Development, Raton Basin API/COGA Chapters, Trinidad and Las Animas County Chamber of Commerce, Purgatoire River Anglers Trout Unlimited, Quarterly Recycling Events, and the Purgatoire Watershed Planning Group.

The upcoming year promises to be exciting with new projects underway on the Purgatoire River and the opportunity to interact with area students through hands-on displays at the upcoming Trinidad Water Festival.

Norwest appreciates the efforts of our employees and the recognition of their contributions to the community that the award symbolizes.



(l to r) **James Thomson, Kevin Ritter, Angela Welch** (Denver office) **Stacey Rivera, Bill Ward, Aaron Caudill, & Greg Braine** (Trinidad office) (not shown) **Suzette Martinez & Stephanie Griego**



Trinidad, Colorado Small Business of the Year

Norwest's Geochemists Take on Challenges Facing the Fossil Fuel Industries

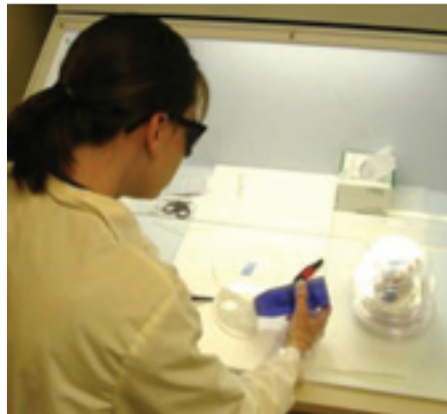
By Art O'Hayre and Terry Gulliver

Several non-government interests have sought a variety of methods to thwart the development of fossil fuels. These methods have included citizen suits, media campaigns, and regulatory initiatives. Norwest's geochemists and hydrologists have provided support to the fossil fuel industry to discredit claims by opponents that are based on misperceptions and faulty science.

Norwest geochemists have used isotope geochemistry in a number of forensic investigations to expose the claims of project opponents or to address the concerns of regulators. For example, Norwest has used stable hydrogen and carbon isotopes to distinguish the source of methane in private wells in gas production areas. Norwest has also used chlorine-36 and iodine-129 for age-dating of groundwater along with numerical groundwater models to demonstrate that produced water from gas wells does not deplete surface water. We have also used isotope geochemistry to address issues concerning fracking of gas wells. For one project we designed and implemented a deuterium tracer test to monitor flowback water from fracking of gas wells. We have also used geochemistry and isotope forensics together with hydrogeologic information to demonstrate that alluvial water quality has not been impacted by water in mine spoils.

At the request of the National Mining Association, Norwest prepared a white paper that provided an analysis of the scientific basis for the statistical approach used by the Environmental Protection Agency (EPA) to derive an aquatic life benchmark for conductivity in waters in the Appalachian Region. The study and the

conductivity benchmark specifically targets coal mining activities in the region. The EPA empirical approach was a major departure from the traditional methods, which establish water quality criteria using controlled laboratory experiments. Norwest used the EPA data to show that the proposed conductivity benchmark of 300 $\mu\text{S}/\text{cm}$ was not appropriate, because the presence or absence of specific aquatic organisms was related to a number of other site-specific conditions. Norwest's examination of the West Virginia



Lacy Jones studying geochemical aerosols at Colorado School of Mines

database found that 990 of the sites would be designated as impaired based on the EPA conductivity benchmark, while 409 of these sample sites are in fact not impaired based on current water quality criteria and biomonitoring. Our study showed that the conductivity benchmark is unnecessary and has a high false positive error rate as a criterion to protect the biological integrity of streams in Appalachia.

The efforts of Norwest's geochemists have assisted the energy industry in demonstrating that fossil fuel sources can be responsibly developed to meet the needs of our dynamic economy while adhering to the principles of sustainable and responsible development.



Aaron Caudil performing water quality analyses on the Purgatoire River in Trinidad, Colorado



Radiosotope sampling in the Raton Basin, CO

Staff Recognitions

The following individuals in the Salt Lake City office have received their certification as a Qualified Professional with the Mining & Metallurgical Society of America (SME): Carl Pollastro, James Sorensen, Greg Gold, Jason Todd, and Larry Messinger.

The following individuals in the Calgary office have received their PGeog. Wei Tang, Michelle Estrick and Khalis Ahmed.

Norwest is pleased to announce the following professionals have joined our staff since January 2012.

Calgary

- Paul Brown - Associate Level Geologist
- Steven Kinzel - Hydrogeologist
- Linda Li - Accounting Analyst
- Kris McBride - Project Administrator

Charleston

- Travis Ferrell - Project Manager
- Ray McDougal - Engineer/CAD Designer

Denver

- Scott Brinton - Hydrogeologist

Salt Lake City

- Kris McLaughlin - Accountant
- Justin Eatchel, Associate Jr. Geologist

Vancouver

- Lisa Butler - Geotechnical Engineer
- Flavio Guimaraes - Mining Engineer
- Mark Janzen - Intermediate Geotechnical Engineer

Norwest Supports Coalbed Methane Operators with Monitoring and Public Education

By Angela Welch

Producing vital natural resources, while protecting the environment, is an integral part of business for Pioneer Natural Resources Company (Pioneer). Pioneer is the largest oil and gas operator in Colorado's Raton Basin, and has been producing coalbed methane (CBM) in the area for years. Water is a by-product of the CBM production. The bulk of the water produced is discharged at surface into the Apishapa and Purgatoire watersheds located in Las Animas County, Colorado. Although not required under CBM regulations, Pioneer volunteered to implement a water monitoring program collecting data on key parameters in the rivers within the watersheds of their operations. This project supplemented the data gathered as a part of the existing Colorado Department of Public Health and Environment (CDPHE) water discharge permits. Pioneer felt many community questions could be answered via the monitoring, providing more transparency around the water quality and quantity in both the Apishapa and Purgatoire watersheds.

In 2007, Pioneer commissioned Norwest to install continuous water level and salinity monitoring equipment at three locations along the Apishapa River. A combination of near real-time monitoring and physical sampling data in the Apishapa River watershed enables Pioneer to ensure that its produced water is environmentally neutral. Easy, free access to water quality data in the basin is provided via web interface to stakeholders. Pioneer also can supply water from its operations to an area that traditionally receives little more rainfall than a desert.

In 2010, Pioneer extended the water monitoring project concept to the Purgatoire watershed located to the south of the Apishapa watershed with the installation of continuous monitoring equipment at nine locations along the Purgatoire River and its tributaries. One additional CBM operator joined with Pioneer to implement the Purgatoire program. Norwest provides weekly maintenance support to the Purgatoire monitoring program.



Apishapa River Gaging Station

Both the Apishapa and Purgatoire monitoring programs offer cutting-edge technology and provide the community, regulators, and interested parties with the opportunity to view first-hand continuous water quality and quantity data relative to the Apishapa and Purgatoire watersheds. Pioneer's dedication to providing positive stewardship offers the community reassurance that producing vital natural resources, while protecting the environment, can be achieved. To learn more about these programs, please visit www.apishapawatershed.org and www.purgatoirewatershed.org.



Apishapa Watershed Website



Landon Beck

Norwest in the San Juan Basin, U.S.

By Cathy Begej

The San Juan Basin, located in the Four Corners Region of the Southwestern U.S., is a prolific source of conventional and unconven-tional gas, oil, coal, and uranium production. To meet the needs of our clients in the area, Norwest has established a permanent presence in Durango, Colorado. Landon Beck, a hydrogeologist formerly based in Denver, relocated to Durango earlier this year. Landon will be supported by Norwest's consulting expertise from our North American offices. Landon can be reached at 970-403-3665, or lbeck@norwestcorp.com.

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also can reduce legal challenges to agency authorizations and approvals which have the potential to significantly disrupt project schedules. The environmental hurdles in the mining and energy industries are more challenging today than they have been in the past, in spite of the constantly growing need for energy and resource development. Norwest professionals are proficient and ready to assist our clients in navigating their way through the environmental and regulatory maze facing their projects around the world.

Safety at ICML's Sarshatali Opencast Coal Mine

By Art Sullivan

Subsequent to India's liberalization policy of 1994, the Sarshatali Opencast Coal Mine (SOCM), operated by CESC's affiliate Integrated Coal Mining Limited (ICML), was among the earliest recipients of a coal tenement in the private sector in India. Since initial production in 2002, Norwest has provided engineering, management, geological, and mine safety services to ICML. Currently, Norwest provides nearly six man months of on-site assistance annually.

The initial challenges facing ICML at SOCM included:

- Land acquisition,
- Relocation of local residents,
- Management staff recruitment and training,
- Mining in steeply pitching coal seams with major faults and intrusions, and
- Efficiently mining a coal reserve which included previous illegal mining, an active burn area, and a protected forest.



Typical Equipment Staging Line



Adjacent Mining

Over the past ten years, ICML has made significant strides in meeting those challenges and has maintained a high level of compliance with India's mine safety laws and regulations, as shown in the following examples. The historic issue of undermined burning coal is being approached and mined in a controlled manner. The photo above is of an adjacent area where underground mining led to burning of the coal seam and subsidence of the surface. Norwest's consistent expert advice has contributed to the contractor's ability to improve productivity and safety standards through continuous focus to achieve well maintained roads and dumps. Equipment maintenance is also at a high standard. SOCM's accident rate is well below the average for surface coal mines in the U.S. and India. At SOCM,

ICML has applied the principles of risk management to control hazards common to surface mines and unique to rural West Bengal. All supervisors are trained in risk management. Management, with the support of Norwest's experts, has established several teams with responsibilities for specific areas, and the teams' proposed controls are being implemented. ICML has modified their risk management program to fit the distinct cultural, environmental, and geologic needs of SOCM. The company has effectively devised risk controls which make the ICML risk management program an example of how safety tools, if mastered and aggressively applied, can overcome significant challenges.



Risk Management Team Training

Cresson Project – Permitting Processes

By Helene Wieting

The November 2011 Norwester article on the Cresson Project described a county land use permit and mine permit application that Norwest was preparing with Cripple Creek & Victor Gold Mining Company (CC&V) mining personnel and their consultants.

Norwest's environmental services group successfully worked with CC&V to complete their second Mine Life Extension permit application which was submitted to the Colorado Division of Reclamation, Mining and Safety (CDRMS) and Teller County Planning Services on February 28, 2012. The applications requested an extension to the mine life from 2016 to approximately 2025, with reclamation and associated closure activities continuing until approximately 2041.

The permit application must satisfy comprehensive regulatory requirements and balance social, economic, and environmental issues. The CDRMS application contains eight volumes covering project descriptions, maps of current and proposed facilities, the mining and

reclamation plan, baseline soils and biological resources, wetlands, hydrogeochemical and hydrologic evaluations, geotechnical slope design, stability analysis, facility designs, wildlife protection, and emergency response plans.

The land use permit application for Teller County includes a project description, as well as plans for historic resource protection and impact evaluations associated with noise, traffic, visual, socioeconomic, and storm-water management.

The permits are anticipated to be in place by September 2012.

As a mine operator, CC&V has maintained a high level of commitment to public health and the environment. In recognition of this commitment, CC&V received the Gold Level Environmental Achievement Award from the Colorado Department of Public Health and Environment in 2008 and again in 2011 (both applicable for three years). This award



Final Permit Application Quality Assurance by Timm Corner, Cripple Creek & Victor Gold Mining Co and Helene Wieting, Norwest Corp

recognizes Colorado businesses and organizations for voluntary and significant environmental achievements. CC&V is the only mining company in Colorado that has achieved the Gold Level status. Congratulations on winning the award.

Canadian Blood Donations By Paul Brown - Norwest CBS Representative

As part of Norwest's commitment to our community, we have joined Canadian Blood Service's Partners for Life Program. For our first year, we have pledged 20 donations with 16 as of the end of April, so we are well on the way to meeting and surpassing that goal. Our donation total for 2012 will be beyond anything we had hoped for, and we are proud of our accomplishment.

Donating blood is a necessary and life-saving way for Norwest to contribute to those individuals in need. A special thank you goes out to Jane Ellis, Kelly McDougall, Richard Grainger, Sean Simpson, Margaret Dumigan, and Barbar Mollah for leading the charge as our first "group donation" team. We would also like to thank those who have already donated and those who are planning to donate later this year. Norwest

looks forward to its continued involvement in this important community program.

To learn more about Partners For Life, go to www.blood.ca and select the Partners For Life icon. To find out where and when you can donate, enter your city at the top of the homepage and get a complete listing of all upcoming local donation clinics. It's just that easy!



Canadian Blood Services Clinic

Join Norwest at MINExpo INTERNATIONAL® 2012

By Toni Jack

The five-month countdown begins for MINExpo INTERNATIONAL® 2012, the world's biggest mining equipment exhibition.



Sponsored by the National Mining Association (NMA), MINExpo® 2012 will be held on September 24-26, 2012, at the Las Vegas Convention Center. Please plan to visit Norwest Corporation in booth 6929.

This year's quadrennial event will be the largest mining exhibition ever. "With 815,000 square feet of exhibit space already booked and 1,600 exhibitors from more than 30 countries, MINExpo® 2012 is already a record-breaking show," said NMA's President and CEO Hal Quinn. "The exhibit space alone is 36 percent greater than the record-setting 2008 exhibition."

In addition to the exhibits, MINExpo® 2012 will have 20 education sessions held the mornings of September 25 and 26, 2012. Bob Evans from Norwest Corporation and Mike McLanahan from McLanahan Corporation, the Program Co-Chairs, have been busy reviewing submissions and putting the sessions together. "The sessions will be very timely and will focus on case studies that we hope will provide attendees with information and ideas that can be applied to their specific mining

situation", "said Evans. Topics include safety, bulk materials handling, processing, maintenance, underground and surface mining, coal, new mining projects, markets, new technologies, and environmental issues. The Sentinels of Safety awards will be presented on September 25, 2012, to U.S. mining operations with outstanding safety records. The following day, officials from the U.S. Department of the Interior will confer national awards for outstanding environmental achievement in U.S. mining.

For more MINExpo® 2012 information follow the show on Twitter (@MINExpo2012), on Facebook (MINExpo INTERNATIONAL) and on the website (www.minexpo.com).



Norwest 2008 MinExpo Booth

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NORWESTER

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