Profile magazine will showcase Western Geophysical employee's photographic talent in its second annual "Capturing the Moment" photo contest. Contest information and an entry form are on page 41. The deadline is January 8, 1999.
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ERIS responds to industry demands for reducing exploration risks and increasing return with advanced seismic imaging technology and a solid teamwork philosophy.

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The oil and gas industry continues to play a dominant role in the economy of Brunei, a small nation situated on the northwest coast of the island of Borneo. Brunei also is home to Western Geophysical's Party 317.

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The Western Trident and the Western Neptune, two new state-of-the-art super-seismic vessels, will be the premier vessels in Western's fleet when they are completed next year.

30 Egypt: Cradle of Civilization, Religion, and Modern Technology
Egypt enjoys a growing economy and is going full steam ahead with the privatization of its public sector to become a free-market society. It is a target for investors from all over the world, including the oil industry.
The merger between Western Atlas and Baker Hughes, first announced last May, is now complete. Thus, a new and exciting chapter in the history of Western Geophysical has begun.

As expected with such an announcement, the merger agreement was initially greeted with a flurry of questions and speculation about the new company. Employees want to know about job security, benefits, retirement, and profit sharing. And, our customers want to be reassured they will continue to receive the same quality and service they have come to expect from Western Geophysical.

Western Geophysical had been part of a larger company since 1970 when we became part of Litton Industries. While that affiliation provided the capital which allowed Western to grow into the world’s leader in seismic services, there was little opportunity for synergism with the other, non-oilfield divisions of Litton.

Our corporate parent structure changed over time to meet customer needs, including the addition of Western Atlas Logging Services in 1987. Now, with the Baker Hughes merger, we are, for the first time, part of an integrated oilfield services company able to provide goods and services ranging from seismic exploration to well completion, and beyond.

Western Geophysical will continue to operate in much the same way that we have for the past 65 years, providing state-of-the art seismic exploration services with a strong emphasis on customer service.

In the short term, most of our employees will see little change in their daily work life as a result of the merger. But, the combination with Baker Hughes will clearly open many opportunities for employees throughout Western. We are committed to drawing on the best of both companies to expand our global reputation and to build the premier total service company in the industry.

Change naturally brings uncertainty, and resistance during such a major change is inevitable. The ability to see uncertainty as opportunity, and to embrace change with confidence, allows us to grow personally and professionally, and to grow stronger as a company.

During this time, it is especially important that we communicate with our employees, customers, shareholders, prospects and potential employees in an open, honest, and constructive manner. Superior results are only achieved when communication is used as a leadership tool and we continue to make every effort to keep all our constituents informed about our goals and vision for the future.

In an increasingly competitive world economy, the capacity to introduce new strategies and practices is a necessity. Western Geophysical’s recent employee survey revealed that, while there are some issues and concerns that need to be addressed, overall, our employees like what they do and have a deep commitment to customer service. With Western’s advanced technologies, and the talents, expertise, and “can do” spirit of our employees, we are poised to make the “new” Baker Hughes the envy of the business. I know I can count on each of you to contribute to that success.

Richard W. Worley
President, Western Geophysical
RODNEY ALSWAGER has been promoted to field supervisor, Western Hemisphere Streamer operations. Als-wager began his career with Western as a junior observer in 1979. He progressed to coordinator and served on several crews from 1981 until 1987. In 1991, Als-wager went back into the field to coordinate the Western Monarch and again in 1993 with the Western Spirit. He was promoted to party manager of the Western Atlas in 1996.

M. LEE BELL was named president of Geosignal in May. Bell, who received a bachelor’s degree in physics from the University of California in San Diego, and a master’s degree and Ph.D. in geophysics from Stanford University, began his career as a research geophysicist with Mobil in 1976. He later joined Digital Exploration in East Grinstead, UK. In 1984, Bell co-founded Entropic Processing in Cupertino, Calif. and in 1986, he co-founded Entropic Geophysical where he served as vice president of research and development. In 1989, he was named president of Entropic. Entropic later merged with Geosignal and Bell was named Geosignal’s vice president of research and development.

GUSTAVO CARSTENS has been promoted to marketing director for Latin America. Carstens received his master’s degree in geophysics in 1980 from the Universidad Nacional de La Plata in Argentina and has worked for various oil and gas service companies throughout Latin America. He joined Western in 1990 as a processing analyst in Buenos Aires and has held various positions including processing/marketing supervisor and processing/marketing manager of the Buenos Aires and Bolivia centers.

GRAHAM CARTER has been named manager, New Ventures, EAME. His responsibilities will include all aspects of EAME’s non-exclusive program development and sales. Carter joined Western in 1974 after earning his degree in geology from London University. During his career with Western he has held a variety of positions including manager of the Bogota processing center and manager of marine processing in Calgary. He joined the spec data group in London in 1987.

JOE DANTE has been promoted to manager, Network Systems. Dante has supervised the development and deployment of Western’s networks for the past four years. He now has the added responsibility of managing the support of Lotus Notes, Novell, and other network services. Dante joined Western in 1983, following his graduation from St. Mary’s University in San Antonio, Texas with a degree in computer science. He began his career as a junior systems programmer and advanced to systems programmer, senior systems programmer, and supervisor of the Network Support group.

RICHARD DEGNER has been promoted to vice president, Latin America Onshore operations. Degner has served Western in various technical and managerial positions of increasing responsibility since he joined the company as a field clerk in Venezuela in 1984. He received degrees in both geological engineering and geophysical engineering from the Colorado School of Mines in 1983. Degner has served in Latin America and Africa as a party chief and area supervisor. In 1990, Degner was appointed area supervisor for Western’s EAME operations and in 1991 was named technical coordinator for the Western Hemisphere. Degner was promoted to U.S. manager for EAME in 1992 and in 1994, he was promoted to area manager for northern Latin America. He was named general manager for Latin America operations in 1996.
LARRY DOUDNA has been promoted to resident manager of Trinidad. Doudna earned his degree in electronics from the Missouri Institute of Technology in 1981. He joined Western shortly afterward and has worked as an instrument technician, coordinator, party manager and, most recently, as a field supervisor. During his 17 years with Western he has worked extensively in marine and transition-zone operations in North America, Latin America, EAME, and the Far East.

RICHARD DRAKE has been named general manager of Texas, Mid-continent, and Eastern U.S. operations for North America Land and will continue to be based in Houston. Drake began his career with Western in 1975 on a field crew in Big Lake, Texas. He has held a variety of positions in U.S. Land operations including observer, assistant party manager, and party manager. In 1994, he was promoted to manager of West Texas, Mid-continent and in 1996 was promoted to area manager of West Texas, Mid-continent, South Texas and Southeast U.S. regions.

TERRY JOHNSON has been promoted to supervisor in the Houston Marine Processing department where he will be responsible for processing several large areas of the Ultra Survey™ program. After graduating from Texas Tech with a degree in math, Johnson started his career with Western in 1988 as a geophysical technician. He advanced to junior analyst in 1990 and analyst/group leader in 1991.

MICK KEAVENY has been promoted to sales supervisor, non-exclusive data, EAME. Keaveny will continue with his sales efforts in both 2-D and 3-D and also supervise the newly formed Client Services and Management Services departments, both located in Western’s Bedford office. He earned degrees in geology and sedimentology from Kingston Polytechnic and London University and has more than 18 years experience in the seismic industry.

GRAHAM MAYHEW has been promoted to manager, 3-D Program Development, EAME where he is responsible for non-exclusive 3-D program development for streamer and OBC surveys. Mayhew earned his degree in geophysics from Southampton University and has worked in the oil industry for more than 15 years. Most recently he was marine operations manager for Europe.

SHAWN RICE has been named general manager of Western U.S., Canada, and Alaska operations, North America Land and will continue to be based in Denver. After graduating from the Colorado School of Mines with a degree in geophysical engineering, Rice began his career with Western in 1984 as a geophysical trainee on a field crew in Montana. He has held a variety of managerial positions in Colorado, Kansas, Michigan, Montana, North Dakota, Wyoming, Houston, and Alaska. In 1996, he relocated to Denver to become area manager of Western U.S., Canada, and Alaska.

EVA ROYER has been promoted to manager, Computer Services where she will have responsibility for desk side Management Information Systems (MIS) support, the Technical Assistance Center, and related administrative services.
CHUCK TOLES will transfer from his position as vice president, Far East, Australia and China to the new position of vice president - Quality. Toles will be responsible for coordinating Western's quality management system throughout the organization and developing procedures and analytical tools to ensure continuous improvement and increased productivity. Toles began his career with Western in 1981 as a geophysical trainee and has moved through the ranks of assistant party manager, party manager, and supervisor to become manager of South Texas in 1989. He transferred to Singapore as manager in 1991 and was appointed general manager of Western's operations in the Far East, Australia, and China in 1994. He was promoted to vice president in 1996.

DOUG VICKERY has been promoted to manager of finance and administration for Latin American operations. Vickery graduated from Stephen F. Austin University in 1984 with a bachelor's in accounting and is a certified public accountant (CPA). He joined Western in 1996, bringing with him nearly five years of experience in the oilfield service industry. His most recent position was as accounting manager for Western Hemisphere and Far East operations.

LARRY WATT has been named supervisor for Latin American operations and will relocate to Houston. Watt has more than 42 years of experience in the geophysical industry, most recently as vice president of 3D Geophysical's Latin American operations.

STEVE WHIDDEN has been promoted to field supervisor, Western Hemisphere Streamer operations. Whidden earned a degree in geophysical engineering from the Colorado School of Mines in 1987 and joined Western in 1988. He began his career as an observer on the Western Caribbean and held various positions including coordinator, assistant party manager, and geophysicist before being promoted to party manager in 1996.

JIM WHITE has been promoted to vice president, Multi-client Data Library, Western Hemisphere where he is responsible for managing Western's seismic data licensing activities organized recently into a consolidated business. White earned his degree in geology from Penn State University in 1981 and joined Western in 1982 as a geophysical trainee in Mississippi. He was named a party manager in West Texas later that same year and has held a variety of supervisory positions in West Texas, Denver, and Michigan. In 1992 he was named manager of Program Development in Houston and in 1995 he was promoted to general manager of North America Land operations. Since February 1998, he has served as general manager, Western Hemisphere Speculative Data.

RANDY WOODRUFF has been named director of Management Information Systems (MIS) where he is responsible for project FOCUS, designed to provide more comprehensive internal information solutions for Western Geophysical. Woodruff began work for Western in 1982 as a junior systems programmer. In 1986, he was promoted to supervisor of the Remote Support group and in 1994 was named manager of Western's worldwide computer network and PC support group.
Baker Hughes and Western Atlas Complete Merger

Company’s Strategy Will Focus on Reservoir to Advance Discovery and Recovery Technologies

Baker Hughes Incorporated announced August 10 that the merger of Baker Hughes and Western Atlas was completed following approval by the shareholders of Baker Hughes and Western Atlas Inc.

Under the terms of the merger agreement, the 54.8 million shares of Western Atlas common stock will be converted into 148 million shares of Baker Hughes stock at the exchange rate of 2.7 shares of Baker Hughes stock for each share of Western Atlas. The transaction is valued at approximately $4.8 billion.

“In bringing Baker Hughes and Western Atlas together, we have combined Baker Hughes’ leadership in recovery with Western Atlas’ leadership in discovery,” says Max L. Lukens, chairman and chief executive officer of Baker Hughes. “The company will build on its strong technology positions to create integrated systems which will enable our customers to enhance value of the reservoir. We have strategically oriented our company in what we believe to be the fastest growing segments in the industry with the highest return potential.”

John Russell, former chief executive officer and president of Western Atlas is president of Baker Hughes. “The combination of reservoir knowledge, from the discovery process with our recovery capabilities in drilling, completion, and workover, positions our new company for growth as we approach the 21st century,” says Russell.

Baker Hughes’ oilfield divisions will be organized into two operational groups that will focus on product and service technology leadership, and systems development. One group, composed of Western Geophysical, Baker Atlas (formerly Western Atlas Logging Services) and INTEQ will report to Thomas R. Bates, Jr., senior vice president. The second group, reporting to Andrew J. Szescia, senior vice president, will include Baker Oil Tools, Baker Petrolite, Hughes Christensen, and Cenrilift. All other divisions will report directly to Lukens.

The combined company will be a leader in the oilfield service industry and process industries with leadership positions in seismic, wireline logging, drilling systems, measurement-while-drilling, drill bits, drilling fluids, sand control, completions, electric submersible pumps, and oilfield chemicals. Revenues for the 12 months ending June 30, 1998 (unaudited) were $6.4 billion. The company will have approximately 35,000 employees worldwide, including more than 16,000 based outside the U.S.

Gold Pan Awards

Client representative Don Ince of Arco Alaska was so pleased with the outcome of a reprocessing project of the Pt. MacIntyre and Greater Niauk surveys that he, along with partners Exxon and BP, sent special “Gold Pans” to recognize the efforts of Western data processing employees.

“I am extremely satisfied with the final outcome of the reprocessing work everyone did,” says Ince. “The level of improvement is remarkable.”

“We have a long relationship with Arco, BP, and Exxon in Alaska, both in field and in processing, which dates back a couple of decades, at least,” says RhonaPhillipsoid, quality control supervisor, Houston Data Processing. “This is just one instance of client satisfaction and an example of a good client/contractor relationship and teamwork.”

Western Geophysical Receives 1998 SEG Distinguished Achievement Award

The Society of Exploration Geophysicists (SEG) awarded Western Geophysical its 1998 Distinguished Achievement Award at its annual meeting in New Orleans, Louisiana in September. This honor, a unanimous decision of SEG’s Honors and Awards Committee, is in recognition of Western’s many significant contributions to the theory and practice of applied geophysics and its long-established position as one of the world’s preeminent geophysical service companies.

Western Geophysical is honored to receive the 1998 SEG Distinguished Achievement award. This award is a tribute to the entrepreneurial and scientific excellence that have helped Western grow over the past 65 years from a three-man operation to one of the world’s leading seismic technology organizations. With 7,000 employees working in all areas of the world, Western is proud to be at the forefront of the global search for oil and gas. We thank the SEG for this singular recognition and look forward to advancing the science of exploration geophysics into the next millennium.

The House That Western Built

A Jimmy Carter Work Project

A chorus of pounding hammers, and the buzzing and whirring of electric saws were heard as the first wall was raised at 3156 Christie in Houston’s Fifth Ward district.

Beginning each morning as early as 5:30 a.m., more than 6,000 volunteers constructed 100 Houston homes during the week of June 15-19. They were joined by 50 Western Atlas employees to brave Houston’s heat wave and participate in the Habitat for Humanity Jimmy Carter Work Project.

Since its founding in 1976, Habitat has built 64,000 homes worldwide. This year’s Jimmy Carter Work Project, held in Houston, is the largest ever attempted in the U.S.

Western’s involvement with Habitat began when Joe Dante, Western Geophysical Network Systems manager, was watching a documentary about former President Jimmy Carter, and his wife, Rosalynn’s efforts on behalf of Habitat of Humanity. “I wanted to get involved when I found out a project was planned for Houston,” says Dante. “I knew I couldn’t pass up this opportunity.”

With Dante’s connections as co-chairman for the Western Atlas Community Relations Committee, he was able to interest Western in becoming one of 80 corporate sponsors to build a home.

The project began with a reception on Sunday where Houston Mayor Lee Brown, Texas Governor George Bush, and former President Jimmy Carter spoke candidly about what volunteers could expect in the coming week. Western volunteers also had the opportunity to meet with the future homeowner of the home they would build, Raina Mott.

Volunteers show off their completed Habitat house and dog house.

“Our house was purchased by a woman determined to make a better life for herself and her children,” says Laurie Swadis, a geophysical analyst at Western Geophysical.

“The new owners are real heroes. They have the courage to beat the odds by achieving high goals they’ve set for themselves and their families.”

Before an applicant is approved for a home, they must agree to spend 300 hours helping to build the homes. They must earn between $11,000 and $23,000 a year, must attend meetings, pass a credit check, and prove to the committee they are responsible homeowners and neighbors.
Mott and her two daughters, Amber, 5, and Chelsea, 3, planned to move into their home on June 27. Soon thereafter, she would start making payments on her $43,000 home with a 20-year, interest-free mortgage.

Construction Begins

As the sun rose Monday morning, the first Western volunteers arrived at the site to find a cement slab, a pile of framed walls, and a stack of supplies.

Workers begin framing the house in Houston’s grueling heat.

“Since most of our volunteers have no construction experience beyond a few handy-man projects, and are more used to air-conditioned offices, we realized we had a daunting task ahead of us,” says Dante.

Slowed by 100 degree heat, the crew worked tirelessly to complete the walls, outside insulation, roof sheeting, installation of windows, and roofing felt by day’s end. They welcomed the relief of Western’s second shift in the evening to keep the project on schedule.

Another day in record-setting, blistering heat greeted volunteers on Tuesday. Wielding hammers and nails, the shingles were pounded into neat rows on the roof, and insulation for inside walls was installed. But, construction came to a halt when supplies ran low and necessary inspections had not begun.

“It was about this time that Jimmy Carter visited our site for the first time,” says Dante. “When he discovered why we were behind schedule, it wasn’t more than 30 minutes before we had what we needed to move ahead.”

After completing the drywall and siding Wednesday, Carter came by and presented Mott with a signed Bible. “It was wonderful seeing how proud she was,” says John Bice, field data processing manager for Western Geophysical.

Thursday’s crew began the finishing touches to the inside structure — hanging doors, installing cabinets, painting, and carpeting. Painstaking detail was given to each area, right down to caulking every hole in the walls.

Corporate Communications Supervisor Soraya Brombacher, was scheduled to only work Wednesday and Thursday evenings. “But, when I was going home Thursday night, I realized there was no way I could go back to work wondering how my house was coming along, so Friday morning I boarded the bus, and went back to help at the house,” says Brombacher. “This was an experience I will never forget.”

Friday was an emotional day for everyone involved. Work had to be completed by Saturday, so the race was on to get the job done. Once all the internal work had been done and the landscaping completed, the crew went one better, and built a dog house for Mott’s dog.

The crew was informed by their house leader, Bob Turner, that out of 100 houses, the Western house was the only one that did not require contractor assistance. Council Member Felix Fraga presented a special plaque to Western Atlas, honoring their outstanding participation.

On Saturday, Western volunteers presented Mott and her daughters with keys to her new home, along with several housewarming gifts.

“I participated in a piece of history when we built the Habitat home for the Mott family,” says General Services Secretary Nicole Rodgers. “Through all the hard work, sweat, and many tears that were shed, it was worth it to see the faces of Raina’s two daughters as they drove up to the house.”

“This was an exciting experience for all of the volunteers,” adds Dante. “When our volunteers were asked if they would do it again, everyone enthusiastically raised their hand and said they would.

“It’s very rewarding when you get a job like this done. We had the opportunity to help a family make a new life.”

Profile Awards

Western Profile recently received a Gold Excalibur Award from the Houston Chapter of the Public Relations Society of America in its 1998 Excalibur for Excellence competition. The first-place award was given for outstanding communication work in the magazine/internal four-plus color category. Profile also was recognized this year with an Award of Excellence by the Business Marketing Association, Houston Chapter, in its Lantern Awards competition in the newsletter/magazine category. Published since 1954, Profile magazine is a long-standing communication tool targeted to employees and clients of Western Geophysical.™
Western Geophysical Sets 27-Day Turnaround Record for Natuna Sea 3-D Seismic Survey Data

Western has set a new industry record for seismic data turnaround by delivering 1800-square kilometers of fully processed 3-D data to Conoco Indonesia Inc. just 27 days after the last shotpoint, cutting the previous record for data delivery by 43 days.

The data were processed from two surveys acquired by the Western Legend in the Natuna Sea, offshore Indonesia. Four data volumes, comprising a full stack and three angle stacks, were processed entirely onboard, an industry first.

The data acquisition cycle was speeded up with the first-time use of Western’s exclusive Sentry™ solid-streamer service. The solid streamer’s ability to acquire high-quality data in the presence of sea noise allowed the Western Legend to continue shooting during rough seas, which forced the shutdown of conventional-streamer vessels operating in the same area.

“The expedient acquisition and processing allowed Conoco Indonesia to timely execute a drilling program relating to the development of a West Natuna Sea gas field,” said Gertjan Van Mechelen, gas exploitation team leader for Conoco Indonesia.

“Our interpreters are extremely pleased with the data,” said Mark T. Wheeler, vice president and general manager of exploration for Conoco. “We also can report that the solid streamer technology resulted in substantial savings in streamer downtime.”

“Four data volumes and the use of cross-line trace interpolation resulted in a staggering 600,000 CMP kilometers of seismic data for the final 3-D migrations,” explained Chuck Toles, vice president of Far East, Australia, and China for Western Geophysical. “The delivery of large volumes of high-quality seismic data is made possible by accurate and timely transfer of data between Western’s integrated data acquisition, mass storage, and processing systems, and the application of the state-of-the-art Omega® software.”

Western Completes Major Offshore Pakistan Non-Exclusive Seismic Survey

Western Geophysical has completed the acquisition of a 5500-km offshore Pakistan multiclient seismic survey. The survey covers open acreage in deepwater blocks at 880 to 3000-m depths. The processed data are scheduled to be available during the 2nd quarter 1998.

Interest in offshore Pakistan has increased recently with various oil and gas companies acquiring exploration licenses in this area during 1997. Western’s new seismic program is situated south of the Pasni South and Pasni East licenses, and west of the Indus-A and 2365-1 licenses. Positive indications of a productive hydrocarbon play in this region were recorded during exploration campaigns in the 1970s.

Western Geophysical’s 2-D vessel, the Western Wave, acquired the survey using a 5100-m, 16-bit digital streamer, sleeve air guns, and Western’s interactive Omega® onboard seismic processing system.
Cairo Hosts Geophysical Conference

The Society of Exploration Geophysicists (SEG), the European Association of Geoscientists and Engineers (EAGE), and the Egyptian Geophysical Society (EGS) sponsored the Second International Geophysical Society and Exposition for Africa and the Middle East. The three-day conference was held in Cairo in February. Some of the Western staff who attended include, from left, Amin Abdel Aziz, data acquisition; Maurice Nessim, general manager of Western’s Cairo Data Processing Center; Steve Smith, deputy resident manager data acquisition; Amr Abdel Baki, data acquisition; Craig Beasley, vice president of Research and Development; Chris Fox, general manager of land acquisition EAME; Lorne Morris, business development manager; Marcus Ganz, data acquisition EAME; and Bill Rimmer, marketing.

Western participated in two research workshops and presented several technical papers at the conference.

Joint Seminar Presented on Reservoir Characterization and Monitoring

Western Geophysical and Western Atlas Logging Services (now Baker Atlas) combined forces last Spring to present a technical seminar held in five different cities in the Far East and Australia. The one day seminar, entitled “Value of Information — An Integrated Approach to Reservoir Characterization and Monitoring,” was presented to more than 300 clients and Western Atlas employees. The seminar was held in Negara Brunei Darussalam, Brunei; Jakarta, Indonesia; Bangkok, Thailand; Kuala Lumpur, Malaysia; and Perth, Australia.

The seminar was the first integrated presentation of Western’s and WALS’ reservoir technologies under the “Value of Information” technical marketing theme. This theme provides an excellent context in which to present the latest developments in reservoir description and monitoring technology including multi-component seismic acquisition and processing, through casing logging tools and techniques, vertical seismic profiling, geostatistical reservoir characterization, and time lapse methods.

Presentations were given by Charlie Jackson of WALS in Kuala Lumpur, and Fred Barr, Bob Will, Martin Brewer, Paul Winspear, and Joe Scarlett of Western’s Far East and Australia regional offices. The seminar was developed by Will and Bert Chenin of WALS in Houston, and organized with the assistance of Winspear and Jackson in the Far East.

Bob Will, (left) time lapse seismic coordinator for Western Geophysical, Houston, explains the importance of history matching of a reservoir as part of the reservoir characterization to one of the “Value of Information” seminar attendees.
Oman

Fourteen members of various Oman-based EAME crews spent a week in April participating in a multiple HSE course conducted by HSE Training Coordinator Rob Missall. The training course was designed to give crew members a basic working knowledge of land environmental awareness, workshop safety, health awareness, explosives safety, defensive driving, firefighting and prevention, and accident investigation and reporting. Attendees (in alphabetical order) were Geophysical Trainee Simon Conlausn, Observer Mike Curry, Surveyor Radwan Tawfiq Elsacaty, HSE Advisor Todd Hemsell, Medical Officer Islam Humayun, Vibrator Technician Vijaya Kumar, Junior Observer David Lester, Technician Ian Milne, observers John Palmer and John Russell, Mechanic Tony Salmon, Surveyor Joe Summers, Geophysical Trainee Patrick Viles, and Quality Control Geophysicist Duncan Wood.

A 14-day course, covering Field Oriented First Aid and multipurpose HSE training was conducted in Muscat, Oman in April. Topics included environmental awareness, job safety analysis, accident investigation, firefighting, communicable diseases, malaria, explosives, camp and workshop safety, defensive driving, and man-loss searches.

Attending were (from left) Surveyor Radwan Tawfiq, Observer Mike Curry, Party Manager Terry Hagan, Dr. Islam, Surveyor Joe Summers, Vibrator Technician VJ. Kumar, junior observers Jay Russell and Simon Conlausn, HSE advisors Pat Viles and Tod Hemsell, Mechanic Tony Salmon, Junior Observer David Lester, Technician Ian Milne, Senior Observer John Palmer, and Quality Control Geophysicist Duncan Wood.
Denver

An HSE Management course was conducted in Denver in May. HSE Training Coordinator Carl Danley and HSE Assistant Supervisor Kari Christensen instructed attendees on environmental awareness, accident classification/reporting, auditing techniques, job safety analysis, and S.T.O.P. for supervision. Attendees (in alphabetical order) were HSE Advisor Justin Antigone, Supervisor Joe Brousard, Assistant Party Manager Michael Daugherty, HSE Advisor Robert Daugherty, Assistant Party Manager Michael Dizep, Manager Kevin Drake, Sr. Navigator Riley Heron, Party Manager John Krull, QSP Advisor Doug Kuntz, HSE Advisor Arie Moerkerken, Field Supervisor Chris Morris, Party Manager Randy Shannon, Supervisor Steve Solokis, Party Manager Jim Steckler, and HSE Advisor Heather Twiss.

London

Attending a Land Seismic HSE course in London in March were (in alphabetical order) mechanics Ken Budd and David Cook, Senior Administrator Adrian Cranston, Driller Jorge Curvalho, Chief Surveyor Earl Dahl, Mechanic Eric Dean, Surveyor Emmanuel Duru, Quality Control Geophysicist Emmanuel Godart, Dr. Shahid Hussain, HSE Trainer Mohamid Meharet, Observer Muhammad Nisar, Dr. Maghererus Sorin, Surveyor Tim Spencer, Mechanic Eliseo Tabone, Surveyor Ian Traynor, Assistant Party Manager Jim Webb, and Quality Control Geophysicist Samir Zedira.

The High-Profile Award

The High-Profile award is only one of many programs designed to recognize outstanding HSE performance at Western Geophysical. The High-Profile was not awarded for this issue.
Worldwide HSE Conference

Participants in the Worldwide HSE Conference include (from left, front row) Charles Gardner, Richard Romagnoli, John Barrett, Geoff Wood, Mike Crane, Steve Sohrensens; (second row) Eduardo Ramirez, Judy Smith, Frank Perkins, Rob Missall, Dave Goodman, Vicki Huebler, Carl Donley, Scott Platz, Joe Broussard, Mary Smith, Janice Galloway; and (third row) Robin Twymon, Jerry Lawson, Larry Williams, Jeff Howell, Doug Kuntz, Tim Granlie, Tim Griffiths, John Perkins, Tom Atkins, and Mark Caruso.

Venezuela

An HSE Land Seismic course was conducted in Caripe, Venezuela in February. Approximately 20 crewmembers attended fire-fighting training as part of the 13-day course. This course was one of three offered in Latin America to crewmembers this year. 

(Photoby Tom Atkins, manager, HSE Training and Compliance)
Houston

An HSE "Train the Trainer" course was conducted in Houston in June. HSE managers and advisors who attended (in alphabetical order) were Roger Anderson, Justin Antigue, David Banda, Joe Barajas, Robert Buchanan, James Cady, Randall Dowd, John Driscoll, Joseph Flynn, Javier Garza, Dale Kluck, Tracy Murrell, Bill Rentfer, Gilbert, Ron St. Jermholm, Heather Twiss, Robin Tywmon, and Derek Wawtow.

Western Geophysical's Commitment to Health, Safety, and Environment

SAFETY FIRST

Western Geophysical is proud of the Health, Safety, and Environment (HSE) accomplishments of all its crews. This section of Profile recognizes crews achieving significant HSE safety records, e.g., accumulated manhours or days without a Lost-Time Incident (LTI). Congratulations to the members of these crews for their efforts, commitment and a job well done.

Crew Safety Record - Without a Lost-Time Incident (LTI)

Party 131 - Southeast Asia - 1 year
Party 144 - EAME - 1 year
Party 145 - South America - 2.5 years
Party 178 - Africa - 1 year
Party 325 - Egypt - 1 year
Party 343 - Venezuela - 1 year
Party 346 - Colombia - 4 million manhours
Party 350 - Bolivia - 2 million manhours
Party 375 - Louisiana - 2 years
Party 701 - Texas - 1 year
Party 715 - Egypt - 1.7 years
Party 751 - Texas - 6 months
Party 774 - Algeria - 2 million manhours

*Note: The Safety First records listed are for the reporting period through June 1998.

HSE Training Coordinator Rob Missall (far left) conducted a Land Seismic HSE course in Houston in July. Attending (in alphabetical order) were Cable Pusher Sergio Arriaga, HSE advisors Mike Bennett, Michael Berry, Mike Buffey, Assistant Party Manager Michael Daugherty, HSE Advisor Robert Daugherty, Cable Pusher Clemente Garza, Assistant Party Manager Stephen Heard, Purchasing Myles Janseau, Party Manager Lydwig Lotal, Operations Support Manager John Morgan, HSE Advisor Jason Ontiverus, HSE Supervisor Frank Perkins, Permit Agent David Raiche, Mechanic Anton Schroder, Supervisor Stephen Solikis, Assistant Party Manager Brent Turgeon, and Geophysical Trainee Saqib Zia.
The skill and experience of Western Geophysical geoscientists and analysts, combined with emerging technologies, increased computing capacity and software capabilities, and a solid teamwork philosophy have created an effective Exploration and Reservoir Information Services (ERIS) group responsive to industry demands for reducing exploration risks and increasing return.

ERIS, explains General Manager Patrick Ng, helps Western's clients reduce their risks in exploring for drillable prospects, develop selected prospects, and maximize production over the life of a given oil or gas field.

"Because the cost of drilling wells is very high, clients to invest up front in the services ERIS offers to help them assess and manage their risks," says Ng. "With the expertise of our geoscientists, we can help them increase their probability of success through the comprehensive services and technologies we bring together to solve complex imaging problems. We have the capability to better image subsalt structures that help our clients lower their risk of drilling dry holes."

Formed just two years ago as a separate business unit, the ERIS group has grown from a handful of geophysical processors in early 1996 to more than 20 depth imaging and reservoir analysts. The group was formerly part of Western's Houston Data Processing division and performs primarily 3-D prestack and poststack depth imaging.
ERIS also works on a range of projects including reservoir characterization to assess reservoir quality, 4-D time lapse studies to pinpoint bypassed hydrocarbons, and seismic attribute analysis.

"ERIS was created in response to industry requirements for depth imaging, primarily in the deepwater regions of the Gulf of Mexico," says Depth Imaging Manager Jerry Kapoor. "Seismic imaging of sedimentary structures below complex salt bodies requires a variety of techniques and tools for accurate subsurface imaging. ERIS has the technology, expertise and resources to perform such tasks," says Kapoor. "Western's sizable investment in both hardware and people in this arena has allowed the technology to expand rapidly. And, the oil industry has embraced depth migration as a viable product for exploration and field development."

The group's first several projects were a "resounding success," Kapoor adds. "We achieved excellent results and we have gotten a lot of repeat business from clients happy with the products and services they received. Our clients are pleased that Western Geophysical can provide high-quality depth imaging data and greatly improve project turn around time, all of which helps them improve the return on their investment."

"What we basically try to do is develop better images of the salt bodies and subsalt areas from seismic data obtained in the Gulf of Mexico," explains Senior Geophysical Analyst Steve Trares. "There is increased growth and interest in deepwater prospects in the area and many oil companies are buying leases with the potential of finding big fields," says Trares. "Those areas contain a lot of salt structures — structures that generally distort the data. Depth imaging allows clients to see the seismic reflections more accurately and in greater detail."

"Our objective is to image subsalt as clearly as we can so that the data obtained are as structurally interpretable as data outside salt," adds Ng. "The challenge is to address the subsalt multiples that still cloud some areas. We are
constantly working with Research and Development (R&D) to improve our imaging techniques.”

One of the primary strengths of ERIS, Ng adds, is that the group is able to respond and work effectively as a team with clients, Western’s researchers, and processing groups in Houston and Denver.

“Our group has a real teamwork philosophy,” says Kapoor. “Clients come to Western to work with ERIS and share the expertise of our geoscientists and analysts combined with the expertise of their geoscientists. And, because this is emerging technology, we also work alongside our researchers and software development groups. The close collaboration among clients, R&D, ERIS, SPSD, and data processing helps us do our jobs faster and better.”

Early in the group’s formation, outside consultants were brought in to help its management and personnel establish a mentality of working toward “breakthroughs” and to “think outside the box,” adds Geophysical Analyst Laurie Swadis.

“ERIS wanted to build a high-performance team — to be open-minded about new concepts, look past preconceived notions, and find new and improved ways of doing things,” says Swadis. “Under this type of open communication, a team philosophy, and a shared responsibility with our clients, our clients know, up front, what to expect from ERIS. We have a way to measure what we set out to do and work together toward a common goal.”

“What some of us were a little skeptical at the beginning about developing a ‘breakthrough’ attitude and building client partnerships,” confesses John Jacka, senior geophysical analyst. “Almost everything we do is new and evolving. We are continually improving our processes and are exploring new ways of doing things. With the right group of people it works well, and we’ve been pretty successful so far.”

“Our goal is to diversify into more complicated, newer areas, and to go even deeper with our depth imaging techniques,” says Trares. “Deepwater is generally defined as greater than 1,000 feet. Many of our projects are in 6,000 to 8,000 feet.”
“We have state-of-the-art technologies for depth imaging and experienced personnel with tremendous technical skills,” says Ng. “But our greatest attributes are our project management skills and communications skills. An open attitude, good communication, and teamwork are really the keys to success.”

“Our clients know what kind of work we do and are willing to work closely with the geoscientists at Western because of our reputation and the high quality data we deliver,” says Kapoor. “They are delighted with the product they get.”

But, adds Trares, ERIS does not get complacent. “Our emphasis is always on finding better ways and developing better tools to do the job. This is a very empowering way to work. We continue to push technologies to the limits,” he says.

All of ERIS’ projects are proprietary, although the group works on are Western Geophysical acquired or processed seismic data.

“We want to be the number one player in deepwater,” says Ng. “The experience we are gaining in the Gulf of Mexico will be applicable to other deepwater areas such as offshore Angola and Brazil. And, we are committed to sharing ideas, technology, and information throughout Western, especially our counterparts in EAME, for the benefit of the company as a whole.”

Depending on the course of the oil industry, Ng also anticipates opportunities will continue to grow and that ERIS will diversify its services into geo pressure prediction and drilling risk management.

“We are challenged and motivated to improve efficiency in all aspects of our work, increase quality, and create a knowledge base we can share. Our customers demand and expect that from us,” says Ng. “It is not a luxury, but a necessity in our highly competitive industry.”
Situated on the northwest coast of the island of Borneo, the Islamic Sultanate of Negara Brunei Darussalam (Brunei) is currently home to Western Geophysical’s Party 317.

The nation of Brunei gained full independence from Britain in 1984 and is ruled by His Majesty, Sultan Haji Hassanal Bolkiah Mu’izzadin Waddaulah, the Sultan and Yang Di-Peruan of Brunei. Located five degrees north of the equator with a land area of 5,765 square kilometers and a population of approximately 300,000, Brunei enjoys an equatorial climate — hot, humid and wet year round.

The capital, Bandar Seri Begawan, located in the northern part of the country, is a modern, well laid out city that is home to 75,000 people. The coastal towns of Seria and Kuala Belait are about 100 kilometers to the south of the capital and are both service towns to the oil and gas industry.

The oil and gas industry continues to play a dominant role in the economy of Brunei with a daily production of some 150,000 barrels per day of oil. Production of approximately 27 million cubic meters per day places Brunei among the largest worldwide natural gas producers with about 90 percent of the gas being exported to Japan.

The onshore oilfield in the township of Seria, first drilled in 1929, has produced more than one billion barrels of oil to date. The field is in its declining days and a decision was made to acquire a high-resolution 3-D survey so that a recovery rate of approximately 95 percent could be achieved.

It is this requirement that brings Western’s Party 317 to town. The crew, located on the southern coast of Brunei facing the South China Sea, is acquiring a high-resolution 3-D survey encompassing secondary jungle, urban, residential, industrial, transition-zone, and shallow marine environments.

Last Fall, an experimental line was acquired offshore Seria to determine receiver type in the shallow marine environment. After some trying days with a small test crew, sufficient data were acquired and processed to
determine how the technical objectives of the main survey could be achieved. The mobilization for the main survey commenced in December. Personnel and equipment were readied for shipment to Brunei so operations could begin in March.

A comprehensive Health, Safety, and Environment (HSE) training program was conducted in Singapore for all Western Geophysical personnel assigned to this operation, including 800 subcontract personnel. HSE advisors Peter Wilkie and Clive Anderson saw to it that all personnel made it to the field in a timely manner so that the line preparation, survey, and drilling could maintain a sufficient lead over the recording crew.

A survey in the southern portion of Brunei started in the jungle in March, followed by drilling in April, and the first recorded shot in May. So far, the crew has recorded 22 swaths and the project is expected to be completed in October.

An added complication arose when one of the drilling crews was formed into a fire-fighting team to assist local authorities in controlling bush fires that swept through the southeast portion of the survey area. A heavy smoke haze lingered over the prospect area for several weeks.

Within the prospect are a variety of environments including an oil refinery, gas plant, tank storage facilities,
and numerous public utility facilities such as hospitals, schools, and the commercial sector of Seria township. Maintaining positive public relations continues as a priority task for the crew and is competently handled by Tan En Hong and his department.

Base camp is situated just outside the 3-D area. The camp is a converted and renovated driving school facility coupled with several portable cabins for accommodations, shower and toilet facilities and a container workshop area.

Crew management includes Operations Supervisor David Gibson, operations party managers John Robson and Lew Viles, and Administration Party Manager Richard Lewis.

The crew passed all “Milestone Zero” deadlines during the mobilization phase of the operation and recently achieved a satisfactory rating from an HSE audit conducted by the client. Jeff Howell, worldwide HSE manager, was a member of the audit team and his presence was appreciated by the crew.

The initial HSE orientation and training, including first aid, safe driving, swim testing, small boat handling, and explosives handling for the subcontracted personnel were carried out with efficiency and dedication by the HSE department. The crew maintains a high standard of reporting on a day-to-day basis.

Technicians Trevor Hill, Bob Ambrose, and Alex Glochowera handle the maintenance and repairs of line equipment for both land and marine sections of the crew. With more than 4,000 channels to keep up and running, and with very little down time, they have done
a great job of minimizing malfunctioning equipment.

Cable repairs and line maintenance support personnel are taken care of by a work force of 35 crewmembers who operate in two 12-hour shifts in order to turn the marine and land lines around with minimum inconvenience to the lay boats and field crews.

A competent mechanical department attends to the daily maintenance of the drills, buggies, boats, vibrators and supervises 46 vehicles. Crewmembers in the department also drill shot holes, drive boats, and operate the jack-up drill barges when required and time permits.

The captain of the Western Express, Matt Jealous, manages to lay marine lines despite the occasional tropical squalls that can appear out of nowhere. Likewise, the skipper of the Western Ranger airgun vessel, Deddy Suraidi, keeps popping along while airgun and compressor mechanics Peter Horne and Paul Burgess keep the ear plugs in and the guns below the waves. The Armada Nine is the support vessel with a battery charging facility and

bulk re-fueling capability for all vessels. The Armada Nine, anchored out past the last airgun shot line, also serves as a safe haven if bad weather approaches the marine crew during operating hours.

With seasick pills and plastic bags in tow, the jack-up drillers battle to keep ahead of the recording crew. The pipeline areas and the occasional call back for re-drills add to the daily pressure to maintain lead and
keep everything in place. This is handled very professionally by Collin Storey with Brian King learning the ropes.

Bend down and turn around, is definitely the drilling technique that turns out the shot holes and hydrophone holes for this prospect. Shot hole depths are 30 meters with hydrophones flushed to 10 meters. Drilling on the lakes and rivers with the local barge is a task done to perfection, even with some “logs with eyes” (also known as crocodiles) watching from the water.

The complex Dual I/O System II combines eight long land and marine lines and eight infill land and marine lines. A tremendous effort by Mark Weikart, Max Summers, Batas Panjaitan, Max Cumentas, Jeff Gilbert, and technicians Ian Whitehouse and Gary Mosier ensured the system came up on time with minimal problems. The usual expert support from Ray Grimes helped contribute to a successful recording start.

Out in the jungle, at the end of a concrete and steel road, lies the largest labor camp in Southeast Asia and is home to a mixed nationality labor force of 720 personnel.

Dr. Tin Toe and several paramedics keep a 24-hour watch on the crew’s health and well-being. This highly trained and experienced MEDIVAC team has proven to be very effective on several occasions.

In Singapore, the crew is supported by Project Manager Jim McRae, HSE Manager Geoff Wood, Area Acquisition Manager Kevin Paine, and Area Manager Rich Cieslewicz. The combined services of purchasing and administrative personnel are kept busy supplying and supporting this large operation.

Selamat Jalan dan Brunei Darussalam — Goodbye from Brunei.
Super-Seismic Vessels Under Construction

_trident and neptune_ to be the premier vessels in Western’s fleet

By Patty Chambers

The *Western Trident* and the *Western Neptune*, two new state-of-the-art super-seismic vessels currently under construction in Ulsteinvik, Norway, will be the premier vessels in Western Geophysical’s fleet when they are completed next year.

Investing in the new vessels is a wise business decision and is important to Western Geophysical’s future, says President Richard White. “The addition of these streamer vessels enhances our company’s position as a market leader in marine seismic acquisition and reflects the strong demand for Western’s seismic services in deepwater projects throughout the world,” says White.

Building seismic vessels takes many months of planning, requires input from a wide variety of personnel throughout Western, and is a major capital expenditure for the company. It also requires extraordinary attention to thousands of details in order to keep the building project on an aggressive schedule and keep a tight rein on the multi-million-dollar budget.

“We started the planning process for the new boats almost two years ago, with the idea of building vessels that would match the capacity of the upgraded *Western Monarch* and *Western Regent*,” says Larry Wagner, project manager for the vessels’ construction. “These vessels are clearly exceeding those specifications and will eclipse the *Monarch* and *Regent* in terms of capability.”

Both vessels are under construction at Ulstein Verft AS of Norway and will feature the UT753 design for worldwide use in deepwater marine seismic surveys. The _Trident_ is scheduled for delivery in April of 1999 and the _Neptune_ will be completed in November of 1999. The combined cost of the vessels, including seismic equipment, will total approximately $190 million.

The two vessels will be identical — 92 m long and 23 m wide with a towing capability of 16 full-length streamers. “Being able to deploy more streamers allows us to collect a bigger swath of data at a time,” explains Wagner. “That is an advantage for our clients. It also enables us to collect more spec data and drive unit costs down.”
At 10,800 hp each, the vessels will be the two most powerful in Western’s fleet. They will be equipped to provide Western’s proprietary Sentry™ solid-streamer service, the first solid streamer in the industry. The vessels also will be equipped with Western’s onboard Marine Integrated Data Acquisition System (MIDAS™), enabling all data to be acquired, quality controlled, recorded, and cataloged automatically.

“These new vessels incorporate the latest seismic acquisition and data processing technology we currently have available,” says Danny Stegall, vice president for Marine Transport. “And, they are being built to accommodate the technology we think we are going to have in the future. It is important that we allow for growth and expansion to stay competitive and remain the world’s leader in seismic services.”

Two primary considerations drive the decision to invest in new seismic vessels, adds Stegall — Western’s commitment to continually improve its capabilities and technologies, and strong market demand for Western’s services.

While both the new vessels are approximately the same length as the Monarch and the Regent, they will be three meters wider. In gross tonnage, that adds up to almost twice that of the other vessels.

“We wanted to build vessels that could carry more fuel. We increased the fuel capacity on the Trident and the Neptune to 60 days endurance before they have to be refueled,” says Wagner. “Both ships can be refueled and resupplied at sea. This allows the vessels to stay in operation for longer periods of time.”

The new vessels also have hotel style “enhancements” not found on any of the other Western ships such as a conference room. The vessels also have an exercise room with a sauna and showers, a day room, a video room with theater seats and big screen TV, and a cafeteria-style galley.

“The crew accommodations are very nice — similar to what you might find at a hotel,” Wagner adds. “When crewmembers spend six to eight weeks on a vessel, it helps if they feel like they have more of the comforts of home.”

The Ulstein shipyard in Norway is the same shipyard that built six Western vessels in the early 1990s — the Pride, Legend, Monarch, Regent, Patriot, and Spirit. Ulstein also built the supply boats, the Western Atlas and the Western Hercules, which were later converted into seismic vessels.

“Western first approached Ulstein about building the new vessels because we were familiar with them and they understood Western’s needs,” Wagner says. “But, what ultimately closed the deal with the Ulstein shipyard was their ability to deliver the first ship, the Trident, in the Spring of 1999. This allows the vessel to be put right to work at the beginning of the prime North Sea season.”

The new vessel-building group, Western Geophysical Party 525, began residency in Ulsteinvik, Norway in January. Sjoerd deJamaer, manager of Marine Transport and who served as project manager for the other six Western seismic vessels, was on temporary assignment.
with the group and returned to the U.S. in August. Joe Varisco is the resident manager for the remainder of the building project. Wagner carefully monitors the building progress and travels frequently to Norway to check on production.

"From the time the first sheet of steel is cut until the first vessel is launched will take a little more than a year and a half," says Wagner. "That's a pretty aggressive schedule for a vessel that size. And, it is my responsibility to see to it that the vessels are delivered on time and on budget."

Many areas within Western Geophysical are involved in the new vessel project, says Wagner, including all marine operating areas; the Applied Technology division; operations management from Europe, Africa and the Middle East (EAME), Western Hemisphere, and the Far East; field support personnel; and the Health, Safety, and Environment (HSE) department.

"With so many groups throughout the company contributing to this effort, it is imperative that good levels of communication are maintained throughout the life of the new vessel building program," says Wagner.

"There are an incredible number of details and components that go into building a seismic ship. And, the technologies in this industry change so rapidly, that we have to work diligently to make sure we are getting the latest, most up-to-date equipment, software and hardware," he adds. "Getting all the equipment requisitioned, ordered, delivered and invoiced on time and within budget is critical."

The vessel construction process is segmented into 42 modules that are fabricated as individual sections and then brought together for assembly. Most of the fabrication is done in and around Ulsteinvik, but some of the work is done by subcontractors outside of Norway, such as Poland, and transported to the shipyard.

Work for the first month focused primarily on engineering and design completion. The shipyard began cutting steel in early February and most of the ships' major systems were specified and finalized. In March, steel cutting continued and four modules were completed and waiting to be assembled in dry dock. A major milestone in April was the beginning of the keel laying. Individual modules continue to be built and assembled.

In May, the first of three LMF compressors arrived at the shipyard to be installed in June while steel fabrication continued as planned. Thirteen modules had been fabricated and assembled in dry dock in June. By July, the hydraulic power pack had been delivered and installed, acceptance tests were run on the main engines, and steel fabrication continued with 23 modules completed. Plans for the delivery of the TMS Sentry™ seismic sections, as well as the Syntron modules and recorder, also were in place. The main engines were delivered in August and construction on the second vessel has begun.

The construction process, says Wagner, remains "absolutely on schedule" despite a Norwegian strike threat in May, a strike in Denmark that affected some of the shipyard's suppliers, and another potential strike by the Norwegian Electricians Union in June.

"The timeline for this project is critical," he adds. "Any delays that impact the delivery of the vessels can represent a financial penalty to Western in lost revenue and increased costs. It all boils down to time and money."

In addition to the two super-seismic vessels under construction in Norway, Western also is building a vessel in Singapore that is aimed specifically at the Southeast Asia market, says Stegall. The $30 million Western Magellan, a four-cable seismic vessel, will be ready in March of 1999. A cable recorder boat also is under construction in Morgan City, Louisiana and a $16 million major refit of the Western Hercules is planned for next year that will upgrade the vessel from four to eight cables and include completely new engines.

"The useful life of most ships is 15 to 20 years and we need to continue to replace older vessels as they age," says Stegall. "Western is committed to building new boats and upgrading our existing vessels to keep up with market demand and provide our clients with the most up-to-date technology for seismic acquisition. We are building a core fleet of vessels for the future."
Egypt:
Cradle of Civilization, Religion, and Modern Technology

"He who hath not seen Cairo, hath not seen the world, for verily she is the mother of the earth."

Ancient saying

Egypt, the land of pyramids and pharaohs, the fertile Nile River valley, camels and burning desert sands, and a rich cultural and religious history, has the largest population and the most advanced and skilled labor force in the Middle East. It is considered by many in the Arab world to be "the center of the earth."

With its temperate climate year round — temperatures rarely exceed 100 degrees F and rarely dip below 40 — beauty can be found everywhere in Egypt, from the modern, bustling city of Cairo to its sand dunes and agricultural lands.

Egypt currently enjoys a growing economy and booming stock market and is going full steam ahead with the privatization of its public sector to become a free-market society. Egypt is fast returning to the preeminence it occupied in the Middle East before the nationalization movement in the 1960s, and has become a target for investors from all over the world.

Seismic activity witnessed a tremendous surge in 1996 due to the success of exploration programs in the Mediterranean, the Western Desert, and the Red Sea. The surge in seismic activity is primarily the result of policies adopted by the deputy chairman of the Egyptian General Petroleum Corporation which promotes investment in oil and gas exploration.

To help meet oil company client demands for exploration services, Egypt also is home to several Western Geophysical seismic crews and one of the most modern seismic data processing centers in the world.

Above: Chief Mechanic J.P. Mongrue
Crew photos by Lorraine Chittick and John Dawson
King Tut mask, Cairo Museum

Photo by Thomas Hartwell

Flush drilling crew
In the summer of 1996, it quickly became apparent that Western’s upcoming project in the Qarun Concession of Egypt’s western desert would need more than an ordinary 2-D vibroseis crew.

The concession lies west and southwest of Cairo and its northeast corner is only a few kilometers from the famous Pyramids of Giza. The entire area covers 13,200 sq. kms of various types of terrain.

The geological subsurface of this region is complex. Special attention to the design of both 2-D and 3-D parameters was needed to meet our client’s objectives. EAME’s Land Geophysical Support Group Manager Mike Fleming traveled from London to consult with our client and oversee parameter tests so that the project could be designed to suit the entire concession area. Instrument Supervisor Mike Zelum from the United Arab Emirates (UAE) provided technical support in planning and start-up, and supervised acceptance tests.
In addition to the geological complexity of the region, a myriad of both natural and manmade obstacles made the area challenging. The area includes just about every type of terrain a seismic crew could confront. To the north are gravel plains with fingers of isolated sand dunes. Running east to west traveling southward are several substantial Jebels or broken escarpments. These give way to soft ‘subkha’ areas preceding Lake Qarun and stretching approximately 35 kms long by 10 kms wide and six to eight meters deep.

Surrounding the southern area of the lake are agricultural areas interspersed with small villages and larger towns. The area is inundated with irrigation canals which run fresh water from the River Nile into the fields and eventually back into Lake Qarun. To the southwest lie two manmade fresh water lakes connected by a small waterfall. The entire area is a government controlled nature preserve.

On the eastern edge of the concession is a live firing practice military missile range, gravel plains containing several permanent military camps, as well as live firing practice tank ranges in periodic use.

Scattered throughout the southern region are designated areas of archaeological interest which required the permission of the antiquities department to enter.

The plan was to enlarge Egypt’s resident crew, Party 715, into a “mega crew” capable of fielding two recording crews with a combination of vibroseis (two sets), and explosives or airguns for the lake areas.

We were fortunate that the operation dove-tailed with Party 324’s transition-zone contract completion in Abu Dhabi and we were able to mobilize their transition equipment and personnel, including the purpose-built 28 ton gun barge M/V Maracaibo. The Maracaibo had to be shipped by boat to Port Suez, put onto a lowboy, trucked to Lake Qarun, and loaded into the lake by a mobile crane.

The crew was equipped with two buggy mounted recorders with Sercel SN 368/ Raps 1000 recording systems, a Sercel SN 368 for dynamite work in the agriculture region, and a Sercel SN 368 for bench testing the wet spread that was deployed in the lake.

At any given point, the lines would drop down over the Jebels using vibrators as an energy source, enter the soft subkha fringes of the lake using dynamite pre-drilled by hand auger, flushing units until a water depth of a minimum of one to one and a half meters into the lake. Then the airguns of the Maracaibo would take over to cross the lake where, on the far shore, the driller and dynamite shooters would shoot the line from the shallow water, through the agricultural area, and on to the line’s conclusion.

During the course of the survey, the client expressed a wish to experiment with a “pilot” 3-D. A total of 181 sq. kms was recorded in the mid-northern part of the block and was run concurrently with the 2-D program.

The combined crew acquired a total of 7,075 kms of 2-D data and 181 sq. kms of 3-D data by the time the project was completed in January 1998. The crews were then re-equipped and separated into three separate crews — 325, 715 and 771. Party 771 was awarded a major 3-D project from the same client and is currently acquiring the data with a 24-bit I/O System II recording system.

The operation faced a multitude of health, safety, and environmental (HSE) obstacles and came through the challenge without a serious accident. Regrettably, a snake bite on a recording crew laborer early in the program affected the crew’s safety statistics. But, the crew’s medical evacuation plan saved what could have easily become a fatality. In particular, HSE Supervisor Dr. Jean Dehn’s unflagging attention to detail and training has paid huge dividends.
Some of the special challenges that a project of this nature confronts include permitting — particularly when operating with explosives in areas of potential risk and working in military areas. Gaining permission to operate motorized boats on lakes where they are banned and satisfying the antiquities authorities was a daunting prospect. Praise goes to Cairo-based administrators Amin Aziz Amin and Amr Abdel Baky, and crew camp bosses Ahmed Malak, General Seman, Mostafa Ibrahim, and Mosen El Sisy whose efforts enabled the crew to maintain operations with no serious loss of time.

Field Supervisor Stephen Smith and Party Manager Ron Koukal did much of the early planning and arrangements and were later assisted or relieved by Supervisor Garry Read, party managers Owen Hughes, Mike Ewart, and Pat Trainor, and assistant party managers Roger Hayden and Gordon Dominey.

There was a great deal of cooperation between the crew and Western’s Cairo Data Processing Center managed by Maurice Nessim. As a direct result of the cooperation between the client, the geophysical support teams in London and Houston, the crew’s quality control department, and the data processing team, Western also was awarded the lion’s share of the 2-D and 3-D processing.

Party 771

Reporter: Robin Wigrley

Before transferring to Egypt, Party 771 had been operating in Niger and Chad. The majority of its equipment was shipped to Egypt to take on the 3-D project that evolved from the large 2-D project in the Qarun area by Party 715.
The crew is equipped with a 24-bit I/O System II recording unit and Marauder 321 vibrators. It was re-equipped with a brand new camp built in Jebel Ali, as well as new AMV cable buggies and a new recording 6 x 6 AMV buggy.

The current 3-D project is the result of a series of extensive tests and a major pilot 3-D recorded last year. That project was overseen and supervised by EAME's geophysical support team in London, headed by Manager Mike Fleming, and is an example of the excellent cooperation with our client.

The crew consists of a combination of personnel already in the country and others who were drafted in from the region. Chief Observer Paul Rolon, Chief of Quality Control Paul Thomas, and Chief Mechanic Bernard Gomez are all original members of the crew from Niger. The crew is supervised by Garry Read who will be transferring soon to Kazakhstan. The party manager is Pat Trainor and Gordon Dominey is assistant party manager.

Instrument Technician Adala Djali is a welcome new member to our ranks and has already shown his expertise in the world of electronics since joining the crew. He is assisted by Valarica Marin. Other observers are Patrick Carbonnel who recently transferred to Oman, Mohammed Saad, and junior observers John Russell and Alaa Alomari. In the Quality Control office are Mahmoud Bassim, Duncan Woods, and Bogdan Nicolescu.

The survey team is under the capable hands of Chief Surveyor Craig Thomas assisted by Mike Fellows and Mitch Puscus. Vibrators are cared for by the efficient team of Mhlab Azziz, Jerry Parry, and Russell Green.

The crew's HSE department is headed by Wayne Jones, assisted by Drs. Wafik and Botros. All have done an excellent job with the close cooperation of Camp Boss Mosen El Sissy and his assistant Usama Amin, resulting in an excellent record since the crew's start-up in Egypt.

Party 325

Reporter: Todd Hemsell

The personnel assigned to Party 325 — with more than 235 years of combined experience — have made it the versatile crew that it is today. In the last six months, the crew has participated in a variety of seismic data acquisition projects throughout Egypt.

The crew started the beginning of the year working on a 2-D survey in an agricultural area near the town of Fayoum and the Lake Qarun area where it finished the 2-D vibroseis, airgun, and portable job that was originally part of Party 715.

Egypt's agricultural areas are crisscrossed by a very complex system of waterways and canals that originate at the Nile River. The irrigation system and reclaimed land has been in existence for thousands of years and is continually growing. Egypt historically relies on its reclaimed and irrigated land as a means to feed its growing population.

Party 325 recognizes the importance of minimizing the environmental impact of seismic explorations on Egypt's agricultural areas. They also realize the need for improving community relations with the local population. The crew shifted away from vibrators and buggies, whose tires could damage the fields and canals, to flush drilling and portable explosives.

A massive change in roles was in order as the crew later exchanged equipment and personnel with Party 715 who moved south near the Nile Valley town of Beni Suef. In a single day, they left their static house camp in Shakshuk to take over a newly imported trailer camp.
The next prospect was close to the Red Sea holiday resort of Hurghada, where the crew conducted a two-phase 3-D survey that encompassed a military/civilian international airport, an active air force bombing range, and several suspected and confirmed minefields. Good communication with military authorities enabled Party 325 to complete both phases without a single incident. While conducting that survey, they were simultaneously assisting Party 159 with their 3-D transition-zone project in Zeit Bay, 80 kilometers to the north, providing a small flycamp, vibrators, uphole rig, and recording equipment.

The crew is currently conducting a two-phase 2-D and 3-D survey about 60 kilometers northwest of Hurghada. The 2-D portion is in a valley filled with soft sand and "bull dust." On each side of the valley are Granite Mountains that form the beginning of the Great Rift Valley. The 3-D section is further to the east and contains an active military practice range with other potential hazards.

Party 325's recently acquired set of camp trailers are currently being upgraded and augmented. Mechanics Gaber and Said Hassan, lead by Chief Mechanic Mark Williams, are hard at work preparing for a possible camp move to the Sinai peninsula for a transition-zone 3-D project. The prospect in the Sinai will encompass possible mine fields, subkha (a crust of earth over mud), typical desert terrain, and a few lines in the Red Sea. The crew's ability to move easily between acquisition methods is a great asset and would not be possible without the experience and professionalism of its personnel.

The crew's personnel have a wealth of experience and the dedication required to get the job done in Egypt's particular business climate. The management team in country begins with Resident Manager Robin Wrigley and Supervisor Steve Smith. Their experience and personal relationships with government, military, and business leaders enable them to provide the field team with the management support it requires in order to perform its job safely and productively, thus maintaining the quality our clients expect from Western Geophysical in Egypt. Meeting our clients needs is a priority for Party 325.

The management team on the crew is lead by a new arrival from Nigeria, Party Manager Robert Heslop. Heslop replaced Owen Hughes who transferred to Algeria. Assistant party manager is Mark Driver. They provide a focal point for crew activities and planning by providing the leadership required to achieve our production, quality, and HSE goals.

Quality assurance of recording equipment is provided by technicians Derk Record and Richard Kleb who are responsible for the maintenance and repair of items as mundane as a light bulb and as important as the recording equipment the crew uses to acquire data.

The Marauder vibrators are kept moving in and out of hazardous areas by Pete Hudson, Bob Coleston, and Ejaz Syed. Hudson's experience in Egypt serves as a library of knowledge for our newer and less experienced
crewmembers, helping them learn their jobs in the safest and most productive ways possible.

Drill supervisors Roger Driekluft and Tim Jenkins supervise up-hole and flush drilling where necessary. When the crew is working in agricultural areas or subkha, they manage as many as 10 drill crews.

With more than 30 years of experience, Camp Boss Ahmed Malek keeps the local labor force, some with as much as 24 years' experience, productive. Camp Boss General Someow provides invaluable liaison with local military authorities.

Observers Eric Halaszynski and Karim Ferhat, and senior observers Radwan Sayou and Abdul Waheed coordinate and direct field activities.

HSE Supervisor Dr. Jean Dehn provides support for 325's HSE advisors Todd Hemsell and Mike Nwishi, as well as medical support for the camp medical officer Dr. Ramy Albair.

Survey operations are handled by surveyors Ian Bardwell, Cristi Popa, and Emanuel Stefan. They are supervised by Ian Cook whose years of experience in Egypt gives him valuable knowledge and experience about possible minefields, terrain features, and the resulting solutions to keep his team in the lead safely.

The Quality Control department, whose motto is, "we don't make problems, we solve them," is managed by Dave Langton. Langton provides geophysical expertise and support to all departments as well as other crews in Egypt. He is assisted by Nicolae Berbelac who has an amazing ability to renovate old pieces of electronics.
Cairo Data Processing Center

Reporter: Marwan Djeddaoui

Western’s Cairo Data Processing Center, the company’s third largest processing center, underwent a tremendous upgrade in its computer power and processing capabilities in 1996 that transformed it into one of the most modern seismic data processing centers in the world.

“In the space of only one year, processing capabilities increased tenfold,” says Maurice Nessim, general manager for Western Atlas Egypt Ltd.

The Cairo Center, currently processing seismic data for all the major oil companies with exploration activities in the Middle East, employs more than 100 Western personnel. The Center’s data processing equipment includes two IBM SP2s and a silicon graphics computer, giving the center computing power not found outside North America, Europe and Japan.

Since its upgrade was completed a little more than a year ago, the Cairo Data Processing Center has also focused on increasing its capacity and effectiveness with high level training of all its employees.

Cairo also was recently the site of the Second International Geophysical Society and Exposition for Africa and the Middle East. Western Geophysical employees presented several research workshops and technical papers at the conference sponsored by the Society of Exploration Geophysicists, the European Association of Geoscientists and Engineers, and the Egyptian Geophysical Society.
YES! I would like to receive copies of the following Western Geophysical brochures and technical papers. I have indicated my preferences and desired quantities in the spaces provided.

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*Produced in 1997 and 1998*
"Capturing the Moment"

Profile magazine will showcase Western Geophysical employees' photographic talent when it publishes the winning "Capturing the Moment" photographs in its spring issue. Winners also will have their work displayed.

The contest is open to all Western Geophysical employees and retirees. Spouses, family members, and former employees are not eligible. Please send in your best photographs — color or black and white — by January 8, 1999. Cash prizes of $250, $100 and $50 will be given for 1st, 2nd and 3rd place winners in each of four categories. Photos must relate to Western Geophysical, may not have been published previously in Profile, and must have been taken within the past two years (not before 1996). A panel of judges will determine the winning photographs.

*Entry deadline is January 8, 1999*

**Categories include:**
- Environment (landscapes, nature, animals)
- People/Lifestyles (individuals, crews)
- Operations (work locations, offices, buildings, boats, equipment)
- Creative (abstract photo illustrations of ideas)

**To enter:**
- Submit no more than one photograph per category.
- Prints should be at least 3 x 5 inches. We recommend 5 x 7 or 8 x 10.
- DO NOT send slides, transparencies, or "instant" prints.
- DO NOT attach anything to photos with staples or paper clips.
- DO NOT write on front or back of photos. Tape a completed entry form (photocopy as necessary) to the back of each photo, or use a blank sheet of paper and include: Your name, address, work location, category entered, and photo identification that should include details such as when and where the photo was taken.

**Profile**
Western Geophysical
10001 Richmond Avenue
Houston, TX, USA 77042-4299

"Capturing the Moment"
c/o Patty Chambers, editor
Western Cove

Angola, the largest African country south of the Sahara, is well placed to take the lead in the 21st Century as growth and development in the region outstrips other areas. Offshore Angola, most of the focus is on deepwater activity. This is why Crew 107 has come to call Angola their second home. Located in the center of Angola, the Port of Lobito provides excellent port facilities.

Angola is far ahead of other African countries in exploring and developing its deepwater provinces with an increase in drilling activity over the past 18 months. Increased oil exploration and discoveries, combined with increased activity in West Africa, have led to a significant interest in further exploration off the Angola coast.

The Western Cove has begun a major speculative seismic survey of approximately 10,000 kilometers in offshore Angola. The seismic data, covering open acreage in both deepwater and nearshore blocks, are scheduled for licensing availability this year.

Lobito, Africa was recently declared the second home for the crew after two years working in Angolan waters. The Western Cove’s commitment to the area was clear when crewmembers decided to make a donation to a local orphanage run by the Catholic Rescue Service. The donation was matched by Western, thanks to the efforts of John Seigfried and Bernard Marley. Supervisor Chuck Dillon also negotiated a matching contribution from the local shipping agent.

At a presentation ceremony in April, Captain Hannes Meisenburger, with the help of Shift Leader Tommy Parker and Seismic Processor Ian Scott, invited 12 children from the orphanage to tour the Western Cove. The tour began with a visit to the “doghouse” where Navigator John Grabiec and Seismic Processor Katie Bannister discussed the finer points of seismic acquisition and recording-room operations. The children thought the most enjoyable and practical place on the vessel was the exercise room. That was before they met cooks Roger Istariz and Leo Suphido who served them lunch at the end of the tour.

Currently, the Cove’s 2-D Angola survey covers 14,300 kilometers of non-exclusive seismic data acquired in open acreage in deepwater. The bridge crew, led by Meisenberger and Craig Feeney, with the assistance of mates Richard Evans and Erik Andersen, guided local fishing boat traffic to avoid equipment damage. Remi Desmarais and Johannes Levisgard kept the vessel in shape with the help of Boson Rolando Macujo and his assistants.

The Western Cove has begun 2-D data acquisition, using a 6000-meter, 24-bit WG-24 digital streamer which is maintained by observers Simon Harding, Davide Pettazzi, Tommy Parker, and Damien Waller. The onboard recording-room equipment is kept in good condition by the technical team of Gaynor Burrows, Bob Obray, Simon Whittaker, and Mike Gleitz. Under the direction of Simon Waller and Billy Combe, the mechanics have done a commendable job preparing a maintenance schedule that includes check lists, stock control, cleanliness, and safety on the back-deck. Providing assistance were Jose Dos Santos, Dave Clarke, and Ernie Sabado. Accurate positioning services were provided by the competent team of John Grabiec, Simon Holm, Chris Gibbons, and Steve Brook. Faultless and timely processing of both seismic and navigation data using Western Geophysical’s Omega® seismic processing system and UNAVCHK® navigation post processing system was performed by Anna Bolyson, Dan Wheeler, Miruna Varodin, Stuart Harling, and Katie Etherton.
Data quality control group leaders Neil Ferguson and Peter Howland supported Party 107. Party Chiefs Reuben Aldrich and Simon O’Toole, along with coordinators Stacey Smith and Jeff Fowler, saw to it that the survey was acquired in a timely-fashion with the highest quality.

The *Western Cove* has been given an extension to the present survey which will keep Party 107 in Angola until December.

### Western Regent

The *Western Regent* is a large, purpose-built seismic vessel operating within Western Geophysical’s Europe/Africa/Middle East (EAME) division. She was built in Ulsteinvik, Norway in 1992. The vessel is 93.2 meters long with an average crew of 45 and has a survey endurance of more than 60 days between refueling. This makes the *Western Regent* an ideal vessel for conducting large-scale 3-D seismic surveys.

In 1997, the vessel underwent a major refit in Norway. The vessel can now handle up to 12 streamers, 6000 meters long, and shoot up to eight strings of air-guns in a dual-array mode. The back-deck area has been completely redesigned, raising the helicopter-deck approximately two meters and enlarging the work area of the cable-deck. Along with doubling the maximum capacity of streamers, safety features of the working environment have been improved. The cable handling system was updated with 12 new cable-reels, driven by portable, radio-control units. Propulsion and compressor equipment are now electrically-driven, with all rotating machinery mounted to minimize hydro-acoustic noise. New propellers also were added to increase towing capacity.

A major part of the refit was the introduction of MIDAS™ (Marine Integrated Data Acquisition System) to the recording room. MIDAS aims to integrate the recording room system via PDL (Prospect Data Logger) with minimum operator intervention.

Survey configuration, shot data, and trace attributes are automatically received from the MSX recording system, SPECTRA navigation system, and source synchronization system in near real-time for quality control and storage in a database. The recording room layout includes three large-format video screens which enhance the display of navigation and observer information, and a console giving access to processing facilities and to a networked group of personal computers.

To increase processing power, a state-of-the-art 20-node IBM SP-2 computer network was introduced. Data quality control and further processing is performed in near real-time using Western Geophysical’s Omega® seismic processing system. Manual tape-loading was replaced by a fully-automated, robotic tape-handling system, resulting in significant reduction in the number of tapes used. Another recent addition is SPECTRA, a modular and versatile navigation system providing fast and interactive functions for acquiring, monitoring, and validating navigation data. Options include online binning for coverage displays and an interface to the ship’s auto-pilot to provide continuous steering correction during shooting to maximize coverage.

The onboard IBM SP-2 resources also are connected via VSAT link to the Western-wide area network. This allows immediate transfer of seismic data to London’s processing groups for quality control of the processing parameters and allow data to be well on its way before the seismic tapes leave the vessel.

The *Regent’s* excellent safety record will benefit further from improvements in layout. The new cable-deck...
PARTY PICKINGS

Reporter Tim Verboon

has a large, single working-space that makes for ease of working, flexibility, and excellent all-round visibility.

A cable maintenance vessel was designed to aid in repairing or replacing acoustic pods, depth-control birds, or whole sections of cable to enable the cables to be worked on without recovering them, preventing costly downtime.

As part of HSE policy, training drills are performed twice each week, exceeding international standard requirements. These include realistic fire simulations using smoke generators, man-overboard recovery drills, and recovering dummies dropped into the sea.

In mid-April, the modified Western Regent was received by Captain Jorgen Fabien. Under the supervision of onboard Party Chief James Brown, and newly appointed Party Chief Chris Inns, she headed into the North Sea for brief sea trials. During refitting, the seismic crew received training in Houston and London in how to use newly installed acquisition, navigation, and processing software and hardware. Crewmembers also spent time on the recently refitted Western Monarch.

After refitting, Party 143 spent the summer making use of the new acquisition and processing systems in the North Sea for Western Geophysical’s New Ventures group. Using the onboard processing, they supplied near-final 3-D DMO stack products to London’s processing groups before heading south for the winter season.

155 Orient Pearl I

After completing several successful 3-D seismic surveys in Sarawak, Indonesia, and Malaysia, the Orient Pearl I left Asia’s southeast region at the end of 1997 and departed for Egypt. Having been awarded the High-Profile Award in January for outstanding efforts and achievement in Health, Safety, and Environment by Marine HSE Manager Dave Goodman and Operations Manager Joe Borg prior to departure, Party 155 left the Singapore-based Far East division in good spirits.

The vessel arrived in Egyptian waters in mid-January under the direction of Europe/Africa/Middle East (EAME) Supervisor Andy Lambert and Party Manager Julian Sheldon, where a 3-D survey began in the Gulf of Suez.

The West Feiran prospect totaled 190 square kilometers of prime lines and was located north of the congested Belayim Oilfield and 75 nautical miles south of the Port of Suez. Working in the restricted, narrow Gulf of Suez afforded excellent views of the scenic, but harsh, mountainous desert country of the Sinai Peninsula.

The narrow Gulf of Suez and the volume of shipping traffic transiting through the area also presented a challenge to Party 155 while they conducted a quadstreamer, four-source survey.

Completing the survey with a minimal amount of downtime were coordinators Peter Dawson, Hamish Hume, and Simon Leith with the expert ship handling of masters Mick Tock and Eddie Wooldridge, chief mates Maynard Greene and Robert Timmins, and second mates Jamie Evangelista and Andy Szymanski.

The Orient Pearl I in the Gulf of Suez.

Senior observers Rolando Jaberina and Arthur Hadland, with the assistance of observers Tim Dallos, Adam Powell, Tim Rampton, Kurnianto Santosa, and Grant Spencer, made sure the streamers were in good condition and quality seismic data were acquired.

Technicians Larry Dusolt and Jeff Cashmore ensured the recording, navigation, and processing systems were functioning at maximum capacity.

Seismic data processors Peter Barlitis, Zoren Kranjec, and Kathy Wedderburn quality controlled and processed the raw seismic data to the client’s requirements and completed a dataset that was ready for shipping when the survey was complete.

Navigators Craig Jackson, Hugh McMenamin, Mick Tiller, and Peter Wright, along with navigation analysts Greg Buswell and Neil Darnell, ensured the navigation date and grid coverage was excellent throughout the survey.

Senior energy source mechanics John Aurea, Marcus Eginton, and Eddie Villanueva, with the assistance of gunners Donato Aurea and Kym Harvey, maintained the airgun system and associated baro-vane towing equipment. Compressor mechanics Wade Skipper, Stanley Turnbull, and Les Whitcombe worked closely with the energy source department and maintained the compressors.
Chief engineers Bernie Kloss and Toh Yeow Teck, along with assisting engineers Chan Swee Leng, Herman Chang, Gorm Fielder, Sentono, and Syarifuddin, maintained constant watch on all machinery in the engine room.

When the West Feiran prospect neared completion in mid-March, Party 155 anticipated docking in Malta while HSE Advisor Tim Verboon began preparations for a Western Geophysical internal safety audit before the Orient Pearl I departed south to West Africa.

Alaska

Party Manager Tom Ainsworth and Crew 711 undertook three prospects that would bring them many challenges during the 1998 season. Experienced crewmembers and new hires were prepared to face the extreme Alaskan conditions as they loaded trucks and mobilized to the prospective area.

The crew experienced several changes this season. Western Geophysical became a secondary provider for the North Slope Training Cooperative (NSTC). A representative from Western was a member of the NSTC steering committee and was active in training compliance, as well as keeping abreast of changing training curriculum and certifications. Health concerns also were addressed — employees were offered a flu vaccination, and a tuberculosis test and hepatitis shot were administered to food handlers on the crew.

Crewmembers went through extensive testing before heading into the arctic region, including functional assessment testing for new employees. Tests consisted of the Lido knee test for knee strength and flexibility; the B-200 test for strength, flexibility, and range of motion of the lower back; the box lift that tested the ability to lift using the back and legs in a bent-knee position using good body mechanics; and the Jmar grip test to evaluate grip strength. Crew 711 also attended an eight-hour orientation outlining what they could expect for the season. After camp orientation, they were assigned a crewmember to direct them in their job.

HSE Advisor Terry Jones made Health, Safety, and Environmental (HSE) issues a priority for the crew. Jones orientated new employees and conducted safety meetings while making sure training was provided to all employees to ensure high safety standards. Along with Jones, HSE Trainee John Driscoll worked to provide the crew with a safe work environment.

Prior to the 1998 season, crewmembers Brandon Naylor, Steve Kurka, Devon Williams, Mike Grief, David Edmunds, and Dan Chambers were sent to an emergency trauma technician course. Jones and Observer Arturo Vasquez, who is EMT qualified, also
instructed personnel in cardiopulmonary resuscitation (CPR).

The drivers training program was used to familiarize crewmembers with vehicles used in Alaska. The program included an overview of Western Geophysical’s company driver vehicle safety policy, safety training for operating vehicles in specific Alaskan conditions, basic vehicle mechanical knowledge, and general servicing. Upon completion, employees were required to take a field driving test. Experienced drivers George Stanley, Chris Key, Geoffrey Alvarez, Lane Maalona, and Curtis Rhea shared their knowledge so the crew could utilize the trucks to their full potential.

![Driver Geoffrey Alvarez checks a line of cable.](image)

Reducing the number of geophones from 12 to six decreased the potential for injuries associated with repeated motion, decreased the work load, and increased efficiency rates in retrieval and deployment. Helpers Eric Brown, Billy Akers, Jeff Harmon, Shon Phillips, Billy Garrison, Darryl Kaase, Soloman John, and Chuck Ingraham were able to string and place the geophones more efficiently.

Research and development projects also were pursued alongside production. A ground penetrating radar was tested to determine ice thickness and proved advantageous in determining the extent of grounded ice. This system was tested on the sea ice as well as freshwater to see if it could be used more effectively than the one currently in place. Lead vibrators were equipped with a navigational system developed by Western Geophysical to show current source-point location and where the next shot would occur. This system proved to be very effective in allowing the vibrators to go stakeless.

Crew 711 then left Franklin Bluffs to begin the Meltwater 3-D prospect located in Alaska’s North Slope region in the lowlands north of the Brook’s Range.

Senior camp mechanics Roger Monson and Jamie Williamson, and Vibrator Mechanic Paul Bauer, along with their teams, worked tirelessly to prepare and maintain the vehicles for the extreme Arctic conditions. Surveyors Marc Taylor, John Wooten, Jereme Livingston, and James Murphy played a key role by anticipating where receiver and source points needed to be laid. Observers David Saye, Arturo Vasquez, and Ron Kandas kept things running smoothly to keep production on track. Veteran Delta Driver Greg Kelchner and John Wood added their efforts to make sure the crew had enough fuel and supplies to keep Party 711 operating. Cooks Devon Williams and Michael Hare, with help from bull cooks Alejando Carrillo and Rudy Rodriguez, kept morale up with good food and a cheerful disposition. Camp Attendant Charles Rush kept the camp in good order for the crew throughout the season.

In March, the crew moved from the Meltwater 3-D survey to the Button and Patches at Kuparuk. Button and Patches was a three-component, 4-D survey. The survey, located in the oilfield, provided some interesting challenges. The more sensitive three-component phones were meticulously placed by an advance party, a key factor in making the transition from the two jobs orderly. The versatile crew made the adjustments quickly, and were very careful working around the drill sites and pipe of the oil field.

The crew then moved to the third prospect on the Beaufort Sea to start the Challenge Island 3-D survey. Working on sea ice is inherently dangerous and precautions had to be observed. Polar bears and thin ice were only some of the things crewmembers had to be cautious about. Ice drillers Thomas Youngblood and Curtis Rhea guaranteed crew safety through countless hours of drilling and checking the ice for cracks and proper thickness. The crew switched to the lighter AHV-12 vibrators along with the TRT vibrators when driving on the sea ice.

Efforts were made by everyone to move operations 70 miles in three days and begin production on the new prospect. The cable crew, under the guidance of cable pushers Brandon Naylor, Walter Collins, and Jeff Troglin worked long hours to start the job in record time.

The crew persevered through deteriorating ice conditions as warmer temperatures proved to be a factor to the future of the season. Cat operators Richard Strassburg and Don Woods, along with the drillers, plowed the source lines to expedite the vibrators. Observer David Saye, and his seasoned cable crew, raced to complete the final strokes before the
Sagavanirktok river-overflow reached the sea ice. This time the weather cooperated with the crew to ensure the prospect would be finished by the end of the season. The crew enjoyed another successful season as they finished the prospect and headed to West Dock to load up the camp.

The 1998 season was characterized by exciting changes and challenges. The crew covered 355 square miles with a new record of 702 source points for one day on the ice. Party 711 overcame one of the harshest environments in North America to obtain and carry on a high standard of quality, safety, and productivity.

794 Alaska

Party 794 began it’s 1998 season conducting a 3-D seismic survey in the National Petroleum Reserve of Alaska (NPRA) in early January. Camp was dug out of the snow drifts, vehicles were started, and Party 794 departed it’s summer stack-site at Franklin Bluffs. After a six-day move across the tundra, camp was set up on the prospect. Party Manager John Snyder and relief party managers Ed Nelson and Bryan Mothershead coordinated the crew’s efforts throughout the season. The abundance of creeks, rivers, lakes, and rough terrain coupled with the hostile Arctic environment, provided crewmembers with a challenging season.

Once on site, the crew, led by surveyors Kent Smith and Phil Helps, immediately ran control and began to stake out the prospect. Despite unfavorable terrain, a lead on the cable crew was quickly built and GPS rovers John Harding, Adam Sevi, Brad Kriechhaus, Mike Tonn, and Ryan Moscrop did an excellent job of maintaining it throughout the season. Mapping and survey quality control were performed in Deadhorse, Alaska’s basecamp by Survey Supervisor Kevin Patrick, Survey Quality Coordinator Pat Hall, and SPECS™ (Seismic Prospect Evaluation and Coordination System) designer Bruce Tisserat.

For the past two seasons, the survey crew has followed a recycling program for the survey lath to reduce waste and the need for new lath. Instead of using the lath one time and disposing of them, stickers were put on them, they were renumbered and reused. This is a positive step toward increased environmental awareness.

HSE Advisor James Nunley with the new D7R Caterpillar.

Close behind the survey crew were ice drillers Terry “Kato” Graham and Stephan Morgan who meticulously checked ice thickness to ensure crew safety. Due to warm temperatures, there was relatively thin ice for the majority of the season. To increase the efficiency of checking the ice, the drill buggy was equipped with an ice-penetrating radar unit. Using the radar, Graham was able to quickly determine if there was ground or water beneath the ice. This was important information for catskinner Rodney Theisen, Kevin Barnhart, and Kevin Thompson. They spent a lot of time on the ice in extremely heavy D7R Caterpillars building snow ramps on the banks of the numerous rivers, creeks, and lakes in preparation for the recording crew.

Obtaining high-quality data and maximum production in the safest, most efficient manner was the goal of Chief Observer Dennis Hannan, Day Observer Kip Kackman, and Junior Observer Chris Graves. Working to achieve this goal were cable pushers Doug Stocker and John Pederson, Trouble Shooter Leon Clugston and cable truck drivers Jay Stewart, Russell Moses, Josh Crandall, Brandon Wick, and Byron Rogers. Their combined efforts meant the crew’s 3,000 channels of equipment was effectively moved throughout the prospect.

Cable Repairman Sam Stadler ensured any damaged equipment was repaired as quickly as possible and put

Party 794 crewmembers adapt to working in the dark in the National Petroleum Reserve of Alaska.
back out on the line. Observer Forest Burkholder, trouble shooters Aaron Folsom and Jeremy Cochran, and battery men Greg Faris and Shannon Miller worked the night shift, making sure the spread was ready to begin production first thing in the morning. After a day of production, data were shipped at the earliest convenience to the new Omega® infield processing center at Deadhorse base-camp where Kathy Tomac, Brian Brigandi, and Steve Brackeen diligently processed the data.

To record as many vibrator points as possible, 10 vibrators were split into two sources. Tending the vibes were Vibration Mechanic Stuart Rauckman and helpers Darrin Hennager and Jim Maes. To maximize production, two vibes from each source were equipped with a Western-designed GPS navigation program called Truck Nav. Using Truck Nav, vibrator operators Gary Gates, Reuben Edwin, Rodney Schlapman, Jack Lusero, Mark Wright, Darrel Crow, Jess Hartman, Jack Alcorn, Mike Smith, and Juan Tello were able to navigate to offset points more efficiently, especially in areas of poor visibility. Party 794 achieved excellent production, including several days with more than 400 vibrator points.

Working around-the-clock performing essential repairs and maintenance to keep all 41 vehicles fueled and in good working condition were Equipment Supervisor Bill Sands, Head Mechanic George Gregory, mechanics Jeff Cottle, Lee Berzanskee, and Don Burge and assistant mechanics Scott Gallegos, Shawn Meiller, and Mat Kishbaugh, and Fueler Tom Abbe.

During production, approximately 3,500 gallons of fuel was used per day. Fuel truck drivers Keith Chadwell, Butch Loyer, Mark Bridgers, and Leigh McLean did an excellent job making sure there was plenty of fuel. They traveled hundreds of miles over the tundra successfully supplying fuel, as well as groceries and vehicle parts. Personnel were transported to and from the crew-site by airplane, but when the weather was inclement, fuel trucks also were used as personnel carriers.

Ensuring everyone’s stay in camp was as enjoyable as possible were cooks Mike Messing and Scott Lane, assisted by bull cooks Lorenzo Deleon and Carlos Carrillo. Spending endless hours in a 977 Cat loader in search of good clean snow to fill the water-maker for showers, laundry, and dishes was “Scoop Cat” Operator Tom Stroup.

Geophysical Trainee Frank Wright proved to be a valuable asset to Party 794 by contributing to the overall production of the crew operating as a GPS rover, vibrator operator, trouble shooter, and crew clerk.

Throughout the season, HSE Advisor James Nunley worked diligently assessing the safety and productivity of daily operations. Assisted by HSE Trainee Randy Dowd, they conducted safety meetings, camp orientations, and internal safety audits. Their efforts were rewarded as Party 794 completed the 1998 season without a lost-time incident (LTI).

The HSE department implemented new ideas this past winter to achieve the safest season possible. Employees were offered a flu vaccination and food handlers were administered tuberculosis and hepatitis-A vaccinations, which exceeds Alaska’s state regulations. Neville Maw, with Geophysical Safety Resources, was contracted by the client to conduct a thorough safety audit of the entire operation. Impressed with Western’s HSE program, Maw gave Party 794 an above average rating. A QSP audit conducted by Allen House, Doug Kuntz, Alaska Manager John Davis, and HSE Trainee Randy Dowd also was conducted. They developed a list of action items, and by the end of the season, Dowd had completed a majority of them, with the remainder to be completed during summer maintenance.

Abnormally warm temperatures ended the season early due to environmental concerns. In mid-April, the last vibrator point was recorded and the crew picked up camp, moving to an abandoned well-site in the NPRA where it will stay until next season. Despite an early end, Party 794 had a successful season.
Recently, Western Geophysical's Crew 82 arrived at Port of Rotterdam in Holland to mobilize for a major speculative ocean-bottom cable (OBC) seismic survey over the Europoort holding area. The survey is under an exclusive license granted by the Dutch Ministry of Economic Affairs, with the data being made available to all interested oil companies.

The survey was conducted within the 500 sq. km restricted-zone of Europoort—a modern shipping facility with more than 200 daily shipping movements. Significant oil and gas field development has reached the perimeter of the restricted-zone. A line of fields producing from the Bunter Sands that includes the northern section of this restricted area.

Previously, surveys could not be conducted out of the Port of Rotterdam without hindering shipping traffic. But, two seasons of successful dual sensor OBC data acquisition in shallow, congested areas of the North Sea demonstrated to the Netherlands government that Western Geophysical has the required technology and expertise to perform this survey.

For a successful survey it was imperative that crewmembers work closely with Europoort authorities, the traffic-control center, coast guards, and pilot organizations.

A meeting was held at the Rotterdam Hilton Hotel to promote the survey and provide a platform for Crew 82 to meet with various organizations. After an introductory speech by New Ventures Manager Doug Neil, and an introduction of crewmembers by Operations Supervisor John Scott, a summary of the OBC techniques and the geophysical objectives of the survey was outlined by Geo-Support Member Pete King. Port Control Center Supervisor Bert Kars outlined the role of the pilots, the traffic center, and the communication employed during the survey. The meeting culminated in a crew visit to the traffic-control center where all vessel movements in and around the Europoort area are monitored. Large-scale prospect charts and swath overlays were given to the control center to help plot the progress of the survey. The crew's land-based marine administrators Mark Smithers and Kenneth Hansen visited the center daily to provide production updates and be a direct interface link with the crew.

The first swath lay over one of three main shipping entrance and exit lanes, as well as one of two vessel anchorages. Traffic control was given a one-week notice to clear the northern anchorage. When the Northern Horizon (recording vessel) and Cable Carrier (cable boat and shooter) arrived on prospect, the anchorage was clear. The pilots onboard the Cable Carrier during the survey were in constant radio contact with more than 200 ships each day. The combined efforts of Crew 82 and the Europoort pilots resulted in a successful survey.

The biggest challenge came when the crew approached the deepwater channel of the prospect area, where vessels with drafts measuring 75 feet pass through a 1200 meter exclusion-zone. The crew laid cable parallel to the edge of the channel to maximize their attempts for full-fold coverage through this sensitive area.

At the Europoort entrance, the Cable Carrier crew was instructed to shoot source-lines into the port entrance. The pilots and crew did a commendable job coordinating with numerous vessels departing and arriving into Europoort. Crew 82 then moved to the southern side of the deepwater channel to shoot six more swaths into the coast.

The crew completed the survey in the North Sea successfully without a lost-time incident (LTI). They have since completed a transit to West Africa, and have started production in Angola. The crew's next survey will be in Nigeria.

Western's Europoort survey will produce the definitive dataset for exploration and production within this area. When the survey is completed, four blocks will be open for licensing.
Anniversaries

THEY SERVE

Service Anniversaries — May, June, July, August
* indicates interrupted service

If you have questions regarding your service date, please call payroll at 713-972-5303 to update your records.

44 Years
Woefel, Wilbert O.

37 Years
Cooper, Ronnie R.
Dowdy, Lawrence
Merten, Fred

36 Years
Kubik, James J.

34 Years
Bennett, Gary M.
Chambers, R. E.
Jones, Robert J.
McCombie, Richard M.
Reyna, Armando

33 Years
Bivin, David D.
* Goodman, David W.
Kapoor, Surinder
Morris, Lorrie G.
Roberts, Richard L.
* Winnefeld Jr., Carl H.

32 Years
Brannan, Orval F.
Dorsey, Richard W.
* Karouia, Makleuf
Lopez, Aurelio A.
Mills, Geoffrey F.
Quinn, Colin

31 Years
* Cooper, Leonard P.
Kudrna, Antonin J.
Swaroop, Brahman N.
Wiltshire, Martin

30 Years
Bickham, Ronnie N.
Chatoor, Winston J.
Di Battista, Angelo
Evans, John T.
Ferrari, Gian
* Picchiani, Roberto L.
Ritchie, Walter
Stringer, J. Haynie

29 Years
* Baker, Christopher G.
* Bernal, George A.
Champan, Douglas L.
* Chegwinn, Robert A.
Dahlgard, Gerald C.
Dingwall, Kenneth A.
* Garrett, Richard D.
Godkin, Robert G.
Hall, Derek
Faine, Kevin
Privett, Robert
Russell, John R.
* Scott, Gary L.

28 Years
Barr, Frederick J.
Chang, Wei, Chean
Chong, James H.
* Meyer, Loetta F.

27 Years
Bibby, Peter J.
Brown, David
* Kauk, Kenneth K.
McLain, Dwaine A.
Reavis, Harold D.
Rodriguez, Hector T.
* Schade, Roger D.
Stegall, James D.
Taylor, Harper K.

26 Years
* Bernal, Steve H.
Briggs, William T.
* Chapparro, Humberto
* Choate, Joe B.
* Clegg, Joseph E.
Denham, Scott S.
* Forrest, William Y.
* Kleinewitz, Robert A.
* Norris, Michael W.
* Rozen, Joan C.
Teran, Raul A.
Venkataraman, Kannan

25 Years
Boer, Joe
Boon, Stephen
Bow, Joan
Fletcher, Keith D.
Fluhrer, Derek
Girouard, Kirk L.
Hickin, Paul N.
Hills-Jones, Gavin
* Humbert, Hugh L.
Jirschele, Robert V.
Kintlaw, Barbara F.
Lenz, Norman Eugene
* Martin, Robert B.
Smithers, James A.
Strickland, David L.
Tronkinson, John S.
Wilson, Larry L.

24 Years
Behrens, William H.
* Bivens, William S.
Boone, Rhonda G.
* Brewer, Martin S.
* Brown, Robert W. M.
Curtis, Richard P.
Echols, Matthew
Findley, Lyndon C.
Hagan, Terence V.
Harter, Linda A.
Johnson, Bruce A.
Kunzler, Andrew M.
* Lawhorn, Norman W.

Western Atlas Benefits Supervisor Linda Bly accepts her 30-year service award from Western Atlas Compensation/Benefits Director Jim Snelling.

Senior Analyst Graham Hamilton (left) receives his 25-year service award from former Houston Land and Special Projects Manager Pat Peck.

Tape Library Manager Jon Kemp (left) and former Computer Operator Manager Don Clark present Tape Librarian Novell Young with her 25-year service award.

Geophysical Technician Aidee Olvera accepts her 25-year service award from Inventory Supervisor John Svatik.

Senior Engineer Dwight Currier (right) celebrates 25 years of service with Computer Systems and Support Manager Kannan Venkataraman.

Sr. VP Technology Denby Auble (left) and GSD General Manager Roy Forshaw (right) congratulate (from left) SPSD Manager Bob Hardy on 15 years and Chief Software Engineer Stan Goldberg on 25 years of service.
VP Western Hemisphere Data Processing
Gary Fair (left) and Marketing Area Manager
Richard Johnston (right) congratulate Senior
Marketing Representative Carlos Barragan
on his 20 years of service.

Senior Graphic Plotter Operator Maggie
Goode-Banks (center) receives congratulations
on 20 years of service from Playback/
Plot Room Supervisor Gale Gortemaker and
Lead Playback Technician Sharon Phillips.

Sr. VP Western Hemisphere Joe Chatoor (left) and Marine Operations General Manager
Larry Scott (right) present Marine Operations Manager Peter Van Borssum with his 20-year
service award.

(From left) Former Houston Land and Special
Projects Manager Pat Peck congratulates
Analyst Mark Dohse on 15 years and Assistant
Manager Trevor Gatus on 20 years of service.

Manager Data Processing Ron Frosch
(right) receives his 20-year service award
from former Houston Marine Processing
Manager Dennis Gallagher.

Accounting Supervisor Doris Honeycutt (left)
and VP Finance/Controller Don Smith present
Senior Accounting Clerk Fe Exitol with her 20-year service award.

Senior Analyst Lee Meister (left) accepts
congratulations on 20 years of service from
former Houston Land and Special Projects
Manager Pat Peck.

Lowe, Robert E.
Martin, Rosemarie A.
Phillips, Rhonda M.
Posey, Dan R.
Prior, Keith S.
Sanchez, Ernesto R.
Speirs, Stephen R.
Stafford, Larry G.
Villiers, Newton A.
Ware, Christine A.
Wise, Michael J.
Yarnold, Richard C.
Young, Joseph R.

23 Years
Brown, Brent R.
Craft, Kenneth L.
De Jamaer, Sjoerd S.
El-Shammasa, Mahaymen
Gurski, Adam M.
Halbe, David C.
Kavia, Dhiraj
Lewis, David J.
Newberry, Linda E.
O'Meara, Raul H.
Taylor, Brenda J.
Vargas, Sigifredo
Wen, Viola

22 Years
Bauer, Clayton J.
Billips, David R.
Franklin Jr., John B.
Geoffre, Mike C.
Gentry, Russell A.
Goddin, Paul
Hickmott, Nicholas E.
Holme, Roger G.
Jollivet, Betty L.
Kamal Elou, Oliet
McFarland Jr., Richard
Moers, Cheryl A.
Munn, Charles
Neece, Martin H.
Rowland, Richard E.
Snyder Jr., Cedric V.

21 Years
Alamiz, Lionel
Cham, Robert
Chandler, Peter
El Fakhhrany, Reda
Ells, Ronald W.
Eudy, Benny D.
Exito, Fe Esperanza B.
Flores, Juan
George, Martha
Hill, Harvey F.
Huntziss, James E.
Joseph, Roderick B.
Koth, Ismail
Luna, Andrew
Martinez, Roberto R.
Mayville, Jeffrey N.
Mecomber, Thomas R.
Mongru, Jean P.
Powell, Robert
Son, Carlos J.
Spradling, Quinten M.
Stobbart, Alan

* Tamez III, Antonio
* Turner, Susan E.
* Young, Susan L.

20 Years
Aaron, James
Adams, Julia J.
Alamiz, Louis
Bishop, Andrew
Blow, Michael R.
Closius, Keith A.
Cook, Terrence C.
Dahanayake, May
Dubose, Don A.
Emerson, Clifton O.
Emmit, Thomas R.
Frosch, Ronald W.
Hadadine, Abdelhamid
Hare, Colin
Hewitt, Rickey W.
Howard, Glenn E.
Jupp, Paul A.
Mann, Rocky S.
Mekin, Hilary
Moya, Ray V.
Munro, David M.
Narang, John I.
Nicanoff, Leonor
Ortega, Luis L.
Parry, Jeremy E.
Peters, Gary S.
Peters, Neil
Sims Jr., Joe C.
Slocum, Michael T.
Smith, Chester D.
Stahl, Roger D.
Thornton, Thomas E.
Tutt, Chris O.
Wahba, Mohsen M.
Ward, Rod
Wilteld, Robert J.
Wittshire, Andrew

19 Years
Adams, Kelley J.
Bradley, Jan A.
Brousson III, Joseph A.
Burchill, Robert J.
Burns, Terry L.
Butler, Gary P.
Butler, Bart L.
Campbell, Glenn
Chang, Hai-Ching
Cole, Stephen
Davis, Robert B.
Dudley, Timothy
Felder, Carlos E.
Fernandez, Urdi
Garza Jr., Clemente
Highwater, Steve L.
Hughes, David K.
Jones, Patrick A.
Khan, Malik M.
Kroschel, Alan
Lamme, Marcela L.
Livingston, Allen G.
Lonnberg, Arthur G.

Manzur, Akkas
Mauger, John C.
Nyland, David L.
O'Connor, Matthew
Aniversaries

Former Houston Land and Special Projects Manager Pat Peck (right) presents Senior Analyst Rick Hewitt with his 20-year service award.

Chief Observer Alan Watson [center] is presented with his 20-year service award by Middle East Land Operations Manager Peter Knox [left] and UAE Resident Manager Bruce Clulow.

[From left] Area Manager Patrick Ng congratulates Senior Geophysicist Jeffrey Lauf on 20 years and Geophysical Analyst Betty Koechner on 10 years of service.

Supervisor Carlos Son [left] celebrates 20 years of service with former Houston Land and Special Projects Manager Pat Peck.

A dinner party was held in May honoring 25 employees in Cairo’s processing center. [Back row, from left] General Manager Western Atlas Egypt E&P Chuck Shepherd, VP Western Atlas Egypt Angelo Di Battista, and General Manager Western Atlas Egypt Maurice Nessim congratulate six employees on five years, six employees on 10 years, 10 employees on 15 years, and three employees on 20 years of service.

Insurance Coordinator Janeene Van Dyck [center] is presented with her 15-year service award by VP Finance/Controller Don Smith and former Accounting Supervisor Carol Beal.

SPSD Section Leader Debra Dishberger [left] congratulates Word Processing Operator Mary Shah on 15 years of service.
Kulkarni, Pramod H.  
LaTour, Andre R.  
Lamb, Susan B.  
Lapping, David  
Laws Jr., Randolph H.  
Lewis, Richard P.  
Llewellyn, Richard G.  
MacDonald, Rory C.  
Markert III, John E.  
May, Raymond J.  
McDonald, James S.  
Melcher, Steven J.  
Milne, Graham W.  
Mitchell, Mark S.  
Murray, Roger E.  
Musico, Milagros M.  
Ortega, Raymundo  
Parker, Diane W.  
Parry, John K.  
Pedrie, Kim D.  
Phillips, Peter W.  
Quigley, John  
Raja, Rosalind A.  
Rayburn, Thomas G.  
Reel, Robin M.  
Riall, Stephen  
Rogers, Mary M.  
Roper, William B.  
Rodford, Rodney K.  
Sanderson, Michael  
Schoon, William S.  
Sexton, Donald H.  
Seymour, Don N.  
Shady, Emad  
Shannon, Mark R.  
Sims, Paul Morris  
Smith, Patrick  
Snell, Patrick A.  
Soto, Gonzalo G.  
Sponar, Brent G.  
Spen, Maurice G.  
Soros, Antila J.  
Tan, Sharon  
Thomas, Glory J.  
Tien, Dan D.  
Tolles Jr., Charles M.  
Twigg, Christopher J.  
Wallace, Thomas  
Wan, Boon, Cecilia  
Whittery, David E.  
Will, Robert A.  
Wood, Timothy  
Woods, Stephen  
Yarath, Prameela D.  

McFarlane, A. Scott  
Nafee, Moustafa  
Ng, Patrick Y.  
Ng, Swee Leng  
Nickell, Ronald L.  
Rabson, William T.  
Ragsdale, Kevin E.  
Roberts, Vicente C.  
Rowe, Robert W.  
Salama, Antoun  
Saunders, Michael R.  
Shaffer, David B.  
Smith Jr., Major C.  
Sophus, Roland W.  
Steffen, Todd  
Swalla, Dean  
Taylor, Grant A.  
Ullah, Shahid  
Urlaub, Randall C.  
Welch, Harland W.  
Wells, Kevin W.  
Woodruff, Randal K.  
Young, Flora E.  

15 Years  
Baldwin, Timothy C.  
Breath, Brian W.  
Brett, Marc N.  
Butler, Daniel O.  
Caldwell, Donald P.  
Cieslewicz, Richard M.  
Dante, Joseph P.  
Davis, Rosa M.  
Den Boer, Lennert  
Dishberger, Debra M.  
Gilbert, John R.  
Goldsmith, Wayne K.  
Grueter, Steve P.  
Hardy, Robert E.  
Heslop, Robert I.  
Hill, Trevor D.  
Kessell, Troy M.  
Mok, William A.  
Rougemout, Kermit W.  
Sharpe, David J.  
Solokis, Stephen J.  
Symonds, Murray  
Umali, Guven  
Usher, Christopher T.  
Watts, David W.  
Williamson, Mitchell  

14 Years  
Anhaier Jr., Leonard J.  
Bogardus, James W.  
Bourne, Richard  
Bryant, Ian  
Burnett, Michael J.  
Coyne, Martin  
Eagles, James W.  
Eovaldi, James W.  
Evans, Stewart T.  
Fitzsimmons, Barry M.  
Fontana, Philip M.  
Furlong, Andrew J.  
Gallegos, Deborah L.  
Ghent, Steven R.  
Gunderson, Eric A.  
Hammond, Stephen D.  
Heilig, Robert W.  
Hogge, Martin J.  
Hodges, Allan J.  

Kulkarni, Pramod H.  
LaTour, Andre R.  
Lamb, Susan B.  
Lapping, David  
Laws Jr., Randolph H.  
Lewis, Richard P.  
Llewellyn, Richard G.  
MacDonald, Rory C.  
Markert III, John E.  
May, Raymond J.  
McDonald, James S.  
Melcher, Steven J.  
Milne, Graham W.  
Mitchell, Mark S.  
Murray, Roger E.  
Musico, Milagros M.  
Ortega, Raymundo  
Parker, Diane W.  
Parry, John K.  
Pedrie, Kim D.  
Phillips, Peter W.  
Quigley, John  
Raja, Rosalind A.  
Rayburn, Thomas G.  
Reel, Robin M.  
Riall, Stephen  
Rogers, Mary M.  
Roper, William B.  
Rodford, Rodney K.  
Sanderson, Michael  
Schoon, William S.  
Sexton, Donald H.  
Seymour, Don N.  
Shady, Emad  
Shannon, Mark R.  
Sims, Paul Morris  
Smith, Patrick  
Snell, Patrick A.  
Soto, Gonzalo G.  
Sponar, Brent G.  
Spen, Maurice G.  
Soros, Antila J.  
Tan, Sharon  
Thomas, Glory J.  
Tien, Dan D.  
Tolles Jr., Charles M.  
Twigg, Christopher J.  
Wallace, Thomas  
Wan, Boon, Cecilia  
Whittery, David E.  
Will, Robert A.  
Wood, Timothy  
Woods, Stephen  
Yarath, Prameela D.  

McFarlane, A. Scott  
Nafee, Moustafa  
Ng, Patrick Y.  
Ng, Swee Leng  
Nickell, Ronald L.  
Rabson, William T.  
Ragsdale, Kevin E.  
Roberts, Vicente C.  
Rowe, Robert W.  
Salama, Antoun  
Saunders, Michael R.  
Shaffer, David B.  
Smith Jr., Major C.  
Sophus, Roland W.  
Steffen, Todd  
Swalla, Dean  
Taylor, Grant A.  
Ullah, Shahid  
Urlaub, Randall C.  
Welch, Harland W.  
Wells, Kevin W.  
Woodruff, Randal K.  
Young, Flora E.  

15 Years  
Baldwin, Timothy C.  
Breath, Brian W.  
Brett, Marc N.  
Butler, Daniel O.  
Caldwell, Donald P.  
Cieslewicz, Richard M.  
Dante, Joseph P.  
Davis, Rosa M.  
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Dishberger, Debra M.  
Gilbert, John R.  
Goldsmith, Wayne K.  
Grueter, Steve P.  
Hardy, Robert E.  
Heslop, Robert I.  
Hill, Trevor D.  
Kessell, Troy M.  
Mok, William A.  
Rougemout, Kermit W.  
Sharpe, David J.  
Solokis, Stephen J.  
Symonds, Murray  
Umali, Guven  
Usher, Christopher T.  
Watts, David W.  
Williamson, Mitchell  

14 Years  
Anhaier Jr., Leonard J.  
Bogardus, James W.  
Bourne, Richard  
Bryant, Ian  
Burnett, Michael J.  
Coyne, Martin  
Eagles, James W.  
Eovaldi, James W.  
Evans, Stewart T.  
Fitzsimmons, Barry M.  
Fontana, Philip M.  
Furlong, Andrew J.  
Gallegos, Deborah L.  
Ghent, Steven R.  
Gunderson, Eric A.  
Hammond, Stephen D.  
Heilig, Robert W.  
Hogge, Martin J.  
Hodges, Allan J.  

Accounting Clerk Eleanor Foreman (center) celebrates her 15 years of service with VP Finance/Controller Don Smith and Accounting Supervisor Vickie Kleen.

Human Resources Employment Supervisor Joel Ray (center) is presented with his 15-year service award by VP Administration/Contracts Bob Lowe (left) and Human Resources Manager Dick Vaughan.

GSD General Manager Ray Forshaw (second from left) and GSD Training Manager Quentin Spradling (second from right) congratulate Geophysical Instructor Donny Phillips (left) on 10 years, and Senior Instructor Gerald Penn (right) on 15 years of service.

Programming Supervisor Joe Hallmark (right) celebrates his 15 year anniversary with Applied Technology Software Manager Haynie Stringer.

Processing Geophysicist William Goller (right) receives his 10-year service award from GeoSignal President Lee Bell.
Anniversaries

11 Years
Armstrong, David T.
Bircher, Arthur C.
Blake, Kenneth A.
Bly, Gayla R.
Brown, Patricia A.
Cadel, Neil
Cantlon, Joe
Charles, Connie
Christensen, Chris L.
Clark, Steven K.
Dadley, Martin
Dominguez Jr., Justo R.
Doyen, Philippe M.
Espinosa, David L.
Estrada, Pedro C.
Flores, Martin
Foussac, Jacques B.
Gibson, Alvin C.
Gunn, Robert C.
Hall, Dennis
Halvorson, William P.
Hirsch, Patricia M.
Hult, Timothy E.
Hume, Hamish M. S.
Hydo, Robert R.
Johnson, Darrel R.
Jones, Richard J.
Keighley, Alison
Kelly, R. Marie
Krook, John O.
Landrum, Bernie
Leckie, Knight, James E.
Lin, Teck
McIntyre, John J.
Murillo, Emilio
Nahar, Randhir
Newell, Duncan
Niece, Jimmy L.
Norh, Malcolm R.
Northcott, Guy A.
Nowfel, Timothy L.
O'Brien, Richard F.
Parks, Kevin W.
Pell, Timothy J.
Perrella, Michael R.
Petersen, Jeffrey L.
Redmond, Kieron
Segura, Pedro
Shaw, Diana K.
Shekell, Timothy J.
Sparks, Alison
Tesillo, Daniel D.
Throop, Joseph G.
Turchiano, Joseph A.
Vestby, Morton
Walker, Jeffrey R.
Warner, David H.
Washington, Victor C.
Wool, Gary D.

10 Years
Abraham, Solomon
Affum-Appiah, Anthony
Akers, Billy J.
Allen, Mark R.
Ambrose, Robert J.
Amr, Fara
Anderson, Charles W.
Arbly, Ronald A.
Banik, William J.

9 Years
Adams, Edward E.
Amato, Paul A.
Weeks, Lynn
Wrigley, Marilyn R.

8 Years
Arredondo, Javier C.
Boyd III, Victor C.
Gonzalez, Jesus D.
Ianniello, Richard
Johnson, Anthony O.
Moraes, Onesimo C.
Rodriguez, Jose M.
Rooke, Elizabeth L.
Schlager, Michael D.
Soto, Felipe
Thompson, Edward E.
Warren, Gary L.
Webb, James G.

7 Years
Abraham, Solomon
Affum-Appiah, Anthony
Aker, Billy
Allen, Mark R.
Ambrose, Robert J.
Amr, Fara
Anderson, Charles W.
Arbly, Ronald A.
Banik, William J.

6 Years
Adams, Edward E.
Amato, Paul A.
Henderson, James G.
Jenkins, Charles W.
Jones, Michael G.
Kempf, Richard
Kool, John S.
McIntyre, John J.
Merritt, Charles W.
Miller, Elizabeth L.
Morales, Francisco
O'Reilly, Michael R.
Olson, Leon
Parks, Kevin W.
Pathak, Suresh
Petersen, Jeffrey L.
Redmond, Kieron
Segura, Pedro
Shaw, Diana K.
Shekell, Timothy J.
Sparks, Alison
Tesillo, Daniel D.
Throop, Joseph G.
Turchiano, Joseph A.
Vestby, Morton
Walker, Jeffrey R.
Warner, David H.
Washington, Victor C.
Wool, Gary D.
Barrington, Matt M.  
Berness, Michael S.  
Betancourt, Guadalupe  
Blackstock, Richard A.  
Boy, Tommy  
Briggs, Kenneth  
Ceburn, Victor J.  
Clements, Goh  
Chang, Steven D.  
Corbett, Beth A.  
Davila, Jorge E.  
Davison, Trevor J.  
DeKeyser, Cynthia J.  
Donnelly, Martin J.  
Echeverri, Alfonso  
Elk, Barry Kenneth  
Eppler, Patricia  
Frewtrell, Steve  
Forder, Nicholas H.  
Fuller, Jeri T.  
Garcia, Joe H.  
Glover, William  
Greenwood, George A.  
Guatemala, Jorge C.  
Hassan, Rose M.  
Homiah, Dawn A.  
Hughes, John J. H.  
Iglesias, Steve  
Kong, Meewi  
Kienast, Kurt  
Marsden, Graeme  
Martin, Robert  
Martison, David M.  
McCure, Charles H.  
McLoughney, Noel J.  
Mesa, Johnny  
Mezzano, Larry J.  
Monteiro-Quesada, Nestor  
Morris, Walter K.  
Noble, Peter L.  
Nunns, Marcus C.  
Pablos, Delfina S.  
Rattray, Roland L.  
Rios, Carmaognano G.  
Sains, Delfina O.  
Saunders, Jason E.  
Sedano Jr., Jairo A.  
Shandluk, Les D.  
Shorey, Mark David  
Simpon, Stefan W.  
Singh, Raj  
Smith, Stacey T.  
Stapel, Martin  
Taylor, Kerry M.  
Thompson, Barron R.  
Tiemann, Terry W.  
Toledo, Ross  
Vernon, Bradley  
Wagoner, Roy W.  
Watson, Milton A.  
Way II, L.  
Barnum, Works, Robert A.  
YezPas, Delfina P.  
Baskin, Mark A.  
Bell, Jonathan C.  
Bernal, Jairo E.  
Bernal, Saulo L.  
Bonnie, Art  
Callaghan, Maureen  
Cantlon, Joe  
Cole Jr., Rosco J.  
Creevian, Fiona  
Crews, Joseph A.  
Dawson, John R.  
De Ranc, Jon H.  
Denman, Gerald J.  
Desta, Dawa  
Diminica, Gordon P.  
Donnelly, Brian Patrick  
Doughty, Graham J.  
Ellis, Stephen D.  
Farris, David J.  
Galan, Frank R.  
Garcia, Oscar  
Gomez, Theresa C.  
Gowen, Stephen J.  
Harrison, Randall V.  
Hash, DeMorrison W.  
Hoffman, John D.  
Jubb, Keith R.  
Judge Jr., James  
Jumbo Jr., Jimmy A.  
Kamil, Gavins J.  
Lester, Paul Martin B.  
Lopez, Francisco V.  
Mace, James  
Marling, Tim G.  
Meneec, Kimberly  
Nieves, Oscar R.  
Nicoli, Raul D.  
Nieto, Henry  
Nofke, Lothar K. W.  
Owen, Russell  
Pacheco, Pedro P.  
Pena Plata, Alvaro  
Pinkard, Standley K.  
Qayyum, Kamran  
Rakha, Babteh  
Robertson, Donald J.  
Rodger, David C. B.  
Ruiz, Elido  
Saud Mina, Maged  
Sanchez, Eliez R.  
Sanber, Timur  
Santec, Jann M.  
Schofield, Duncan C.  
Simpson, Colin  
Sisodia, Ranjot  
Smith, Jerry  
Soni, Rajiv  
Spradling, Hilda L.  
Tan, King Seong  
Tavender, Alan J.  
Tolaba, Fernando  
Vizcar, Becky M.  
Walsh, Thomas A.  
Way II, L.  
Barnum, Works, Robert A.  
Whetton, Mark D.  
Wilkie, Peter A.  
Wilshaw, Robert J.  
Wilson, Stephen  
Woods, Nathan  
Woods, Terese Ann  
Yale, Mark W.  
Youssef, Ishaq

Processing Geophysicist Pat Eppler celebrates her 10 years of service with Geosignal President Lee Bell.

Former Houston Land and Special Projects Manager Pat Peck (center) congratulates Clerk Patricia Brown (left) and Analyst Mythili Pabbitsy 10 years of service.

(From left) Research and Development Manager Laurent Meister congratulates Project Manager Jane Trounter on five years and Principal Research Geophysicist Alfonso Gonzalez on 10 years of service.

Marine Data Processing Assistant Manager Larry Cain (left) and former Marine Data Processing Manager Dennis Gallagher (right) present Analyst Louis Jurca with his 10-year service award.

Senior Accounting Clerk Juliarda Ducante (center) accepts congratulations on her 10 years of service from Accounting Supervisor Doris Honeycutt and VP Finance/Controller Dan Smith.

Junior Geophysical Analyst Dorothy Barrow (center) is presented with her 10-year service award by 2-D Spec Data Services Manager Patricia Greenon and Special Processing Analyst Carl Blackmon.

9 Years
Abayon, Mouses A.  
Alvarez, Norma G.  
Andrew, Ernest J.  
Barbara, Delfina P.  
Barth, Mark A.  
Bell, Jonathan C.  
Bernal, Jairo E.  
Bernal, Saulo L.  
Bonnie, Art  
Callaghan, Maureen  
Cantlon, Joe  
Cole Jr., Rosco J.  
Creevian, Fiona  
Crews, Joseph A.  
Dawson, John R.  
De Ranc, Jon H.  
Denman, Gerald J.  
Desta, Dawa  
Diminica, Gordon P.  
Donnelly, Brian Patrick  
Doughty, Graham J.  
Ellis, Stephen D.  
Farris, David J.  
Galan, Frank R.  
Garcia, Oscar  
Gomez, Theresa C.  
Gowen, Stephen J.  
Harrison, Randall V.  
Hash, DeMorrison W.  
Hoffman, John D.  
Jubb, Keith R.  
Judge Jr., James  
Jumbo Jr., Jimmy A.  
Kamil, Gavins J.  
Lester, Paul Martin B.  
Lopez, Francisco V.  
Mace, James  
Marling, Tim G.  
Meneec, Kimberly  
Nieves, Oscar R.  
Nicoli, Raul D.  
Nieto, Henry  
Nofke, Lothar K. W.  
Owen, Russell  
Pacheco, Pedro P.  
Pena Plata, Alvaro  
Pinkard, Standley K.  
Qayyum, Kamran  
Rakha, Babteh  
Robertson, Donald J.  
Rodger, David C. B.  
Ruiz, Elido  
Saud Mina, Maged  
Sanchez, Eliez R.  
Sanber, Timur  
Santec, Jann M.  
Schofield, Duncan C.  
Simpson, Colin  
Sisodia, Ranjot  
Smith, Jerry  
Soni, Rajiv  
Spradling, Hilda L.  
Tan, King Seong  
Tavender, Alan J.  
Tolaba, Fernando  
Vizcar, Becky M.  
Walsh, Thomas A.  
Way II, L.  
Barnum, Works, Robert A.  
Whetton, Mark D.  
Wilkie, Peter A.  
Wilshaw, Robert J.  
Wilson, Stephen  
Woods, Nathan  
Woods, Terese Ann  
Yale, Mark W.  
Youssef, Ishaq
8 Years
Adams, Craig A.
Ahmed, Syed Yamin
Albertin, Gwe K.
Andrade, Eduardo
Andren, Eric P.
Apthorpe, Antoon J. H.
Atkins, B. L.
Aurelio, John
Avery, Paula R.
Bell, Sharon
Bell, Thomas A.
Benito, Chancey F.
Benito, Joan M.
Bochm, John P.
Bonnr, Hazel A.
Brooks, Earlene
Brown, James K.
Cansio, Renegio C.
Carbonnel, Patrick A.
Carstens, Gustavo J.
Chang, Wenfong
Collins, Kathy L.
Copeland, Simon D.
Cox, Claus A.
Crawford, Tammy M.
Dai, Hsiu Chih
Degel, Tomislav
Docter, Romeo V.
Donghia, Sandra L.
Dwyer, Nagy
Flyn, Simon C.
Pompa, Mark
Fowler, Jeffery A.
Garnier, Jerry D.
Gillies, Bryan
Gilson, Carolyn D.
Girke, Marion P.
Guzman, Jorge A.
Hage-Youssef, Robert E.
Harding, Simon G.
Harny, Edmond J.
Harrison, R. Todd
Hobert, Rebecca L.
Hendr, Barbara
Hendron, Richard M.
Holm, Thad R.
Jacka, John E.
Jennings, Michael W.
Johnson, Alan
Johnson, Janet M.
Kamal, A. Hafez
King, Kieran
Koening, Christoph A.
Leveging, William R.
Lopez, Jose M.
Madrid, Henry
Manderfield, David J.
Montague, Matthew J.
Monteal, William J.
Moradiel, Enrique
Nance, Eric
Neilson, Lane
Newberry, Edward L.
Nill, Gregory T.
O’Nions, Kevin A.
Ortega, Manuela
Ortiz, Eugenio
Parrana, Nelson
Reade, William C.
Remillong, David J.
Revheim, John
Reyes, Frances S.
Saunders, Brian
Seker, Bob G.
Sheal, William B.
Stanley, Larry R.
Steinhaus, Robert J.
Stratton, Richard H.
Stubbs, Scott A.
Torres, Jose S.
Vance, John R.
Vismonte, Leopoldo B.
WalDROP, Susan D.
Whitebread, Richard
Whitfield, Gary R.
Williams, Jennifer Ann
Williams, Larry M.
Winterberg, Kent D.
Wood, Carl S.
Zarzuela, Edgar G.
Zulueta Jr., Generoso D.

7 Years
* Abuzaed, Mohamed M.
Anderson, Clive R.
Augustin, Leslie P.
Brazel, Joe M.
Browett, Jeremy
Burke, John
Burns, Steven
Cane, Kevin B.
Chewbury, Malidur R.
Cooke, Alexander M.
Cooper, Robert A.
Earney, Michael
Eisinger, Gert K.
Fols Jr., William R.
French, Steven G.
Garrett, Geoffrey W.
Giler Cervatos, Javier
Gonzalez, Thomas C.
Gutierrez, Carlos
Harber, Andrew J.
Henman, Ian A.
Howes, Jacqueline
Humphries, Mark D.
Haynh, Thomas
Jafar, Zulfikar
John, Dennis A.
Kelm, Shawn E.
Kite, Tina M.
Langridge, Andrew J.
Lee, Seonghumb
Lessar, Daniel G.
Lunsford, Mary L.
McGuire, Janet R.
Medrano, Jesus O.
* Mejia-Rivera, Erick
Melody, Paul M.
Mingelli, Claudio
Mitchell, John A.
Mize, Heather M.
Nava, Rogelio D.
O’Neal, Kevin W.
Olaza, Roberto
Paul, William S.
Philadelphia, Justine
Prinz, Karl H.
Rind, Robert
Rivas, Diego E.

Denver Processing Area Manager Jeff Omvig (far right) congratulates (from left) Head Computer Operator Tim Beringer and Geophysical Analyst Richard Blackstock on 10 years; Junior Analyst Roman Gorecki and Senior Secretary Carolyn Kaye on five years; and Senior Geophysical Analyst Mike Abitobil on 10 years of service.

Former Houston Marine Processing Manager Dennis Gallagher (left) presents Marine Processing Supervisor Terry Johnson with his 10-year service award.

Geosignal President Lee Bell (left) presents Data Processing Supervisor Kurt Kienast with his 10-year service award.

Retirement

Rolando Lara

Former Geosignal President Rolando Lara (second from left) was honored at a retirement dinner in April in Houston. Lara, who founded Geosignal in 1986, continues a relationship with Geosignal as a consultant. (From left) Lara received well wishes from President Lee Bell, Vice President Oliver Carroll, and Vice President of Operations David Palaniappan.
In Memoriam

Roger Melvin Coker, Sr.

Roger Coker, 63, passed away in May 1998 in La Marque, Texas. He retired from Western as a geophysical engineer after 28 years of service. Coker is survived by his wife, Evelyn, five daughters, two sons, and grandchildren.

Roland Guivarch

Roland Guivarch, 46, died in May 1998 in Kuwait. Guivarch joined Western in 1989. He progressed in his career to become senior boat mechanic. He is survived by his wife, Francoise, a son, and two daughters.

Al Swartzfisher

Western retiree Al Swartzfisher, 63, died at home in May 1998 in Houston. He began his career with Western in 1984 and retired as a senior programmer in 1995. Swartzfisher is survived by 12 siblings.

Suwan Thaebtham

Suwan Thaebtham, 43, died in June 1998 in Abu Dhabi. He joined Western in 1994 as a vibrator operator. Thaebtham is survived by his wife, Ubon, and four children.

Mirjana Usher-Putnikovic

Mirjana Usher-Putnikovic, 46, passed away in April 1998 in London, England following a battle with cancer. She began her career with Western in London in 1984 where she moved from her native Croatia. Usher-Putnikovic progressed in her career to become EAME land processing manager. She is survived by her husband, Chris Usher, EAME vice president of Data Processing, and daughter, Masa.

Charles Zdarsky

Charles Zdarsky, 73, passed away in June 1998 in Houston. After joining Geosignal in 1988, he progressed in his career to become a processing geophysicist. He is survived by his wife, Jan, and two sisters.