

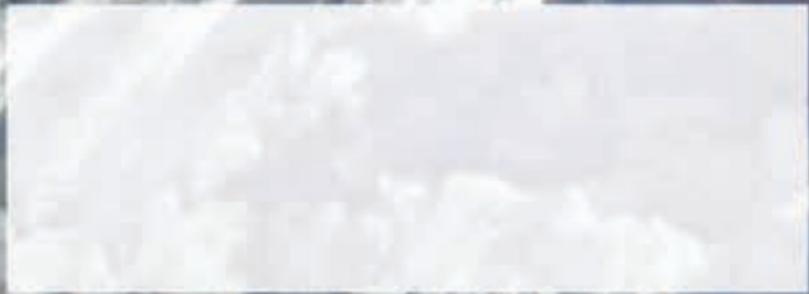
AAPG AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS, AN INTERNATIONAL ORGANIZATION

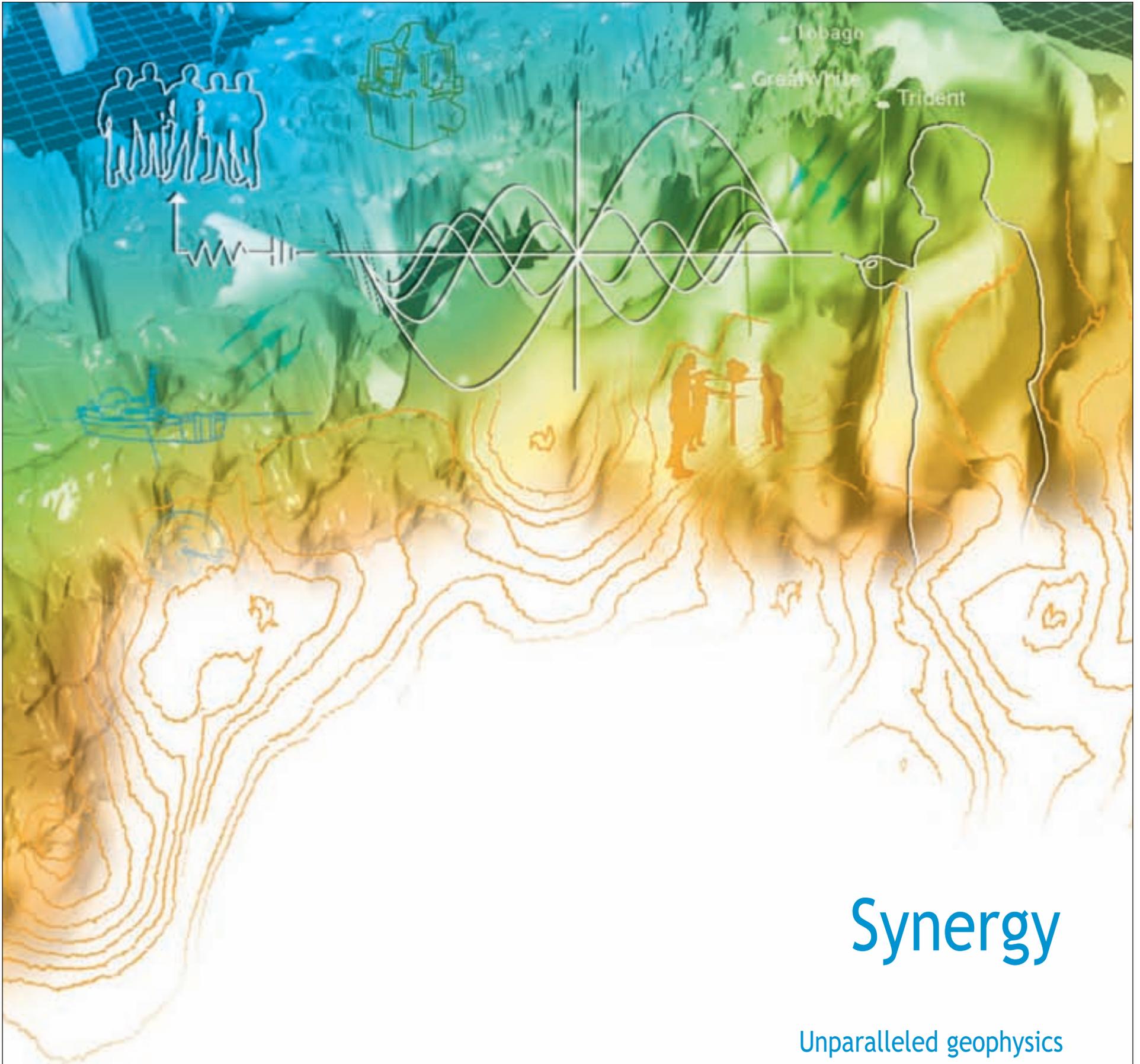
EXPLORER

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On the cover: The technique is called passive seismic, but there's nothing very passive about the technological advances that are setting the pace for the geophysical industry these days – part of the industry and activity snapshot covered by our annual Seismic Issue. The cover shot of technicians testing broadband receiver stations in the Swiss Alps is a reminder that no corner of the earth is too remote for exploration potential. Story on page 14. Photo courtesy of Spectraseis.

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Vol. 28, No. 6
The AAPG EXPLORER (ISSN 0195-2986) is published monthly for members. Published at AAPG headquarters, 1444 S. Boulder Ave., P.O. Box 979, Tulsa, Okla. 74101, (918) 584-2555. e-mail address: postmaster@aapg.org
Periodicals postage paid at Tulsa, Okla., and at additional mailing offices. Printed in the U.S.A.
Note to members: \$6 of annual dues pays for one year's subscription to the EXPLORER. Airmail service for members: \$45. Subscription rates for non-members: \$63 for 12 issues; add \$67 for airmail service. Advertising rates: Contact Brenda Merideth, AAPG headquarters. Subscriptions: Contact Veta McCoy, AAPG headquarters. Unsolicited manuscripts, photographs and videos must be accompanied by a stamped, self-addressed envelope to ensure return.

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POSTMASTER: Please send address changes to AAPG EXPLORER, P.O. Box 979, Tulsa, Okla. 74101.
Canada Publication Number 40046336.
Canadian returns to: Station A, P.O. Box 54, Windsor, Ontario N9A 6J5
e-mail: returnsIL@imex.pb.com



AAPG's role in today's and tomorrow's geologic arena has been amplified – and the Association is uniquely qualified to connect and impact these four different areas.

PRESIDENT'S COLUMN

Destination Worthy; Journey Priceless

By LEE T. BILLINGSLEY

This is my last column as AAPG president, and it has been a heck of a ride. I would not trade my experience for anything. However there has been a price to pay:

Extra coffee to overcome late night writing and e-mail: \$45.88

Extra laundry service to have clean clothes at numerous meetings: \$75.42

Extra flowers and gifts to my wife, Joanne, to compensate for my focus on AAPG duties: \$88.92

Experience as president: priceless

* * *

As president, I served as leader of the Executive Committee, which this year functioned like a championship team. Characteristics of this year's team included:

- ✓ Development, as a team, of goals for the organization.
- ✓ Lack of personal agendas.
- ✓ Commitment to overall goals.
- ✓ Willingness to respect and listen to alternate views within the group.
- ✓ Willingness to present new proposals, openly discuss, modify, agree on a group decision and finally



Billingsley

support the action as a united group.
✓ Have fun together.

I would like to recognize the individual members of the EC.

□ Will Green (President-elect) focused on getting ready for next year as president, and chaired the Tac

Ops III Committee, which reviewed AAPG's business directorate.

□ John Dolson (Vice President) served as our adviser and connection to international members, expanded AAPG into Russia and was an enthusiastic supporter of AAPG activities in international areas.

□ Mike Party (Secretary) recorded and edited all our meeting minutes, coordinated with student committees

See **President**, next page

Tinker Voted President-Elect

Scott W. Tinker, director of the Bureau of Economic Geology, the University of Texas at Austin and Texas State Geologist, was voted president-elect by the AAPG membership. He will serve as AAPG president in 2008-09.

Beaumont, independent geologist, Tulsa.

□ Editor – Gretchen M. Gillis, Schlumberger, executive editor, books, Schlumberger, Sugar Land, Texas.

Also elected were:

□ Vice president (Regions) – John Hogg, exploration vice president, MGM Energy, Calgary, Canada (two-year term).

□ Vice president (Sections) – John M. Armentrout, Cascade Stratigraphic, Clackamas, Ore. (one-year term).

□ Secretary – Edward A. "Ted"

The newly elected officers will begin their duties on July 1, serving on an Executive Committee headed by Willard R. "Will" Green, Midland, Texas, independent.

Remaining on the committee is Randi S. Martinsen, who will complete the second of a two-year term as treasurer.

Also on the new committee is Martin D. "Marty" Hewitt, of Encana Oil and Gas, Calgary, Canada, who will assume the chairmanship of the House of Delegates. □

President

from previous page

and the DPA, and kept us grounded with the views of independent geologists.

☐ **Randi Martinson** (Treasurer) learned the AAPG financial system from budgets to investments to insurance, and added prospective on both students and professors.

☐ **Ernie Mancini** (Editor), our chief science adviser, from BULLETINS to special publications. He also helped us to understand students, professors and academic institutions, and implemented a network of associate editors dedicated to expansion of E&P Notes.

☐ **Larry Jones** (Chairman, House of

Delegates) managed the effort to introduce and pass the bylaw amendment on graduated dues – and specialized in very short e-mail messages.

AAPG's Executive Director Rick Fritz and the AAPG staff made our experience positive. The Executive Committee has the responsibility to direct, focus and oversee performance by our staff. The staff is a dedicated, talented professional group, but the Association's performance will only be as good as the direction supplied by the EC to the staff.

We had especially good results on tasks when we clearly communicated our vision and trusted the staff to implement, using their own talents.

The relationship between staff and the EC was a very effective partnership.

* * *

So what did we accomplish this year?

✓ Committees – Reorganized into groups with a committee manager for each group; updated their mission statements.

✓ Corporate Advisory Board – Provided new emphasis on corporate members to advise and participate in AAPG proposals.

✓ E&P Notes – Established a network of associate editors to proactively seek and, if necessary, write articles for this series.

✓ Graduated dues – Studied various options, discussed with HoD and other leadership and ultimately supported passage in HoD.

✓ Position papers – Provided written policy for frequent review and method of change, and reviewed all existing papers.

✓ Global climate change policy – Appointed an ad hoc committee, reviewed draft statement, set charge for

permanent committee and Web-based method for future member discussion (see page 8).

✓ Business plan – Worked with staff to develop a five-year tactical plan.

✓ Budget – Preliminary figures indicate an improvement over a small budgeted surplus.

* * *

What lies ahead?

During my year as president my appreciation for the role that AAPG both does play and can play in the geologic arena has been amplified. The Association is uniquely qualified to connect four different institutions or groups:

1. Government
2. Academia
3. Industry
4. Public

During a given year an EC completes some ongoing projects and starts new ones for the next EC to finish. Some of the concepts begun this year can be very valuable in the future as we fulfill our role as connector between the various groups.

New projects include:

✓ **Research support in academia** – AAPG establishes and administers an industry-funded consortium for geoscience research.

✓ **Academic manpower** – AAPG administers a Visiting Professor program that utilizes industry professionals, and also establishes endowments for professor support.

✓ **Global climate change** – The new committee and ensuing Web discussion should provide valuable and timely information to both the public and members.

✓ **Student programs** – The new Imperial Barrel Award competition provides a new avenue to connect AAPG and industry with students and academia.

✓ **Petroleum Technology Transfer Council** – AAPG is evaluating a management role to continue the program after DOE funding is stopped.

* * *

Working toward goals within AAPG reminds me of an experience in geologic field mapping – a group of geologists are looking at a distant outcrop, and all agree that they need to reach that goal. However, several potential paths are possible:

Some want to take the most difficult, but shortest route so they have time to party.

Others want to take more time and conserve their energy so they are not expected to try to find another outcrop before dark.

Still others go along with the group decision, but wonder why they signed up for this course in the first place.

So it is with AAPG projects. As long as we keep the big goals in mind, we can be flexible in how we get there.

And as a corollary, take time to enjoy yourself, no matter how you get there.

* * *

So in closing, I challenge all members to do your part to be active and volunteer. AAPG offers a great outlet.

Best of luck to Will Green and next year's Executive Committee.



HONOR THE LAND. WIN THE DAY.

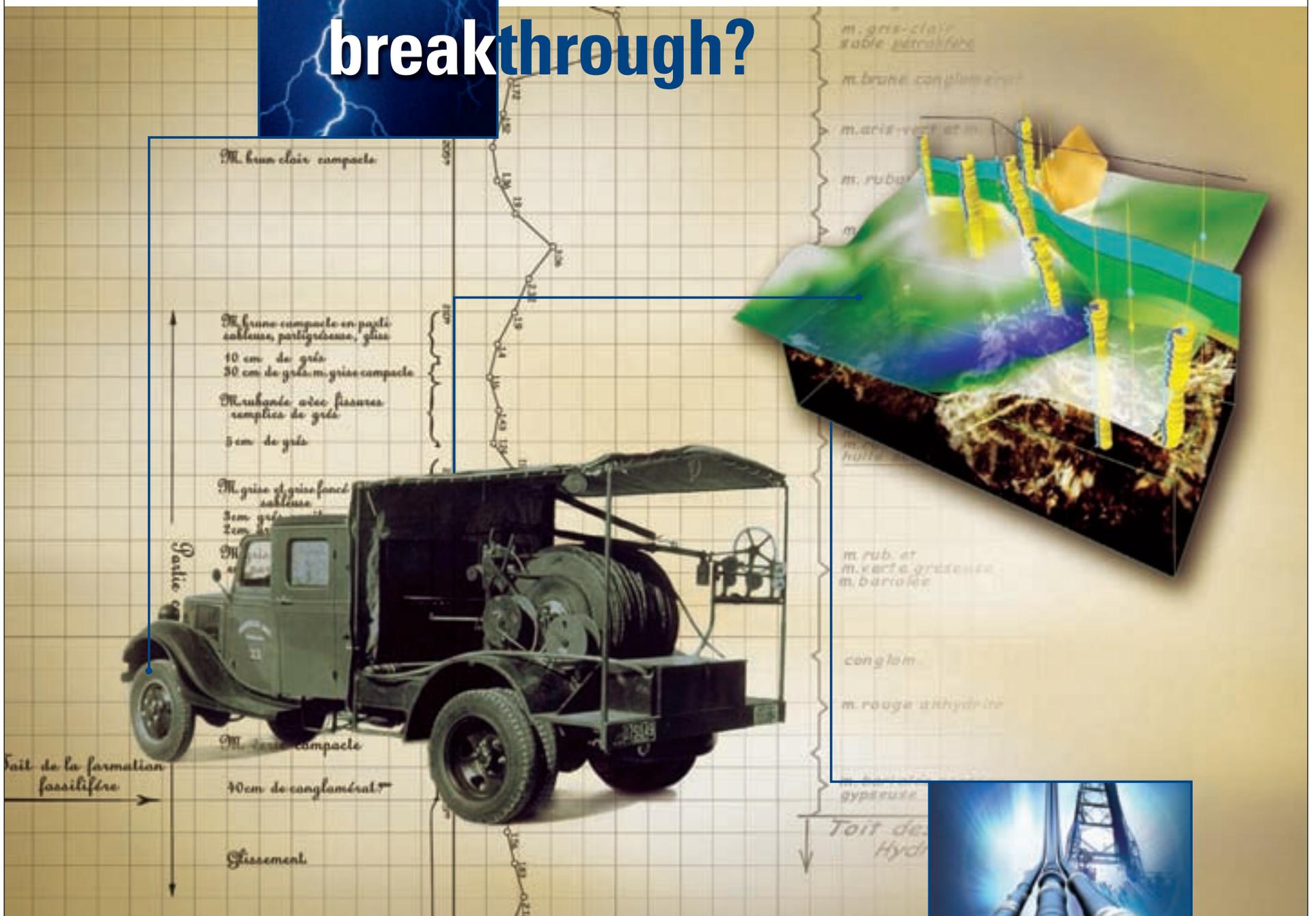


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| 301 | 301 | 302 | 303 | 304 | 305 | 306 | 307 | 308 | 309 | 310 | 311 | 312 | 313 | 314 | 315 | 316 | 317 | 318 | 319 | 320 | 321 | 322 | 323 | 324 | 325 | 326 | 327 | 328 | 329 | 330 | 331 | 332 | 333 | 334 | 335 | 336 | 337 | 338 | 339 | 340 | 341 | 342 | 343 | 344 | 345 | 346 | 347 | 348 | 349 | 350 | 351 | 352 | 353 | 354 | 355 | 356 | 357 | 358 | 359 | 360 | 361 | 362 | 363 | 364 | 365 | 366 | 367 | 368 | 369 | 370 | 371 | 372 | 373 | 374 | 375 | 376 | 377 | 378 | 379 | 380 | 381 | 382 | 383 | 384 | 385 | 386 | 387 | 388 | 389 | 390 | 391 | 392 | 393 | 394 | 395 | 396 | 397 | 398 | 399 | 400 | 401 | 402 | 403 | 404 | 405 | 406 | 407 | 408 | 409 | 410 | 411 | 412 | 413 | 414 | 415 | 416 | 417 | 418 | 419 | 420 | 421 | 422 | 423 | 424 | 425 | 426 | 427 | 428 | 429 | 430 | 431 | 432 | 433 | 434 | 435 | 436 | 437 | 438 | 439 | 440 | 441 | 442 | 443 | 444 | 445 | 446 | 447 | 448 | 449 | 450 | 451 | 452 | 453 | 454 | 455 | 456 | 457 | 458 | 459 | 460 | 461 | 462 | 463 | 464 | 465 | 466 | 467 | 468 | 469 | 470 | 471 | 472 | 473 | 474 | 475 | 476 | 477 | 478 | 479 | 480 | 481 | 482 | 483 | 484 | 485 | 486 | 487 | 488 | 489 | 490 | 491 | 492 | 493 | 494 | 495 | 496 | 497 | 498 | 499 | 500 | 501 | 502 | 503 | 504 | 505 | 506 | 507 | 508 | 509 | 510 | 511 | 512 | 513 | 514 | 515 | 516 | 517 | 518 | 519 | 520 | 521 | 522 | 523 | 524 | 525 | 526 | 527 | 528 | 529 | 530 | 531 | 532 | 533 | 534 | 535 | 536 | 537 | 538 | 539 | 540 | 541 | 542 | 543 | 544 | 545 | 546 | 547 | 548 | 549 | 550 | 551 | 552 | 553 | 554 | 555 | 556 | 557 | 558 | 559 | 560 | 561 | 562 | 563 | 564 | 565 | 566 | 567 | 568 | 569 | 570 | 571 | 572 | 573 | 574 | 575 | 576 | 577 | 578 | 579 | 580 | 581 | 582 | 583 | 584 | 585 | 586 | 587 | 588 | 589 | 590 | 591 | 592 | 593 | 594 | 595 | 596 | 597 | 598 | 599 | 600 | 601 | 602 | 603 | 604 | 605 | 606 | 607 | 608 | 609 | 610 | 611 | 612 | 613 | 614 | 615 | 616 | 617 | 618 | 619 | 620 | 621 | 622 | 623 | 624 | 625 | 626 | 627 | 628 | 629 | 630 | 631 | 632 | 633 | 634 | 635 | 636 | 637 | 638 | 639 | 640 | 641 | 642 | 643 | 644 | 645 | 646 | 647 | 648 | 649 | 650 | 651 | 652 | 653 | 654 | 655 | 656 | 657 | 658 | 659 | 660 | 661 | 662 | 663 | 664 | 665 | 666 | 667 | 668 | 669 | 670 | 671 | 672 | 673 | 674 | 675 | 676 | 677 | 678 | 679 | 680 | 681 | 682 | 683 | 684 | 685 | 686 | 687 | 688 | 689 | 690 | 691 | 692 | 693 | 694 | 695 | 696 | 697 | 698 | 699 | 700 | 701 | 702 | 703 | 704 | 705 | 706 | 707 | 708 | 709 | 710 | 711 | 712 | 713 | 714 | 715 | 716 | 717 | 718 | 719 | 720 | 721 | 722 | 723 | 724 | 725 | 726 | 727 | 728 | 729 | 730 | 731 | 732 | 733 | 734 | 735 | 736 | 737 | 738 | 739 | 740 | 741 | 742 | 743 | 744 | 745 | 746 | 747 | 748 | 749 | 750 | 751 | 752 | 753 | 754 | 755 | 756 | 757 | 758 | 759 | 760 | 761 | 762 | 763 | 764 | 765 | 766 | 767 | 768 | 769 | 770 | 771 | 772 | 773 | 774 | 775 | 776 | 777 | 778 | 779 | 780 | 781 | 782 | 783 | 784 | 785 | 786 | 787 | 788 | 789 | 790 | 791 | 792 | 793 | 794 | 795 | 796 | 797 | 798 | 799 | 800 | 801 | 802 | 803 | 804 | 805 | 806 | 807 | 808 | 809 | 810 | 811 | 812 | 813 | 814 | 815 | 816 | 817 | 818 | 819 | 820 | 821 | 822 | 823 | 824 | 825 | 826 | 827 | 828 | 829 | 830 | 831 | 832 | 833 | 834 | 835 | 836 | 837 | 838 | 839 | 840 | 841 | 842 | 843 | 844 | 845 | 846 | 847 | 848 | 849 | 850 | 851 | 852 | 853 | 854 | 855 | 856 | 857 | 858 | 859 | 860 | 861 | 862 | 863 | 864 | 865 | 866 | 867 | 868 | 869 | 870 | 871 | 872 | 873 | 874 | 875 | 876 | 877 | 878 | 879 | 880 | 881 | 882 | 883 | 884 | 885 | 886 | 887 | 888 | 889 | 890 | 891 | 892 | 893 | 894 | 895 | 896 | 897 | 898 | 899 | 900 | 901 | 902 | 903 | 904 | 905 | 906 | 907 | 908 | 909 | 910 | 911 | 912 | 913 | 914 | 915 | 916 | 917 | 918 | 919 | 920 | 921 | 922 | 923 | 924 | 925 | 926 | 927 | 928 | 929 | 930 | 931 | 932 | 933 | 934 | 935 | 936 | 937 | 938 | 939 | 940 | 941 | 942 | 943 | 944 | 945 | 946 | 947 | 948 | 949 | 950 | 951 | 952 | 953 | 954 | 955 | 956 | 957 | 958 | 959 | 960 | 961 | 962 | 963 | 964 | 965 | 966 | 967 | 968 | 969 | 970 | 971 | 972 | 973 | 974 | 975 | 976 | 977 | 978 | 979 | 980 | 981 | 982 | 983 | 984 | 985 | 986 | 987 | 988 | 989 | 990 | 991 | 992 | 993 | 994 | 995 | 996 | 997 | 998 | 999 | 1000 |
| 85 | 46 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 | 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120 | 121 | 122 | 123 | 124 | 125 | 126 | 127 | 128 | 129 | 130 | 131 | 132 | 133 | 134 | 135 | 136 | 137 | 138 | 139 | 140 | 141 | 142 | 143 | 144 | 145 | 146 | 147 | 148 | 149 | 150 | 151 | 152 | 153 | 154 | 155 | 156 | 157 | 158 | 159 | 160 | 161 | 162 | 163 | 164 | 165 | 166 | 167 | 168 | 169 | 170 | 171 | 172 | 173 | 174 | 175 | 176 | 177 | 178 | 179 | 180 | 181 | 182 | 183 | 184 | 185 | 186 | 187 | 188 | 189 | 190 | 191 | 192 | 193 | 194 | 195 | 196 | 197 | 198 | 199 | 200 | 201 | 202 | 203 | 204 | 205 | 206 | 207 | 208 | 209 | 210 | 211 | 212 | 213 | 214 | 215 | 216 | 217 | 218 | 219 | 220 | 221 | 222 | 223 | 224 | 225 | 226 | 227 | 228 | 229 | 230 | 231 | 232 | 233 | 234 | 235 | 236 | 237 | 238 | 239 | 240 | 241 | 242 | 243 | 244 | 245 | 246 | 247 | 248 | 249 | 250 | 251 | 252 | 253 | 254 | 255 | 256 | 257 | 258 | 259 | 260 | 261 | 262 | 263 | 264 | 265 | 266 | 267 | 268 | 269 | 270 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Southwest Keathley Canyon

- 64 Blocks Kirchhoff PrSDM Full Volume
- 126 Blocks Wave Equation PrSDM Full Volume

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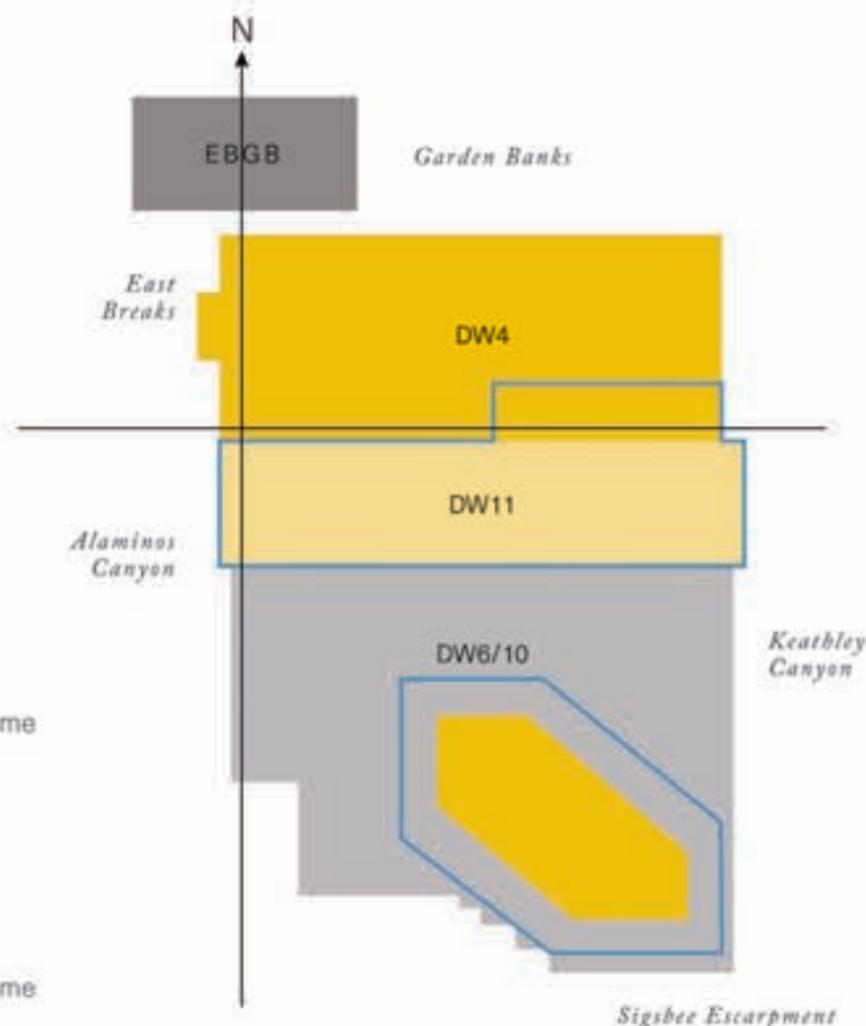
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Climate Change Solutions Panel Formed

EC Reviewing Climate Statement

By LARRY NATION

AAPG Communications Director

As noted in the May EXPLORER, the proposed climate change position statement has been available through May 30 on the AAPG Web site for member perusal and comment.

As of May 15, more than 50 comments had been recorded. An e-mail also notified the membership of the discussion.

The Executive Committee, in consultation with DPA and DEG leadership, will take the Web site comments into consideration in approval of a final policy statement, according to AAPG President Lee T. Billingsley.

"This position statement is one component of AAPG's effort on the topic of global climate change," Billingsley said.

A special ad hoc committee that crafted the proposed statement (which was approved by the EC following review by the DPA and DEG) also recommended a continual process for supplying members with information on global climate change. They recommended "Frequently Asked Questions" as a format for documenting facts on all sides of an issue.

The committee has proposed an initial group of eight questions (see accompanying box).

The EC has approved the Global Climate Change Solutions Committee (see committee charge, bottom box). The chair and members will be named

FAQ Discussion Points

- ✓ Are temperatures during the last two decades warmer than any other time in the last two millennia?
- ✓ What mechanisms are proposed to explain the temperature variations recorded over the last century?
- ✓ Is the recorded increase in greenhouse gases clearly attributable to fossil fuel consumption?
- ✓ Are increases in greenhouse gases the only plausible mechanism to explain this warming? Can any other forcing factor (such as solar variability) explain the increase in surface temperatures?
- ✓ How do climatic variations recorded in geologic history compare to the current observed and projected climate changes?
- ✓ What global change lessons do we gain from Earth history?
- ✓ How reliable are climate model predictions for the next century?
- ✓ How can we better assess the potential impact of climate change variability? □

Global Climate Change Solutions Committee

The committee's charges are:

- ✓ Communicate timely information on both global climate research and potential solutions to members and the public. The communication forms ideally will be the AAPG Web site, DEG *Environmental Geosciences Journal* and possibly the EXPLORER.
- ✓ Provide technical content in the forms of technical programs at meetings; special publications; and DEG *Environmental Geosciences Journal* articles.
- ✓ Promote and facilitate various fields of geologic study that relate to global climate change and potential solutions.
- ✓ Recommend updates to the Executive Committee for AAPG's position paper.
- ✓ Monitor an ongoing AAPG Web forum on global climate change and potential solutions.
- ✓ Determine topics for FAQs and write the discussion with references. □

later. "That committee will manage an ongoing Web forum that contains both information and discussion" in accordance with the recommendation.

"As president of AAPG I receive a steady flow of questions, suggestions, opinions and demands, but no topic generates such a polar diverse set of correspondence as global climate change," Billingsley said.

"As president this year, I felt that I had a responsibility to best represent all members on this topic," he continued. "Alternatively, some would suggest that true 'leadership' would take a stand and lead the organization in one direction or another. Others want leadership to review survey data and try to serve the majority view."

Billingsley summarized the two polar views on global climate change as:

✓ CO₂ emissions from human activity have very minor influence on global climate.

✓ CO₂ emissions from human activity are responsible for a large percentage of global warming in the last 100 years.

"At this stage of scientific knowledge, neither of these positions would best serve AAPG and its members," Billingsley said. "Instead, AAPG needs to be involved in global climate change solutions. AAPG needs to be part of those solutions."

The Climate Change Statement and populating the proposed committee will be considered at the June 30 EC meeting

□

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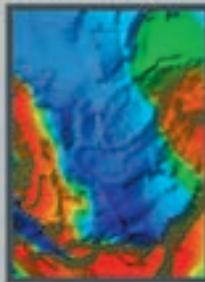
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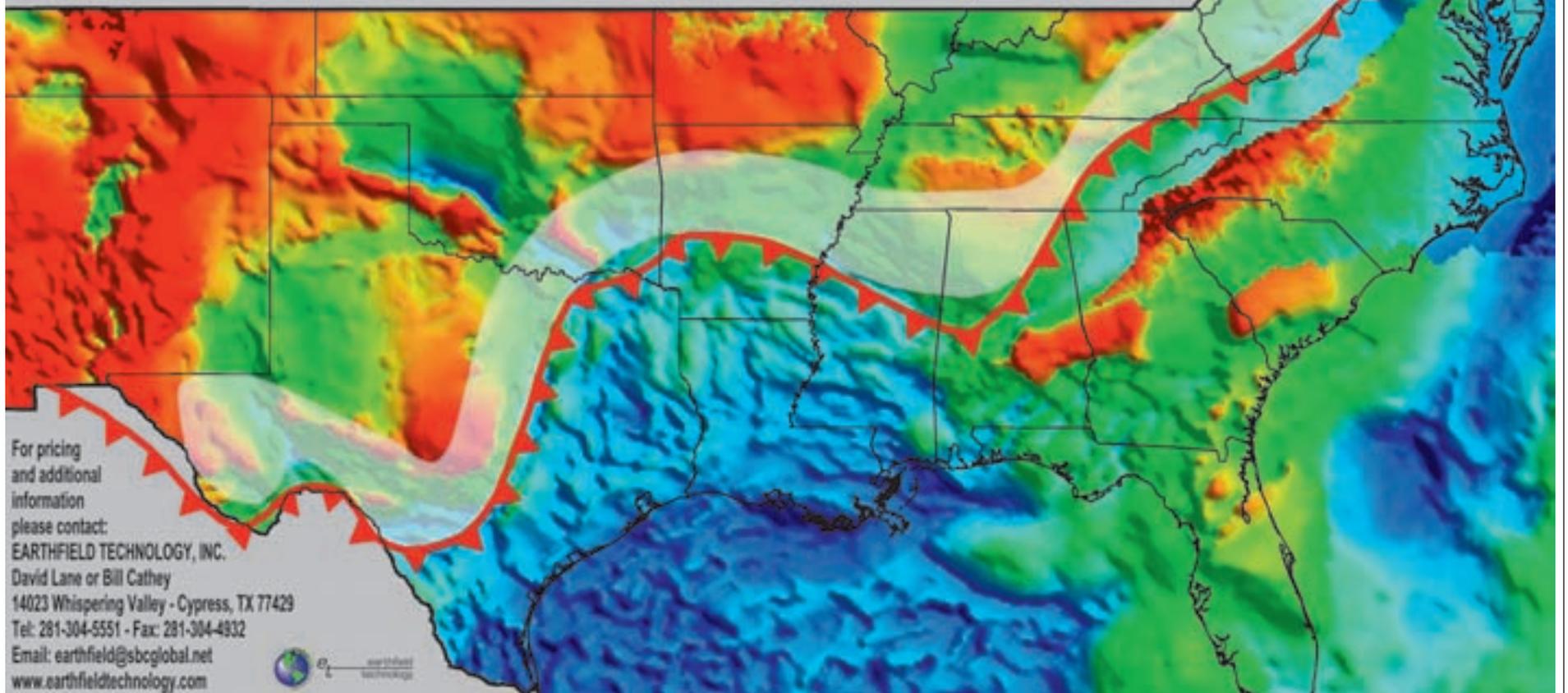
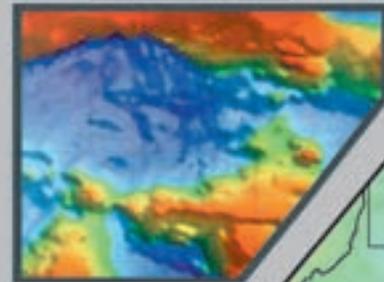
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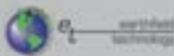
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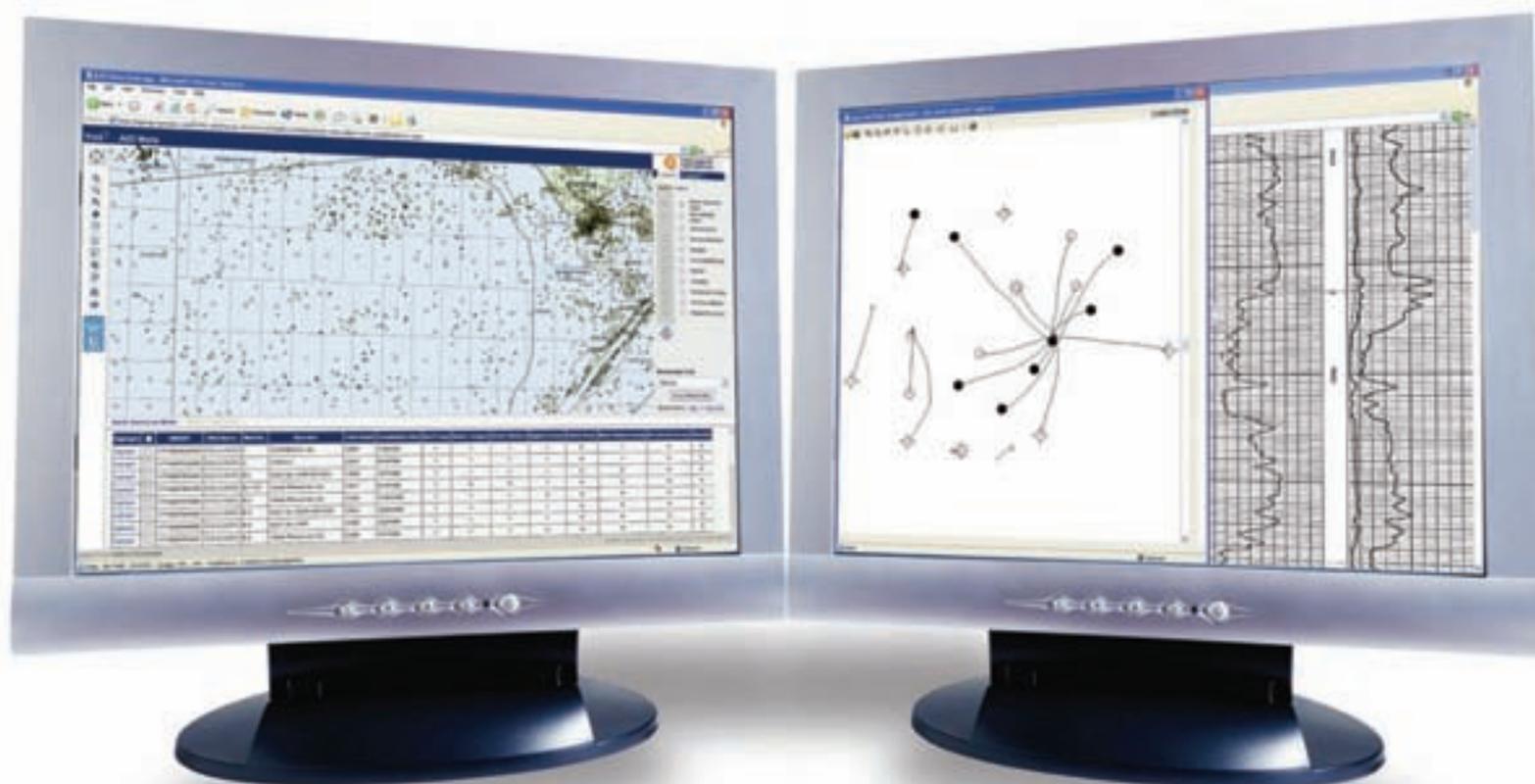


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Enjoying the 'Sweet Spot' It's a Good Cycle To be Riding

By LOUISE S. DURHAM
EXPLORER Correspondent

If you want a quick read of the current state of the geophysical industry, take a look at the goings-on at Houston-headquartered OYO Geospace, which manufactures instruments and equipment for use in the seismic business.

"Our backlog is three weeks," said board chairman, president and CEO Gary Owens, "and we're 24/7, working three shifts. I see no signs of a downside now."

That doesn't mean he's become complacent in this cyclical business, where the good times can trigger near-euphoria and the bad times can knock you down flat onto the floor.

"I hear guys say we've been through a paradigm change, and we'll never go through a cycle again," Owens said, "but this is a cyclical business - I've been doing this for 37 years, and I've heard \$100 barrels for 20 years or something."

Still, the current demand for seismic services is so hot that Schlumberger's WesternGeco seismic division reportedly has a backlog of \$1.1 billion.

It's essential to keep in mind, however, that the geophysical business is, in fact, a subset of the oil and gas industry and therefore vulnerable to most any hiccup - large or small - in commodity price, hydrocarbon demand, supply, etc.



Enjoying the 'Sweet Spot'

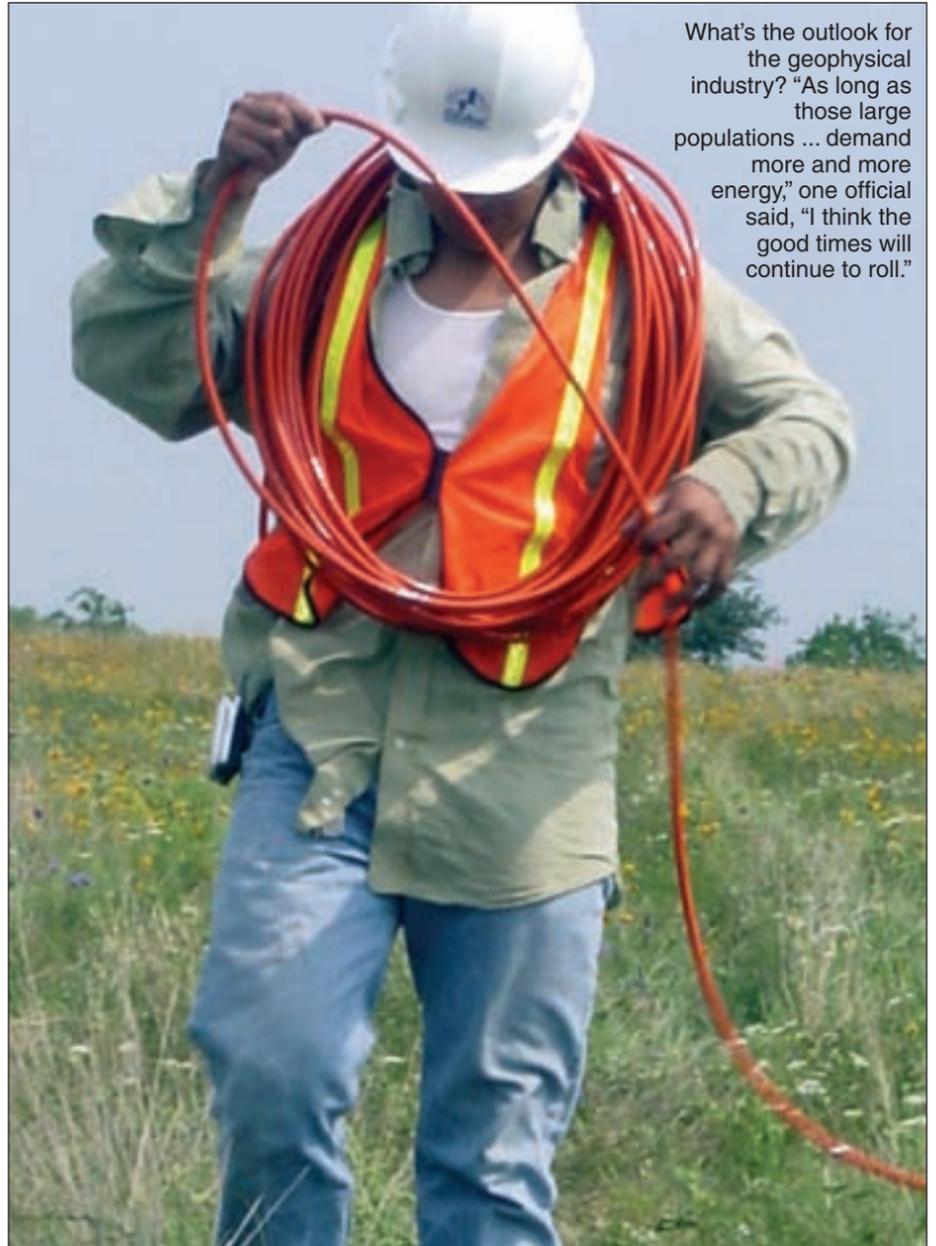
So, you ask, just how much longer will the good times last?

"I have no better crystal ball on that one than anyone else," said Bob Peebler, president and CEO at I/O. "I think what is unique about this time is it's clearly demand driven."

"If you go back to the last boom we had, it was more or less supply-driven rather than demand," Peebler noted.

"This quickly brings you to the economic question of Asia and other

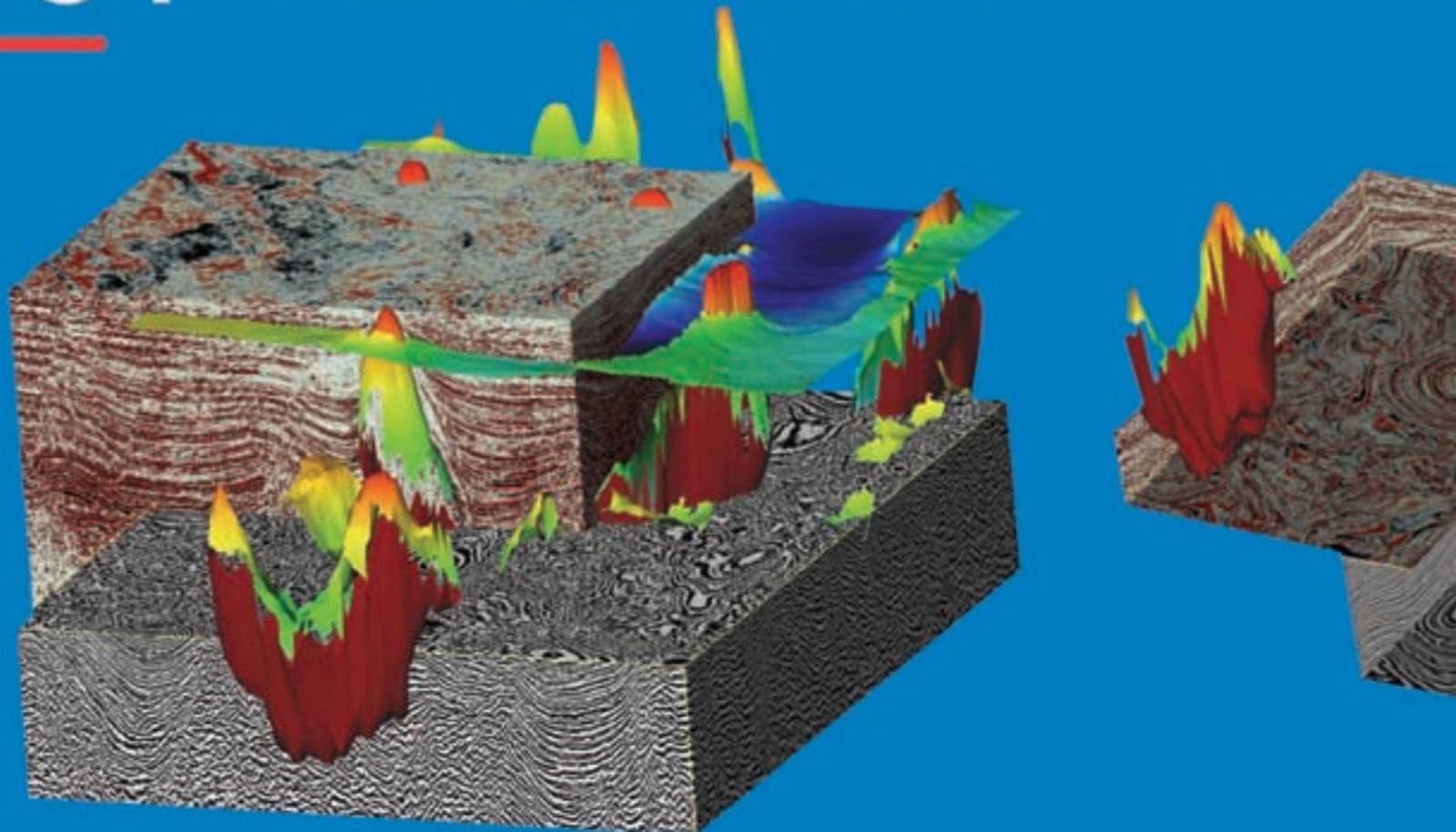
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What's the outlook for the geophysical industry? "As long as those large populations ... demand more and more energy," one official said, "I think the good times will continue to roll."

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developing countries," he continued. "Every time I go to that part of the world, I can imagine them trimming their sails a bit over time – but I think they've gone beyond a tipping point and likely will continue, and their people will want more."

Richard Degner, president at Global Geophysical Services concurs.

"In the Asia Pacific region, some of the countries with a large population have a low per capita energy consumption yet a tremendous acceleration year after year in recent times of increasing appetite for energy," Degner said. "So as long as those large populations of underdeveloped countries continue to demand more and more energy, and the overall demand curve in the world continues to increase, and the oil and gas industry from the supply side continues to struggle to keep up, I think the good times will continue to roll."

"I like the place geophysics is in now," Degner noted. "Its role in helping the E&P companies extract hydrocarbons from the earth is likely to become even more prominent as the supply gets tighter."

"As we shift more toward exploitation of existing reservoirs rather than a lot of large exploration objectives, this is the sweet spot for geophysics," Degner said. "Going forward, it's likely to be more important within the E&P technology value chain in a relative sense – relative to overall expenditure."

Stepping Past Challenges

To keep up with demand and to offset production decline – which Peebler emphasized is substantial – the oil companies are venturing into increasingly



Photos courtesy of Global Geophysical

Keeping busy: Marine seismic operations continue to provide plenty of work for geophysical crews – and plenty of data for geologists.

complex areas presenting non-traditional challenges, both in an exploration sense and in how better to develop and produce.

"This brings you into geophysics being used more in the engineering and production side of the business," Peebler said. "It's our thinking that demand is creating a whole other generation of geophysical applications."

"It's not a whole lot different than when we went from 2-D to 3-D," he noted. "The need and advantage for 3-D drove the formation of new companies and new technologies, and that's been a very long cycle – it hit the wall a bit in '97, but that

was after 10 years of growth."

When addressing the applications and challenges to come, Peebler separates the marine side of the business from land, noting they have different drivers even though sharing a common theme: the demand for oil and gas.

Regarding marine, the most visible phenomenon today is the dramatic increase in towed streamer.

Indeed, the towed streamer market has morphed from near death only three or so years ago to a near frenzied level of activity today.

"You see a lot of new capacity," Peebler said, "and I think what's on

everyone's mind is, are we going to overbuild again. We're pretty confident that what we see going on – our guess – is through '08, '09 the activity, demand, capacity are out there. Beyond that, we're not sure how many additional crews will be coming on and what their assumptions are.

"It seems like everyday someone else new is coming into the market," Peebler added "and the existing acquisition companies are increasing capacity. It's a bit of a gold rush now for people getting into that market."

"We wonder ourselves if there's a need to be gearing up – will it be longer than a two- to three-year bubble, or will it fall dramatically?"

Next: 3-D on Steroids?

In addition to new capacity coming on, the challenge of what the oil companies are trying to solve is driving another level of capability in marine towed streamer.

For instance, there's increasing demand for wide azimuth surveys, particularly for subsalt imaging.

"These are bigger, more complex surveys, which steps it up a notch in the kind of equipment and capabilities you need," Peebler said. "As people are trying to image deeper and trying to image more complex reservoirs, we'll see a bit of re-tooling of existing fleets to accommodate those more complicated surveys."

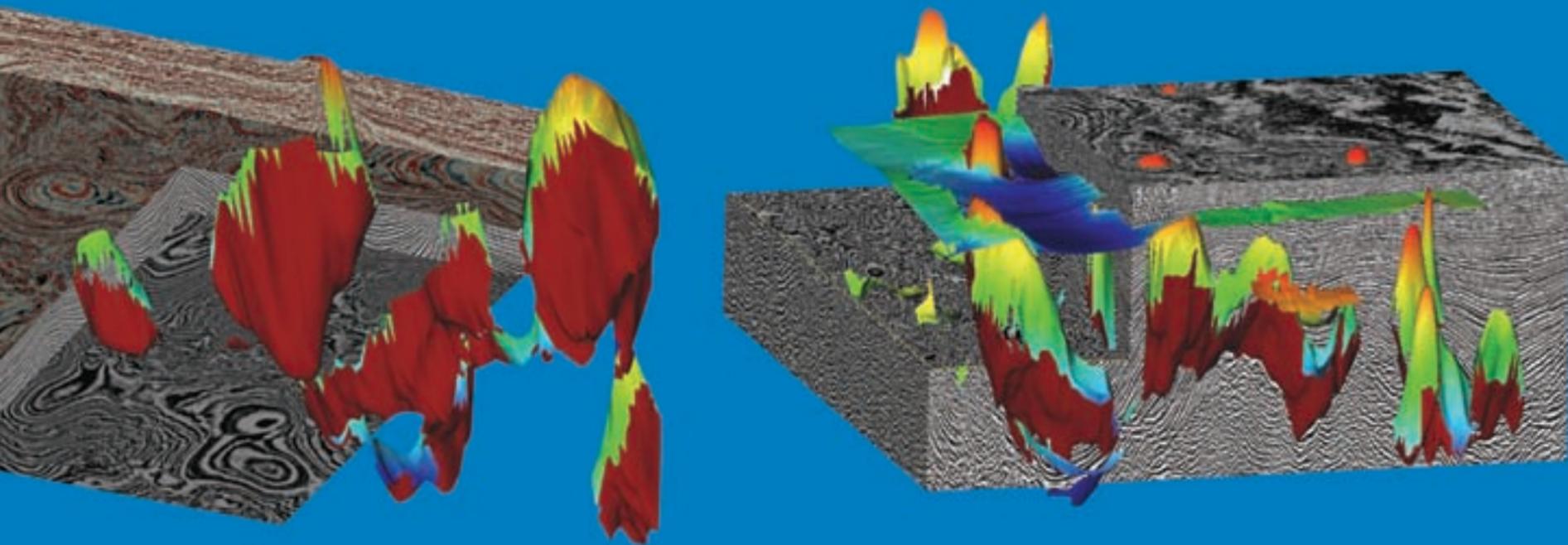
Should a shakeout be in the cards somewhere down the line, Peebler predicts the commodity-type players would be the ones to fall by the wayside.

"The guys who have captured more of the technical leadership will still be in pretty good shape," he said. "But who knows how it will all sort out?"

See **Looking Ahead**, next page

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The most visible phenomenon today is the dramatic increase in towed streamer.

Looking Ahead from previous page

"It looks good for the next couple of years," he added. "Beyond that for towed streamer, we're not sure."

Look for a growing, more technically complex ocean bottom market, particularly in complicated areas where it's more difficult to implement surveys with towed streamers.

"You can probably do these more efficiently and effectively with ocean bottom," Peebler noted. "We think putting new generation digital sensors on the seabed will get better measurements than streamers, and we think that niche will grow and probably cannibalize some of the towed streamer business."

It's generally acknowledged that land has been treated a bit like a commodity

by the oil companies for the last few years. Using 3-D has become routine, but there's been no concerted effort to take the technology to another level like in marine, according to Peebler.

"There's a lot of opportunities, and a good part of the world's reserves are on land," he said. "Yet most 3-D on land has not been designed for deeper reservoirs and more complicated formations like fractures, low porosity sandstones."

Over the next few years, it's likely there will be a re-tooling of the whole land technology base that's driven by the need for higher density shooting, longer offsets, even using multi-component or full wave.

"When you put it all together, it's really another technology cycle," Peebler said. "I'm pretty confident we're looking at least at a five-10-year cycle on land – and we're closer to the beginning of it than the end."

"I think we're going from 3-D to 3-D on steroids – recording more information, more content at each sensor point and also putting more out onto the ground," Peebler noted. "More interesting survey designs to solve these very specific problems will take a lot more technical capability – and that drives in new processing, new interpretation and all those things."

Getting Off the Cycle

As the challenges increase for the oil companies, particularly on the production side, 4-D seismic activity likely will increase. Even though some fairly large marine 4-D surveys have been implemented, Peebler noted it's still early in this game, and he emphasized that 4-D has really only just begun on the land side.

When all's said and done, however, it all comes back to what the perception is regarding demand.

All bets are off if the industry wakes up one day and Asia has imploded economically or a serious worldwide recession looms on the horizon, Peebler said. He emphasized, however, his instinct kicks in to say this isn't in the cards in the time frame being discussed.

Nevertheless, preparing for the proverbial rainy day is a good thing, according to Owens.

"What we're trying to do here is build around our core competencies," he said, "but try to smooth some of our revenue stream out. When it goes bad for the industry, we want to have some way to make some money, and one of those is to try to take the seismic method and go to the production side."

"In exploration, when the cash flow goes away, you go away," Owens said. "We're trying to find something more stable, and from an instrument manufacturer's standpoint, permanent installation of equipment is attractive."

"When you have a boat you do part of a survey, turn around and do another part and so on," Owens noted. "But when you're doing it with an entrenched (cable) system, it has to be a large system so you cover the whole field and shoot it once – this is one of a number of ways we're trying to soften the cyclic nature of the business."

In this volatile industry caution has become a part of most everyone's vocabulary.

"We have to be cautious that all prices associated with exploring, finding and producing hydrocarbons remain in balance relative to commodity price and that supply remains in balance relative to world demand," Degner said.

"But I don't see anything being tremendously askew right now." □

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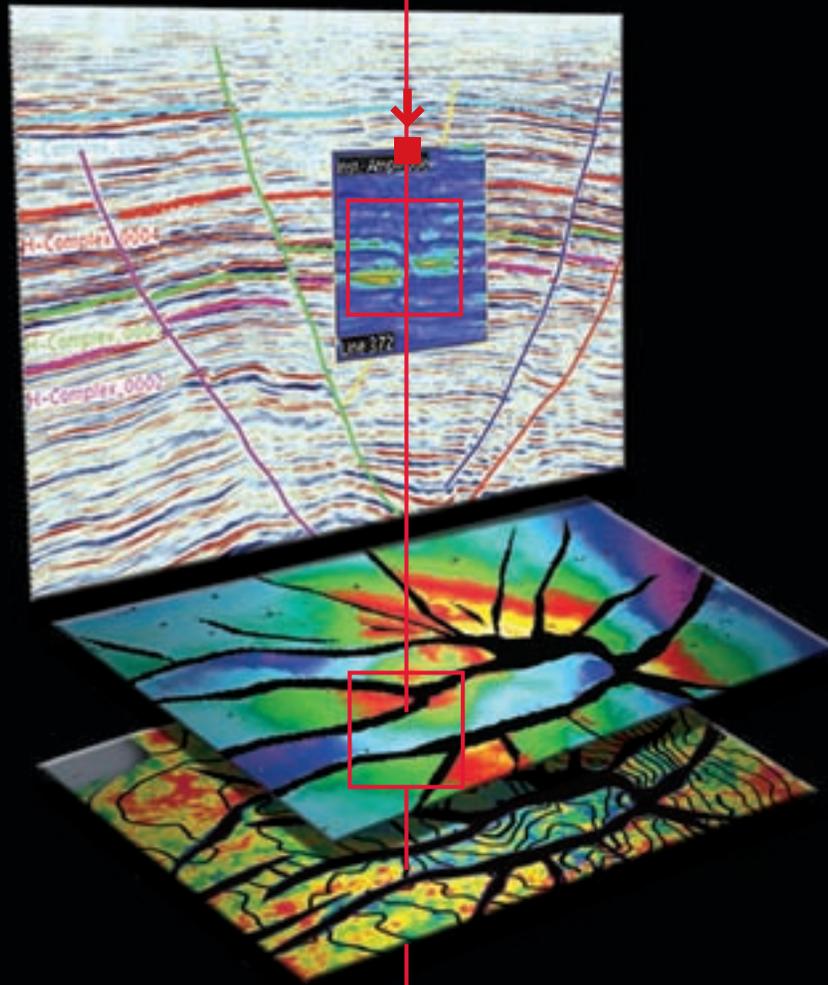
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Seeking the Universal Hydrocarbon Indicator

Low Frequency, But High Hopes

By LOUISE S. DURHAM
EXPLORER Correspondent

Imagine your comfort level when drilling a well if you knew with absolute certainty there were hydrocarbons in the target reservoir.

This is not a pipe dream.

In fact, it's the goal of some innovative technology that evolved out of research at the University of Zurich.

Early on in their research efforts, the Zurich-based scientists recognized a relationship between low frequency spectral anomalies in seismic background wavefields and the geological characteristics of a group of reservoirs, principally in the Middle East.

The research concentrated for the most part on some enigmatic amplitude peaks gathered around 3 Hz in surface seismic data measured above hydrocarbon-bearing reservoirs – indicating a possible universal hydrocarbon indicator (DHI).

There were skeptics aplenty – namely the geophysicists who traditionally have thumbed their collective noses at low frequency data below 10 Hz, where conventional geophones are less effective.

Today, however, there's evidence these folks have had a major attitude adjustment.

Indeed, these long-ignored data have gained respect for their potential to yield information that, when properly analyzed, could significantly reduce the number of dry holes drilled in the industry.

In fact, a low frequency DHI technology was developed some years back in Russia where it has been applied commercially.

Passive seismic techniques using low frequency ambient waves, which are ubiquitous in the earth's crust, were a major topic at the 2006 EAGE workshop on passive seismic methods and applications held in Dubai. A throng of 120 professional participants representing most all major E&P firms and contractors validated the intense industry interest in this technology.

Increasing Success Rates

It is noteworthy that this evolving low frequency spectral analysis technology is a passive seismic technique as opposed to another relatively new DHI technology, multi-transient electromagnetic, which is an active electro-magnetic application, the same as the now-familiar controlled source electromagnetic (CSEM) technique used offshore.

Back in 2003, when there was nary a hint of the soon-to-come dramatic upswing in commodity prices and drilling activity, a group of entrepreneurial R&D folks decided the time was right to seize the moment and band together to specialize in DHI.

The resulting Zurich-based company – Spectraseis – quickly began acquiring low frequency seismic data and developing industrial applications as its research progressed.

"We felt that the industry had underinvested in R&D and was overlooking technologies that could have a major positive impact on its performance," said Spectraseis CEO Ross Newman. "Our goal was to bring a strong body of research to the market, and it's been really exciting to see our work being taken up so quickly by producers."

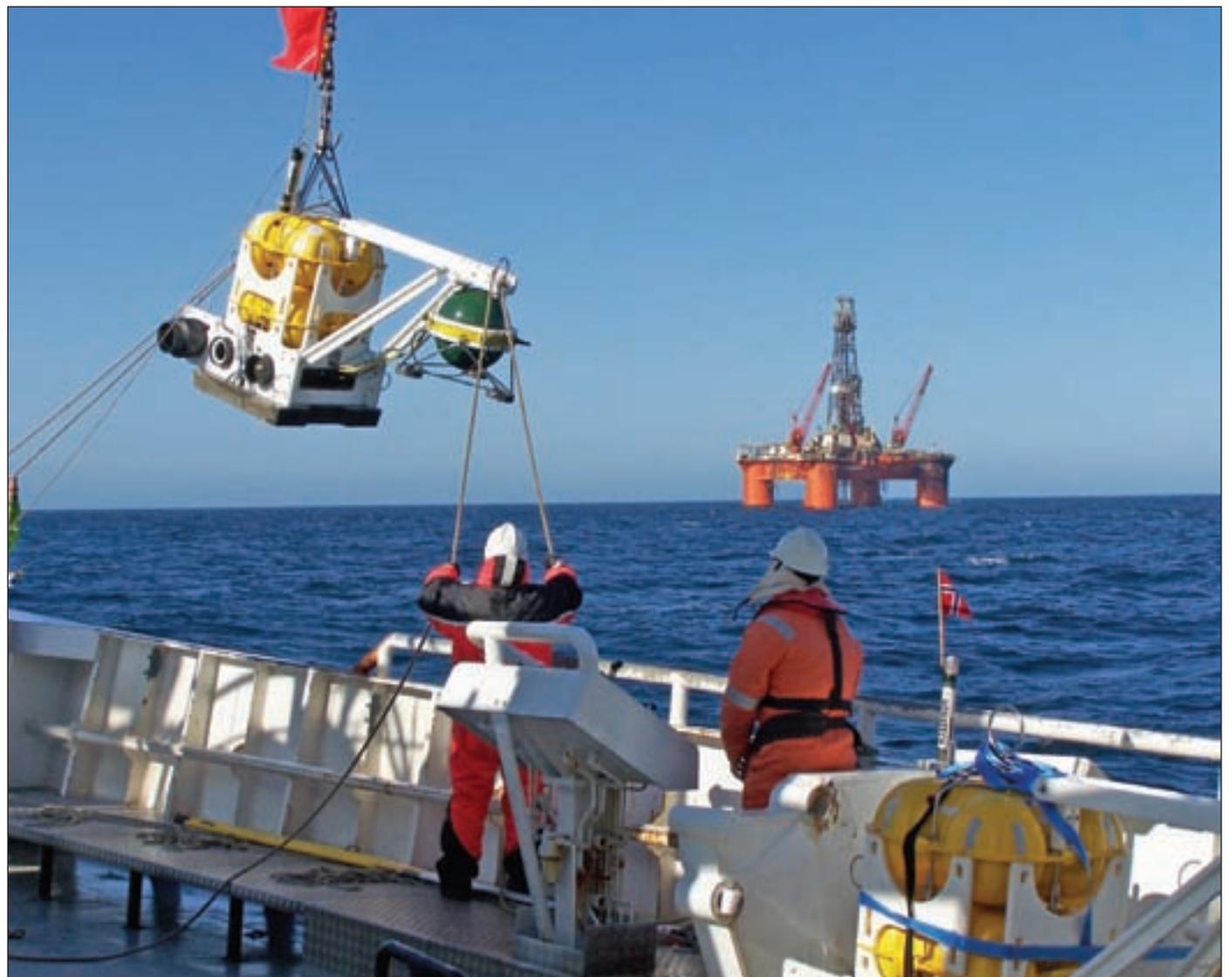
Simply put, the company's work is based on the observation that low frequency waves in the 1- to 10- Hz range are shaped into coherent patterns above hydrocarbon-bearing reservoirs.

"The seismic background spectrum is modified differently through interactions with



Photos courtesy of Spectraseis

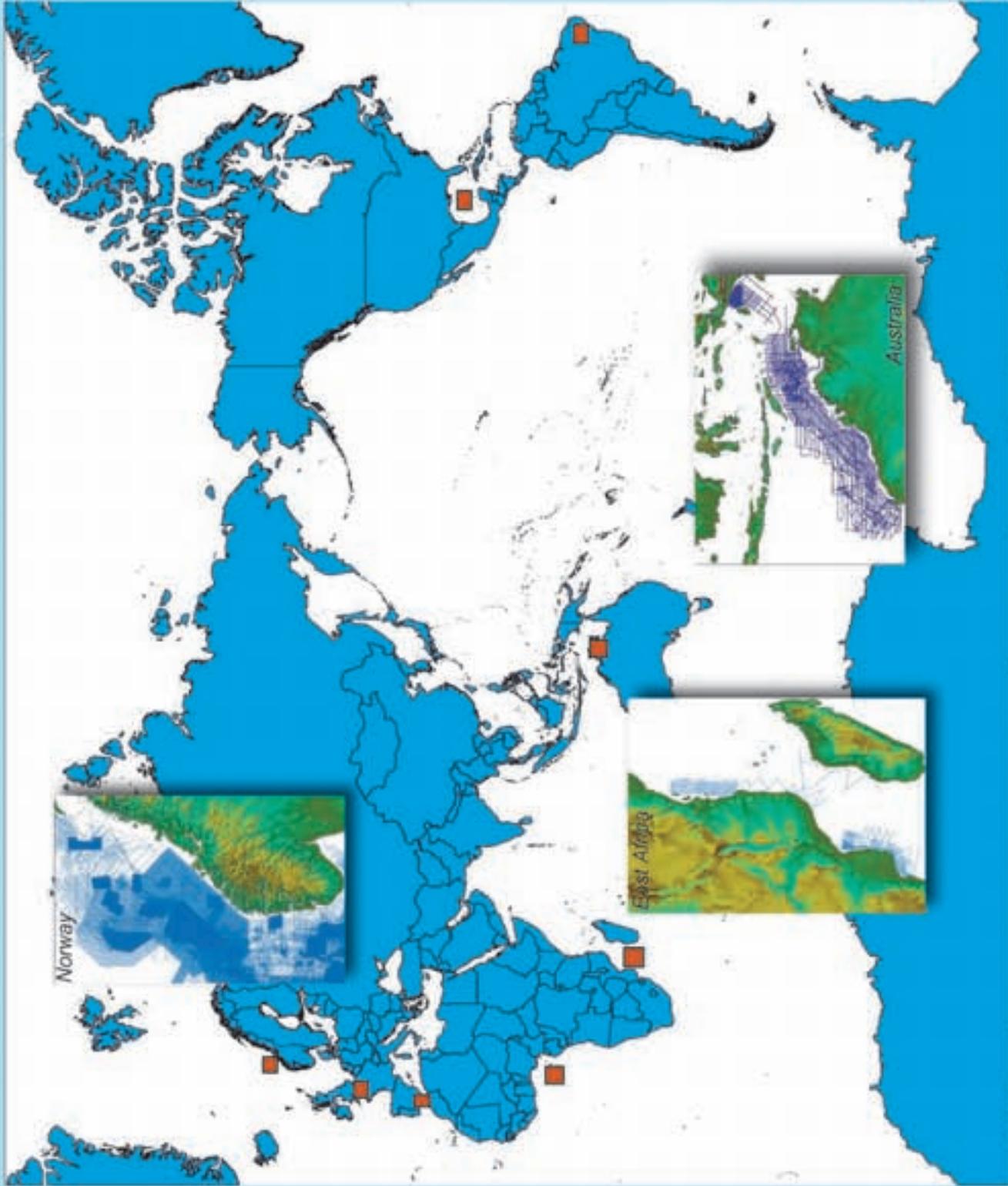
A geophysical crew camp in Libya. The small crew size and minimal environmental footprint make for easy logistics and site access.



Success story: A recoverable OBS node being deployed during a survey of a proven non-producing oil field in the North Sea using high-sensitivity ocean bottom seismometers. The green pressure sphere contains the receiver. Related story, page 18.

See **Passive**, page 16

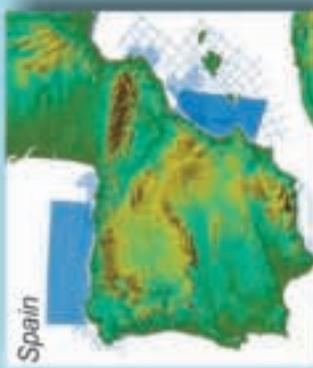
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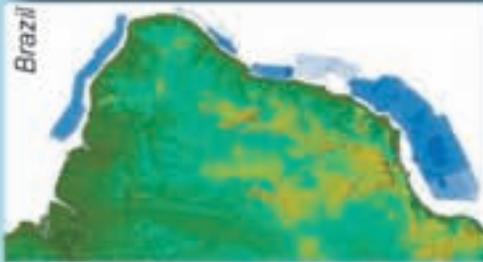


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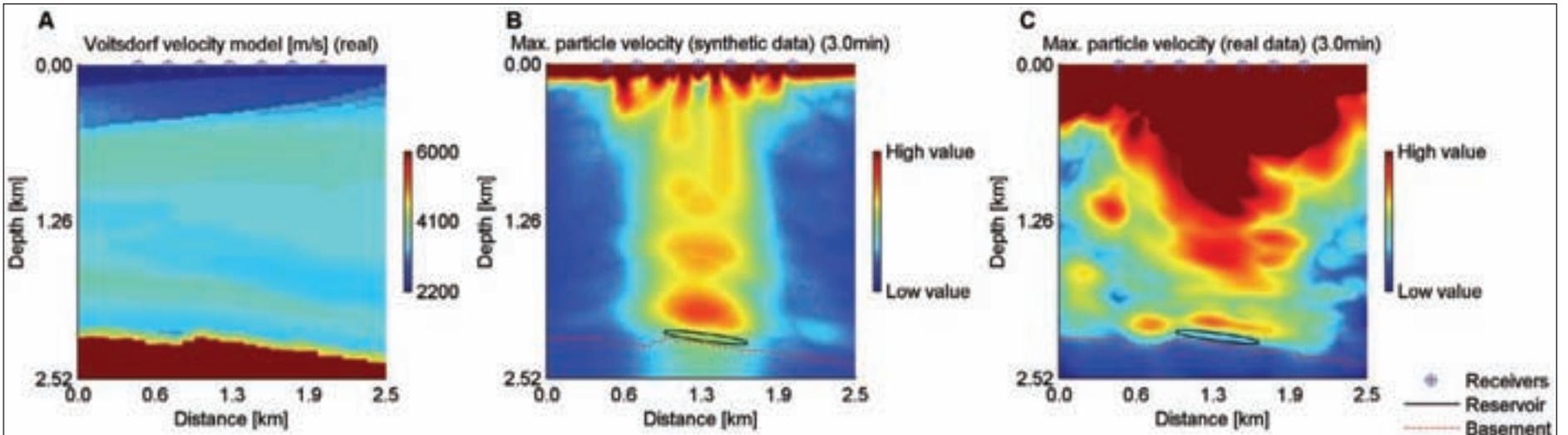
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A: The velocity model for this field in Austria consists of a low velocity top layer, a thick intermediate velocity layer with low velocity contrast relative to the top layer and a crystalline basement of high velocity. B: The reverse simulation of synthetic signals with source at the approximate location of the reservoir shows that the source location can be identified very well in this complex media. C: Time reverse modeling with real survey data shows a pattern similar to the synthetic example.

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Passive

from page 14

subsurface reservoirs having hydrocarbon-filled pores as opposed to water-saturated formations," Newman said. "Hydrocarbon reservoirs create characteristic patterns in the frequency spectra of surface signal, which can be analyzed to obtain information about the subsurface structures."

Armed with such a tool to identify and map specific spectral signatures directly related to hydrocarbon accumulations, oil and gas finders would have the potential to dramatically increase their exploration success rates.

'Empirical Evidence'

One of the challenges facing the technology providers is the lack of a full-fledged physical model for the spectral anomalies, according to Andy Jupe, an independent consultant specializing in the development and application of microseismic and passive seismic technology in the oil industry.

"Spectraseis and their partners at the University of Zurich and ETH Zurich have been really getting into the physics," Jupe said. "Some of the hypotheses they've been considering seem to offer a plausible, albeit not yet proven, explanation."

"Despite this uncertainty over the physics, you can't dismiss the fact that there is a considerable body of empirical evidence supporting the technique," Jupe said. "This includes at least 20 case studies within the public domain, including comprehensive trials and blind tests conducted by ADCO, KOC, Petrobras and the Shell affiliates RAG. The results of these trials all seem to confirm the viability of the technique as a DHI."

DHI technology using low frequency passive seismic data is targeted for exploration, field appraisal and production. Geologic features that are difficult to discern with 2-D or 3-D, e.g., stratigraphic traps, make good targets for low frequency passive seismic evaluation, Newman noted.

Except for early exploration efforts where large-scale screening is important, DHI technology is ordinarily used as a supplement to other technologies.

For example, a large area can be screened to detect points of specific interest where 3-D surveys might be justified versus surveying the entire area – an always-expensive undertaking.

Seeking Specific Signatures

In order to identify and map the spectral signatures associated with

See **3-D Results**, page 20

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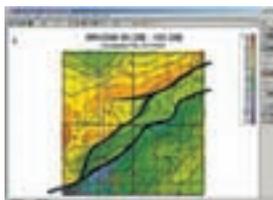
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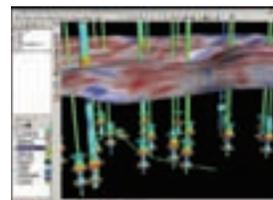
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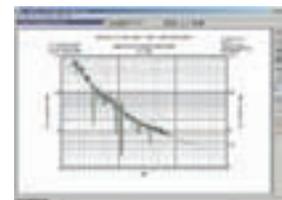
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Photos courtesy of Spectraseis

Action in the North Sea: For the first time, an offshore trial is under way to determine the applicability of direct hydrocarbon indicator technology.

DHI Getting Offshore Test

By LOUISE S. DURHAM
EXPLORER Correspondent

Low frequency passive seismic technology studies in oil and gas fields worldwide have successfully identified characteristic spectral anomalies that correlate to the location and geometry of hydrocarbon reservoirs.

For the first time, however, an offshore trial is under way to determine the applicability of this direct hydrocarbon indicator (DHI) technology as a means to directly confirm prospects – prior to drilling – in the marine environment.

The program is a collaborative effort between Norsk Hydro, Scripps Oceanography and Spectraseis, which developed the low frequency spectral analysis DHI technique being implemented

The locale is the non-producing Astero field in 350 meters water depth on the Norwegian shelf sector of the North Sea. Hydro drilled both a discovery and an appraisal well at Astero, which is north of the giant Troll oil field.

“We’re transforming the technology from onshore to offshore the first time,” said Peter Hanssen, principle geophysicist at Norsk Hydro oil and energy research centre in Bergen. “It’s the first worldwide test offshore.”

The environment precludes placing sensors by hand, which is the MO for this technology onshore. Instead, Scripps is supplying ocean bottom sensors (OBS), which will drop to the seabed to record the low frequency data – the natural noise of the earth induces the signal that the OBS will pick up from the reservoir.

“For the future, if the test is positive, it will change how we look for oil worldwide in any area,” Hanssen said. “It will have immense implications.”

“It’s a dedicated exploration tool,” Hanssen added. “Once we’ve established it works, we’ll want to go where we haven’t drilled before and have prospects we want to analyze. You can check your prospect and focus your expensive 3-D active seismic survey on a specific promising area instead of doing the whole block.”

The two-week-long data acquisition phase of the North Sea program was scheduled to wrap at press time, with processing of the data to follow.

Final results are expected by September, according to Spectraseis CEO Ross Newman. □

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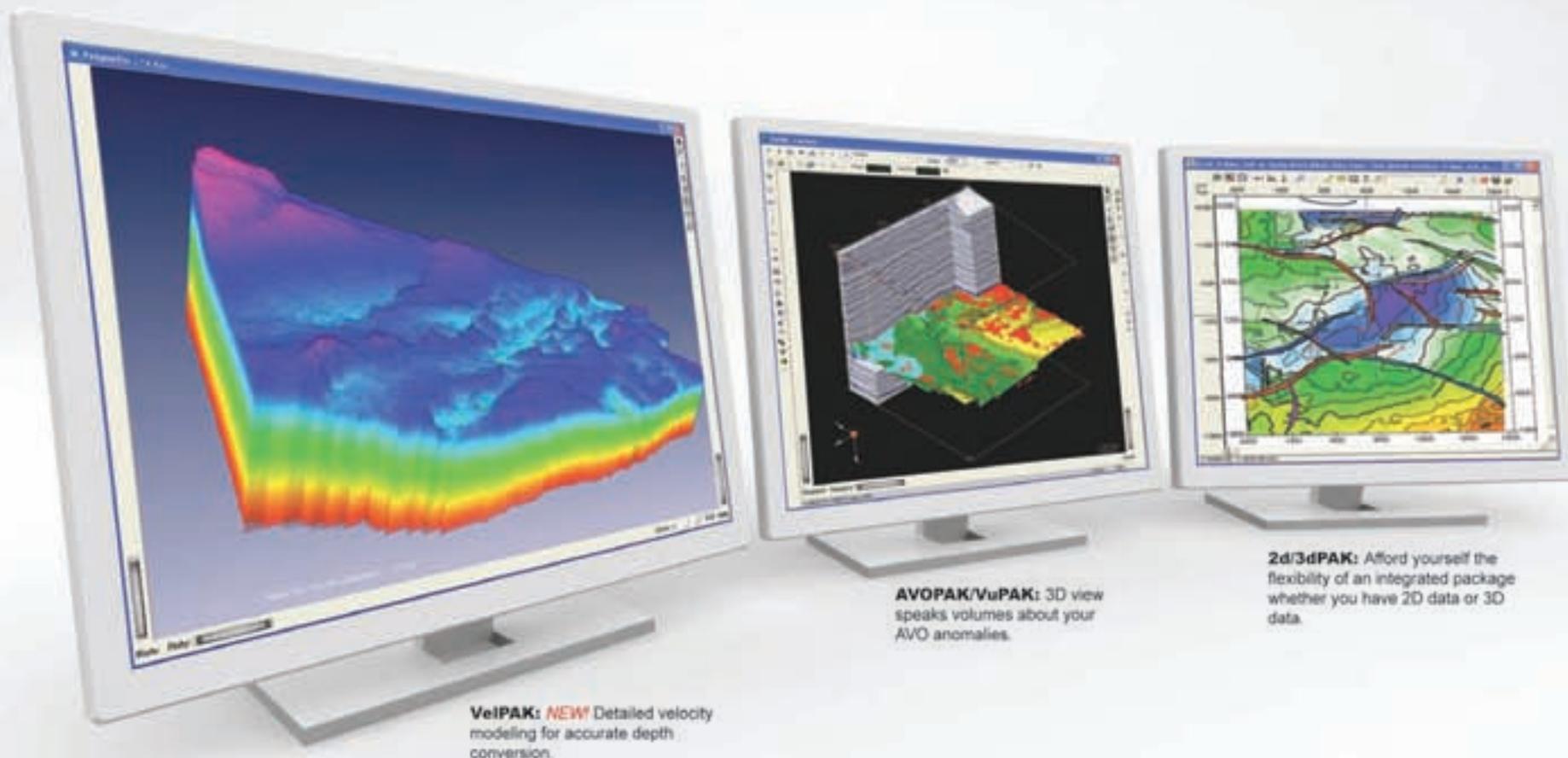
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Do not disturb (the surroundings): A technician tests broadband receiver stations, demonstrating passive seismic operations, in the Swiss Alps.

3-D Results

from page 16

suspected hydrocarbon-containing reservoirs, Spectraseis utilizes its proprietary HyMAS (Hydrocarbon Micro-tremor Analysis) technology to acquire, process and interpret low frequency data.

"Hydrocarbon microtremors represent a frequency-dependent hydrocarbon signature present in the passive wavefield," said Rob Habiger, chief technical officer at Spectraseis. "We use our technology to analyze the changes that occur in this wavefield when the low frequency waves propagate through hydrocarbon-bearing reservoirs.

"We look for specific spectral signatures characteristic of the interaction between the reservoir and its fluid," Habiger added, "providing the critical information – whether the structure of interest contains hydrocarbons."

To acquire the complex low frequency data, survey teams use portable 3C broadband seismometers, moving among a series of designated points covering a grid layout with node spacing of 250 meters to 2,000 meters, depending on the survey goals. Multiple teams can be deployed simultaneously.

All signals unrelated to the target reservoir are removed or attenuated using the company's processing software suite. The low frequency data then can be interactively overlaid with G&G information, such as contour, fault and other attribute maps.

Success Stories

A number of field programs have been implemented since Spectraseis' successful inaugural commercial survey in 2004 at a Petrobras-operated field in the onshore Potiguar Basin in Brazil.

These include three experimental surveys in collaboration with Shell-affiliate RAG in Austria, which accurately predicted the company's first successful oil well in ten years, according to Newman.

Shell, in fact, has developed its own in-house approach to low frequency spectral analysis technology.

The company has participated via SRAK (a joint venture of Shell, Saudi Aramco and Total in Saudi Arabia's vast Rub al-Khali desert), where a variety of acquisition applications have been used in the search for gas and associated liquids.

These applications include magnetotellurics and seismic spectroscopy, which reportedly taps the same principle as low frequency seismic albeit employing a slightly different methodology.

The various scanning tools used at Rub al-Khali aimed to provide a look at the

subsurface in a quick, cost-effective manner. A paper presented at the AAPG-sponsored GEO 2006 in Bahrain indicated positive results from the low frequency passive seismic spectroscopy data, which reportedly are currently being re-evaluated.

Results will soon be in for a recent extensive pilot survey Spectraseis implemented over a Pemex-operated gas field in the Burgos Basin in Mexico.

More than 500 measurements of the omni-present wavefield at the surface were acquired over an area encompassing about 200 square kilometers, Newman said.

Following processing, the team of scientists was able to extract a hydrocarbon potential map from spectral anomalies and compare this map with available reservoir information. Newman noted they observed a high correlation of the hydrocarbon microtremor signal with the known location of a producing gas reservoir.

"The operations showed environmental and access benefits, which are important for us in Mexico," noted Efrain Mendez, coordinator for monitoring and technology development for exploration activities at Pemex E&P. "Landowners were more willing to grant us access for the survey, and it was completed in about a third of the time we would have needed for conventional seismic.

"The next step for us will be integration of the results with 3-D seismic from the region and comparison with drilling results" Mendez added.

"If the results are good, we see potential applications in swamps, lakes and offshore Gulf of Mexico."

What's Next

Not content just to identify and map spectral signatures that can be directly correlated to hydrocarbon reservoirs, experts in the field are busy developing new techniques that provide more detailed subsurface information.

For example, Spectraseis has made advances in the realm of time reverse modeling to localize the source of the low frequency microtremors through its cooperative research program at ETH Zurich.

"The technique of time reverse analysis is a promising method to reliably localize the so-called hydrocarbon microtremors," Habiger noted. "We have shown the potential of such an approach via a numerical feasibility study.

"By using a realistic geologic section we have encouraging results that indicate it's possible to localize the origin of tremor signals," Habiger said. "In the near future we believe it will be possible to distinguish between two reservoirs that are stacked."

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Must Taste Like Chicken?

Cables Are Munchies for Critters

By DAVID BROWN
EXPLORER Correspondent

Ask any number of professionals in the oil and gas industry the following question:

"What is the biggest challenge facing on-land seismic acquisition today?"

And you are bound to get the same answer:

"Cows eating the seismic cable."

Wait.

Don't leave.

Cattle actually have been known to chew up any unburied or exposed cable left on the ground. It's a real and serious problem for the seismic acquisition sector.

Okay, a real problem.

Input/Output Inc., a Houston-based seismic company, estimates that up to 50 percent of seismic acquisition time is spent on cable troubleshooting and repair.

AAPG member Charles Wickstrom, managing partner of Spyglass Energy in Tulsa, said his company conducts seismic acquisition operations through Alliance Geophysical.

"We run approximately 500 channels of live lines, of cable on the ground, which means we have 1,500 geophones on the ground at any one time," Wickstrom said.

"When we're working in areas

where cattle are present, we have a tremendous problem with the cattle eating the cable and the geophones," he added.

Rodents have been a long-time problem for geophysical companies because they are widespread on land and tend to gnaw into any cable they encounter.

Several kinds of rodent-proofing for seismic cable have



been tried through the years.

"Depending on where you shoot in Texas and Louisiana, you have rats that are just unbelievable in how much damage they can cause," said Joe Broussard, regional manager for Dawson Geophysical Co. in Oklahoma City. Broussard said his

company also has encountered problems from cattle damaging or destroying cable and geophones.

He explained that a number of olfactory irritants, including heavy pine scent and hot red pepper mixtures, have been tried to discourage critters from chomping on the cable.

"There was even somebody who came up with a spray that has lion's urine in it, but nothing I have ever seen is really effective," he said.

continued on next page

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Deer and even wild pigs can chew through seismic cable put down in forested areas, Wickstrom said.

In the arctic, seismic crews have to protect cable from the arctic fox, which seems to have a special appetite for the lines.

During a seismic project on Canada's Banks Islands, the crew doused the cable with deisel fuel to discourage gnawing by caribou. Arctic foxes still caused up to five breaks per day.

The prospect of cattle eating through seismic cable brings up a number of technical questions.

For instance, what kind do they like?

Do they prefer the traditional Crunchy Coaxial?

Or is there a move to trendier tastes, like Mocha Fine Filament?

Do cattle see a string of seismic cable and think:

"Buffet!"?

(Don't) Give Me a Home ...

In the seismic business, the common and correct term for cable that connects the geophone sensors to the seismic recording truck is "cable."

It's also called geophone cable or geophone line.

A jughand, jug hustler or juggie is a person on a seismic crew who positions the geophones. (*You will need this information later.)

Wickstrom said Alliance Geophysical can have 20 miles of electrical cable spread over three square miles at one time.

"There might be 15-18 cables

"In our shooting in Osage County (Oklahoma), it became such a problem that we hired cowboys to work on our crew."

destroyed on any given day," he said. "We have several full-time employees who do nothing but repair cable."

The longer a cable has to stay on the ground in cattle country, the more likely it is to get chomped.

"With this wide-azimuth 3-D, you can have cable on the ground for 10 days to two weeks," Broussard noted.

He said seismic cable typically will stay on the ground for an average of seven days during a shoot.

Cattle have been a threat to seismic recorders left in place for a long period to measure earthquake waves, according to an Australian scientist.

"We have to be careful with cattle and sheep," he said. "Cattle will often destroy a recorder. Sheep you can normally keep at bay by surrounding the recorder with fallen timber."

(Sheep are easily tricked.)

Range Rovers

The attraction that cable and geophones hold for cattle can be explained in a number of ways.

First, people almost never use the word "smart" and the word "cattle" in the same sentence, except for this one:

"Cattle ain't too smart."

Also, cattle will get into anything within chewing reach, including (a

personal memory) a box of fencing nails.

"They eat everything," Wickstrom said. "They'll eat the wire off the trucks, if you let them get to it."

Insulation on the cable has been thought to attract gnawing animals.

Wickstrom said "they might be attracted to the sweat on the palms of the jughands." (*Told you.)

On the theory that salt from sweat attracted the animals, Alliance set out salt blocks in the seismic shoot area, trying to lure the cattle away from the cable, he said.

At other times, farmers have been asked to remove their cattle from the shoot area and pasture them elsewhere.

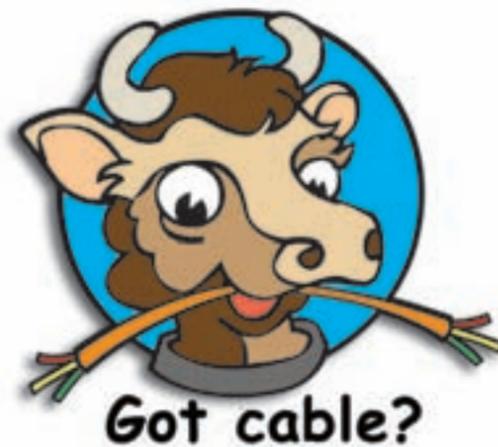
"We have actually made a plow that makes a trench, and you bury the cable and the geophones at the same time," Broussard said.

However, land owners aren't always willing to give permission to bury the cable, he said.

And cattle have proven remarkably persistent at chewing up the lines.

"In our shooting in Osage County (Oklahoma), it became such a problem that we hired cowboys to work on our crew," Wickstrom said.

These seismic cowboys move the herd away from the cables and pasture them down at night to protect



operations, he explained.

Despite the best efforts of the industry, cable loss because of livestock and other animals is a continuing problem.

Finding breaks and repairing or replacing cables can be a time-consuming process, delaying acquisition projects and adding significant expense.

"Some companies have even gone to charging the clients for lost cables," Wickstrom noted.

Until someone comes up with a better deterrent, seismic cable and geophones will be susceptible to damage by cattle, rats, mice, deer, pigs, foxes and other gnawing creatures.

In response to the growing concern, a survey of well-informed petroleum geologists came up with this question: What about goats?

"Fortunately, we haven't gotten any goats yet," Wickstrom said.

"Thank goodness." □





Photos courtesy of Global Geophysical

If it worked for them, perhaps it will work for us: Geophysical crews are learning to borrow technological ideas from other industries to help them better operate in unique environments. Above, innovations inspired by the timber industry helped in equipment conversions for crews working in Algeria.

Borrowed Ideas Adapted

Innovation Spurred by Necessities

By LOUISE S. DURHAM
EXPLORER Correspondent

Over the past few years there's been copious buzz about new gee-whiz gizmos in the geophysical industry – recording systems advances, new imaging techniques, etc., etc.

Yet it's the relatively mundane, "behind-the-scenes" gear that's essential to get a survey to the point where the more razzle-dazzle equipment and technology can be applied.

This aspect of the business harbors its own kind of cachet, which becomes obvious when you consider some of the innovative approaches being used to modify equipment from other industries for application in the seismic world.

"Rather than use the same cut-and-dried equipment that's been in the industry for the last 20 to 30 years we've gone out and tried to look for equipment in the construction, agriculture and timber industries that would better fit our needs on particular jobs."



Those are the words of Steve Hammond, worldwide manager for mechanical equipment at Global Geophysical.

"Also, the way the oil market goes up and down," Hammond said, "a lot of companies supplying equipment specific to our industry really struggled in the past decade – some had to downsize just to stay in business."

"As a result, the lead times for

See **Innovations**, page 28

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EOE.



From Mustang Island, with love: To overcome the logistical challenges of performing seismic operations on Uganda's land-locked Lake Albert, modular boats from a Mustang Island project were disassembled for a complex shipment that included air, truck and barge.



Photo courtesy of Global Geophysical

Landlocked Marine Shoot

Complex Locale Gets Unique Plan

By LOUISE S. DURHAM
EXPLORER Correspondent

Geophysical contractors sometimes find themselves in the darndest situations.

Yet they're often adept at zeroing in on solutions.

This was the case in Uganda, when U.K.-based IMC Geophysics International was faced with the challenge to acquire a seismic survey across a large part of a water body for

its Canada-based client Heritage Oil Corp., which has been actively drilling in Uganda for a number of years.

The assignment was an upgrade from the land 2-D and 3-D and the transition zone 2-D activity IMC had been pursuing in the region.

Even though IMC had the expertise to design the survey it lacked certain assets, i.e. gear, to acquire it in the most effective manner.

The company called on Houston-based Global Geophysical, and the two entities ultimately struck a synergistic deal: Global would supply the equipment and a number of key personnel, e.g., senior navigators, observers, and IMC would supply the labor and local logistics.

A Complex Environment

The program target area is Lake Albert in northwest Uganda.

"Geographically, it's a very complex environment for a conventional marine survey," said Duncan Riley, vice president worldwide marine at Global. "Lake Albert is a textbook horst and graben geologic feature everybody reads about when studying geology.

"The lake is bordered on the east by a mountain range that's been thrust upward almost vertically," Riley added, "so the eastern border of the lake is roughly a near-300 meter vertical cliff. The lake is about 150 kilometers long and averages 35 kilometers in width, and the water depth is a fairly uniform 50 meters. The surface area is some 5,300 square kilometers."

In other words ...

"It's a marine environment in the middle of a land-locked country," Riley noted, "so it's stretching the expertise of anyone that's done significant work there in the past because they've been working in savannah and thick bush."

The inhospitable locale itself – hot and wet, in the middle of the continent – is a considerable challenge for personnel.

IMC designed the survey, which encompasses 15 square kilometers on land and 315 square kilometers in the marine environment. Rather than trying to implement two separate surveys and marry the data post acquisition, a recording system designed to work in both land and shallow marine environments made far more sense.

Mustang Experience Pays Off

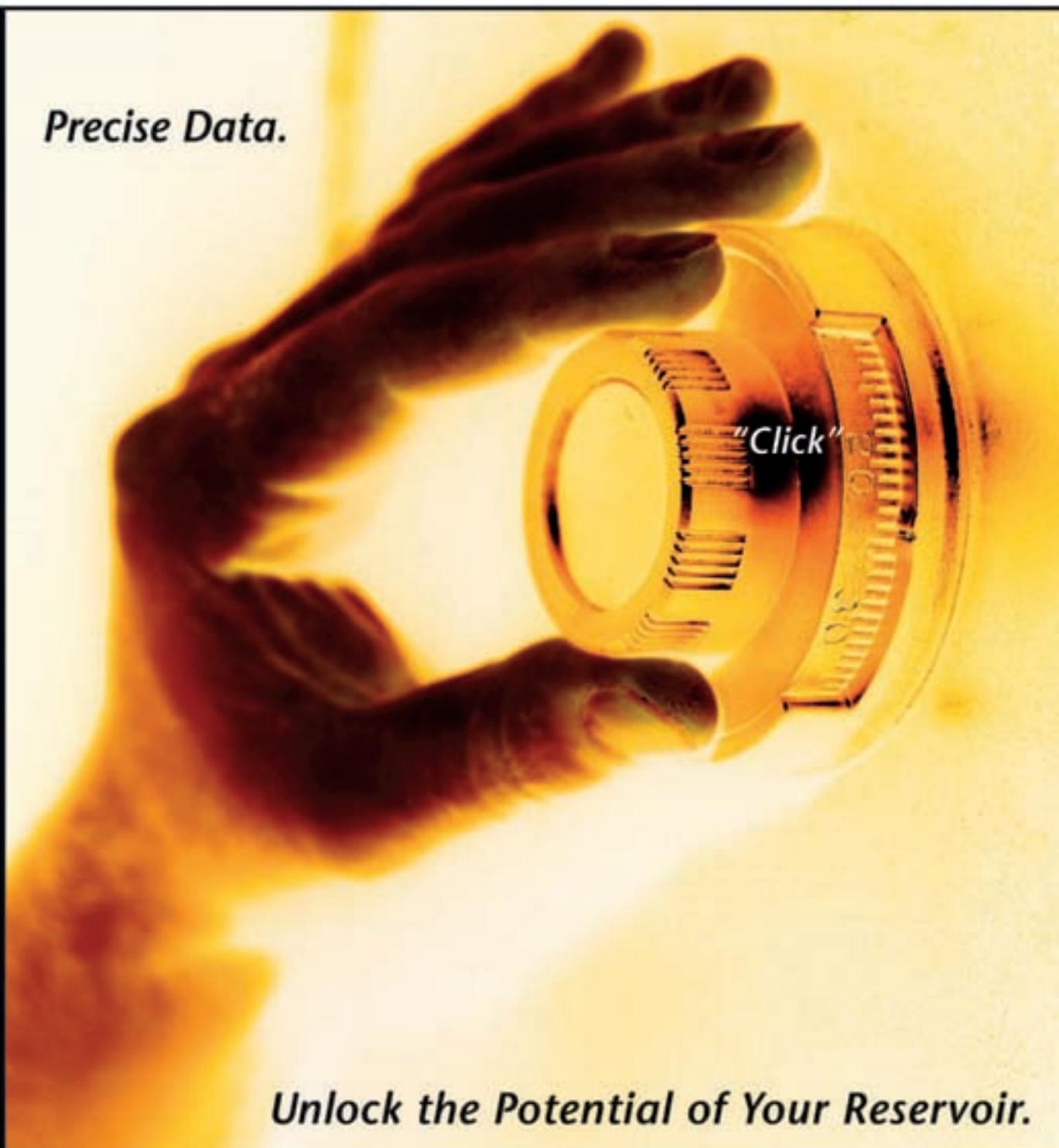
This was right up Global's alley given the successful transition zone survey it acquired late last year on Mustang Island in the south Texas coastal area near Corpus Christi. There, the company worked in a number of operating environments – crossing the transition zone, the island and back into the bay – using one recording system.

The company transported many of that job's assets, which were initially put together for a coastal transition zone environment, to Uganda where they're being deployed to acquire a seamless data set across the water, the land component (including the logistics base) and the gap between.

Moving the equipment to its

See **Uganda**, page 30

Precise Data.

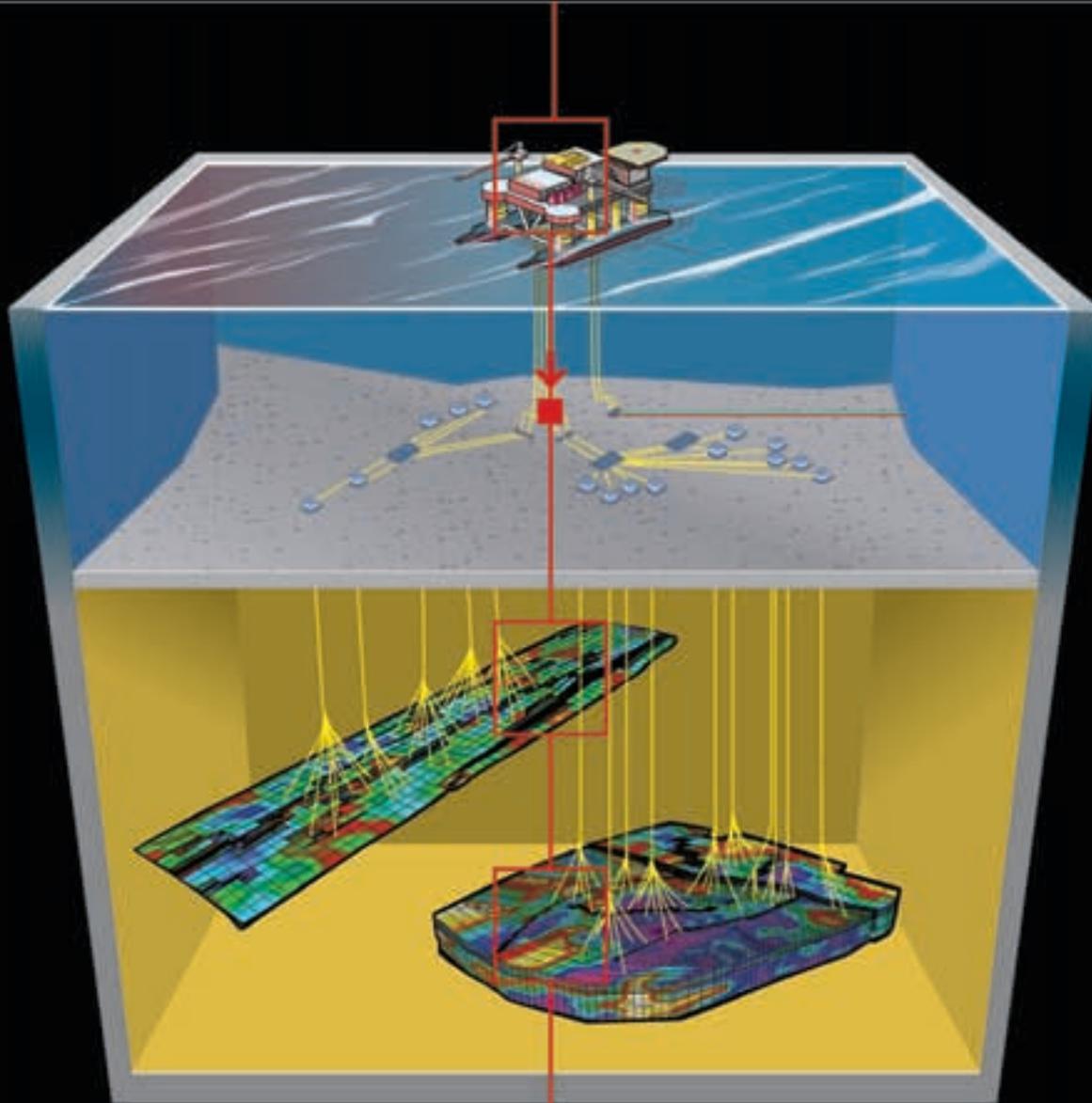


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Rubber-tracked Morooka carriers being used for drilling.

Innovations

from page 24

equipment now are way, way out," he added. "In going to these other industries that are not suffering those setbacks, we find equipment is more readily available."

Morookas and Fabteks

Hammond noted Global is constantly on the lookout for something that will work better than what they're currently using. It could be an apparatus that's more robust, or one that would maneuver better than what's being used on the terrain at a particular survey locale.

"Some of it is R&D," Hammond said. "I'll try to find something I think will work

in a specific area for us, and then try to get one machine and build it up and then put it on a crew to try out and work the bugs out of it."

They've produced some winners.

For instance, they took the Morooka – widely used in the heavy equipment construction industry – and adapted it to make it ideal for drilling and equipment carrying.

The Morooka is a track machine like a Caterpillar, but it's rubber-tracked, making it more environmentally friendly than steel tracks.

"It's basically a rubber track dump truck – a carrier – but it gets around to a lot of places we couldn't get to with the traditional rubber-tired buggy," Hammond said. "There are a lot of Morookas being used in Canada for drilling, but we're putting together our own custom package.

"We remove the dump bed and start with the bare frame and build up our equipment on the back end of it," Hammond noted. "We're building the drill ourselves and mounting it on the carrier.

"In addition to the drills, we're using the Morookas as carriers for our new accelerated weight drop machines."

From the timber industry, Hammond said they acquired the Fabtek buggy, which has more armor and protection than a regular drill buggy, making it more suitable for use in heavily forested areas.

It's being customized by Global to carry cable, ground equipment and personnel, and also for drilling and for fuel/water transport. In fact, the same drill design is being used for the Fabtek as for the Morooka.

The company currently is equipping Fabtek vehicles to use in the wooded areas in Arkansas. They're also using them in the heavy sands in Algeria – far removed from a forest setting – because of their availability and flexibility as a multi-application, heavy mechanized vehicle.

The Case Quad Track, which is a tractor from the agriculture industry, also is finding a niche in the seismic business.

"Some of us at Global had past experience with these while working with other geophysical companies," Hammond said. "They worked well in Alaska, and now we're using them in Algeria.

"Whereas dozers are used strictly for line clearance, the Quads are multi-purpose," Hammond noted. "They have blades for moving earth and are faster than dozers for line cutting. They can also be used to tow camps, fuel trailers, water tanks and such."

Looking Good

Aside from the focus on new, improved ways to use iron, industry contractors are embracing the relatively new airborne LiDar (Light Detection and Ranging) remote sensing technology to enhance survey planning, design and layout.

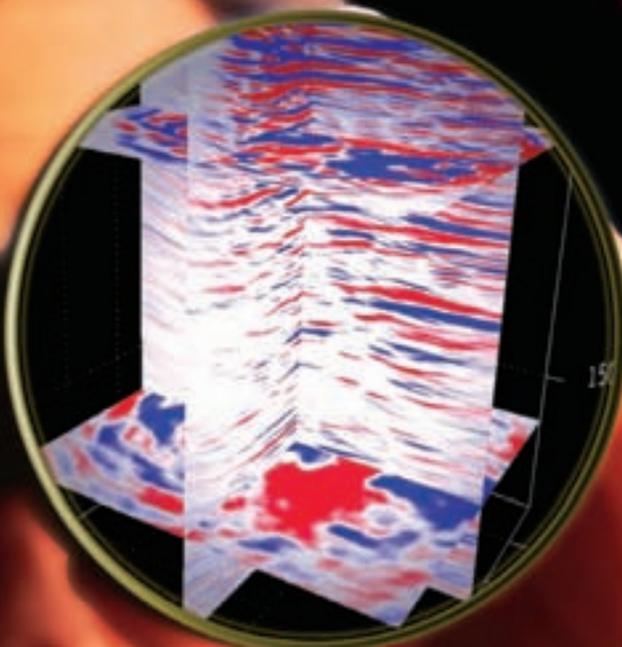
The LiDAR system integrates a laser scanner, a Global Positioning System and an Inertial Measurement Unit. It's particularly useful as a means to provide an accurate high-resolution representation of the earth's surface in areas of steep terrain and coniferous canopy – so long as light can penetrate.

The system measures surface elevation via a laser scanner mounted on a fixed wing aircraft or helicopter. LiDAR survey data are acquired by the oil company rather than the seismic contractor on most occasions.

Global currently is using LiDAR data

See **New Ideas**, page 30

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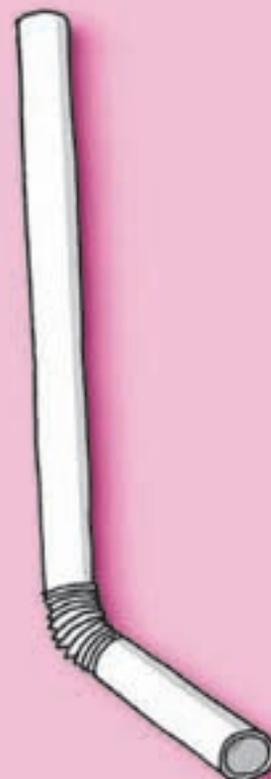


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New Ideas

from page 28

on a survey in Arkansas, according to Vlad Vanovac, worldwide manager of surveying and navigation at the company.

"In Arkansas it's crucial because of the vegetation coverage of the area," Vanovac said. "It allows us to go into the trees and get the vertical position component accurately, and we can go in with GPS to get the horizontal component."

"It's a cost-effective approach," Vanovac added.

Using LiDAR-derived elevation (Z) value for seismic points versus acquiring Z via GPS units on the ground – which can take an inordinate

"If you find rough terrain where you need heliportable drilling, and you move the points not very far (using LiDAR) and make it accessible by drill buggy or vibrator, you can save a lot of money."

amount of time – increases the efficiency of survey crews, especially where there's heavy vegetative canopy, added Mark Wagaman, geophysicist at CGG Veritas.

The accurate measurements of land surface elevations can make all the difference in how a survey proceeds – and, in turn, how much it costs.

A project using dynamite as a

source provides a good example.

"The economic way to use dynamite is to put it on a buggy or truck to move it," Wagaman said. "If you use a helicopter and a heliportable rig where the 'copter drops it down and it drills the hole, loads it and the 'copter picks it up, that's expensive 'copter time."

"If you find rough terrain where you need heliportable drilling," Wagaman

said, "and you move the points not very far (using LiDAR) and make it accessible by drill buggy or vibrator, you can save a lot of money."

LiDAR has become almost routine in some of the rougher areas in Canada, according to Wagaman, who added it's also often used in the rugged areas of Utah, Wyoming and Colorado.

CGG Veritas used the LiDAR technology successfully in 2004 on its LaBarge 3-D project in the Green River Basin of Wyoming. The operating challenges included elevations ranging from 2,100 to 2,750 meters, carbonate outcrops and a thick tree canopy of pine and aspen stands.

LiDAR data applications for the LaBarge survey included source pre-planning and elevation substitution. In some instances pre-planning enabled movement of source points from areas requiring heliportable drilling, which enhanced project economics – the price difference to drill a shotpoint with a heliportable rig versus a buggy rig was \$470 U.S.

CGG Veritas currently is using LiDAR technology in New York state.

Overcoming Obstacles

In case you're pondering what to do if your survey includes excessively dense vegetation, bridges and such that are impenetrable by light, not to worry.

B-PINS (Backpack Portable Inertial Navigation System) likely will meet your needs.

"You start from a known point and carry it on your back as you walk," Vanovac said, "and it calculates your position as you walk. It's autonomous and will give horizontal and vertical accuracy sufficient for geophysical operations in areas where LiDAR can't penetrate."

"The advantage is speed, and it requires fewer people than a conventional survey crew," Vanovac added. "It allows us to weave between the trees and basically flag the line for the drilling or recording crew to follow, with minimal tree cutting."

"There's one person with one helper instead of three working on a GPS crew or a half dozen on a conventional crew." □



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**Uganda**

from page 26

destination was a major logistical challenge.

Riley noted they amassed a variety of modular boats and equipment that could be disassembled, shipped and reassembled at the shore – problem is, the shore is a long, long way from the Entebbe airport where the containers were unloaded from the plane.

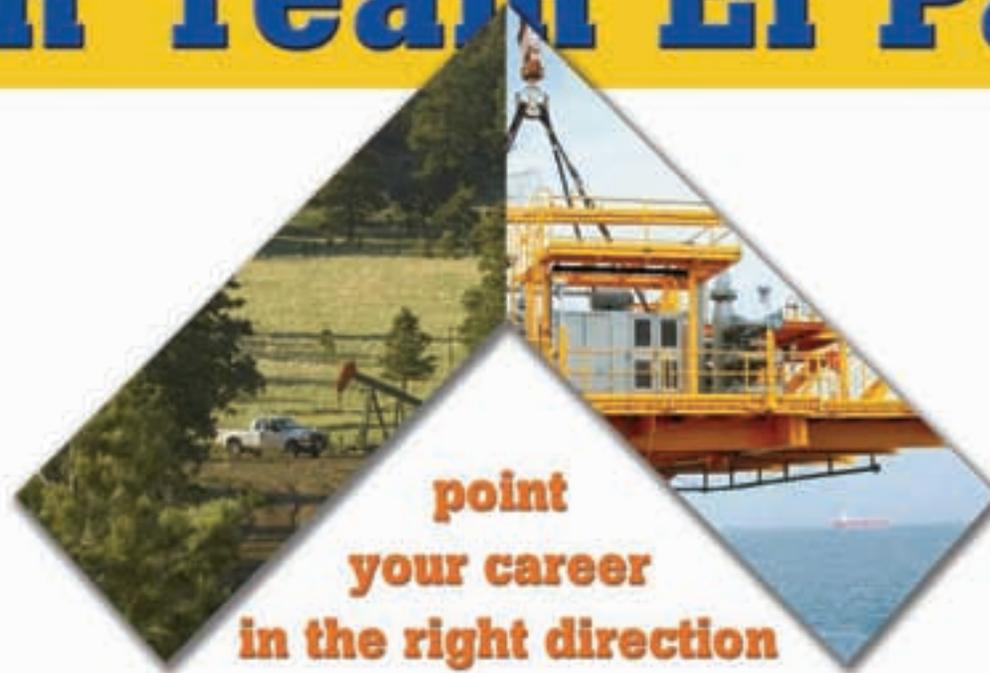
About 20 trucks loaded with gear traveled 10 hours to reach the central part of the lake, which has a port of sorts where the gear could be loaded onto barges.

It then took about six hours for the barges to reach the base camp on a depressed piece of land, which is accessible only by small plane or boat. A small dock was available for unloading the equipment.

The survey is being implemented using the Sercel 408 UL recording system onshore, where dynamite will be used. Offshore, the 408 ULS is being used along with airguns.

The 330-square-kilometer program will require about three months, according to Riley. □

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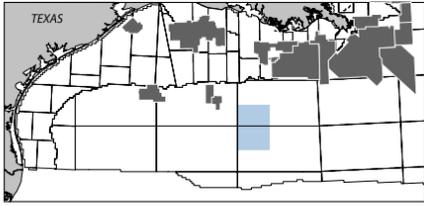
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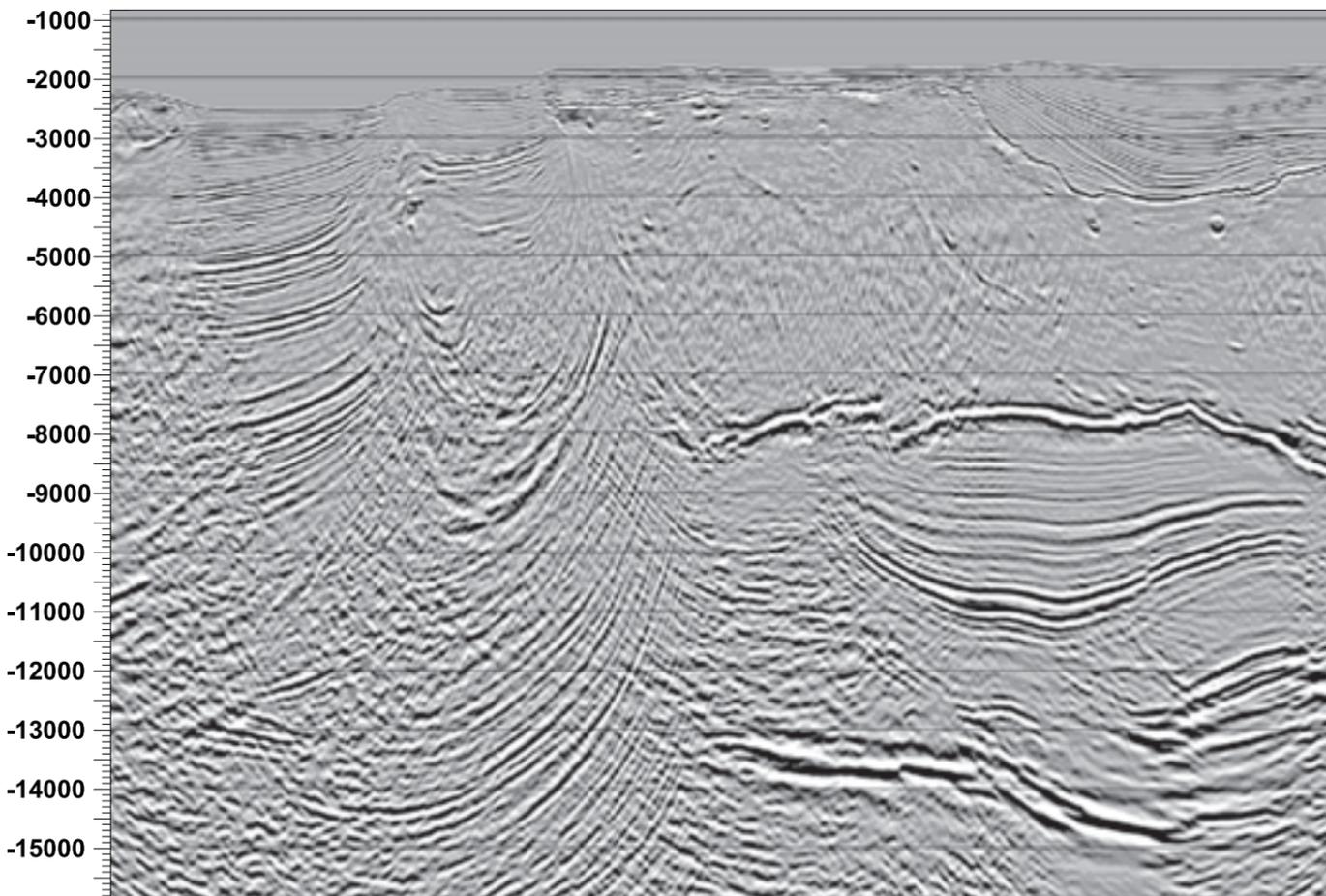
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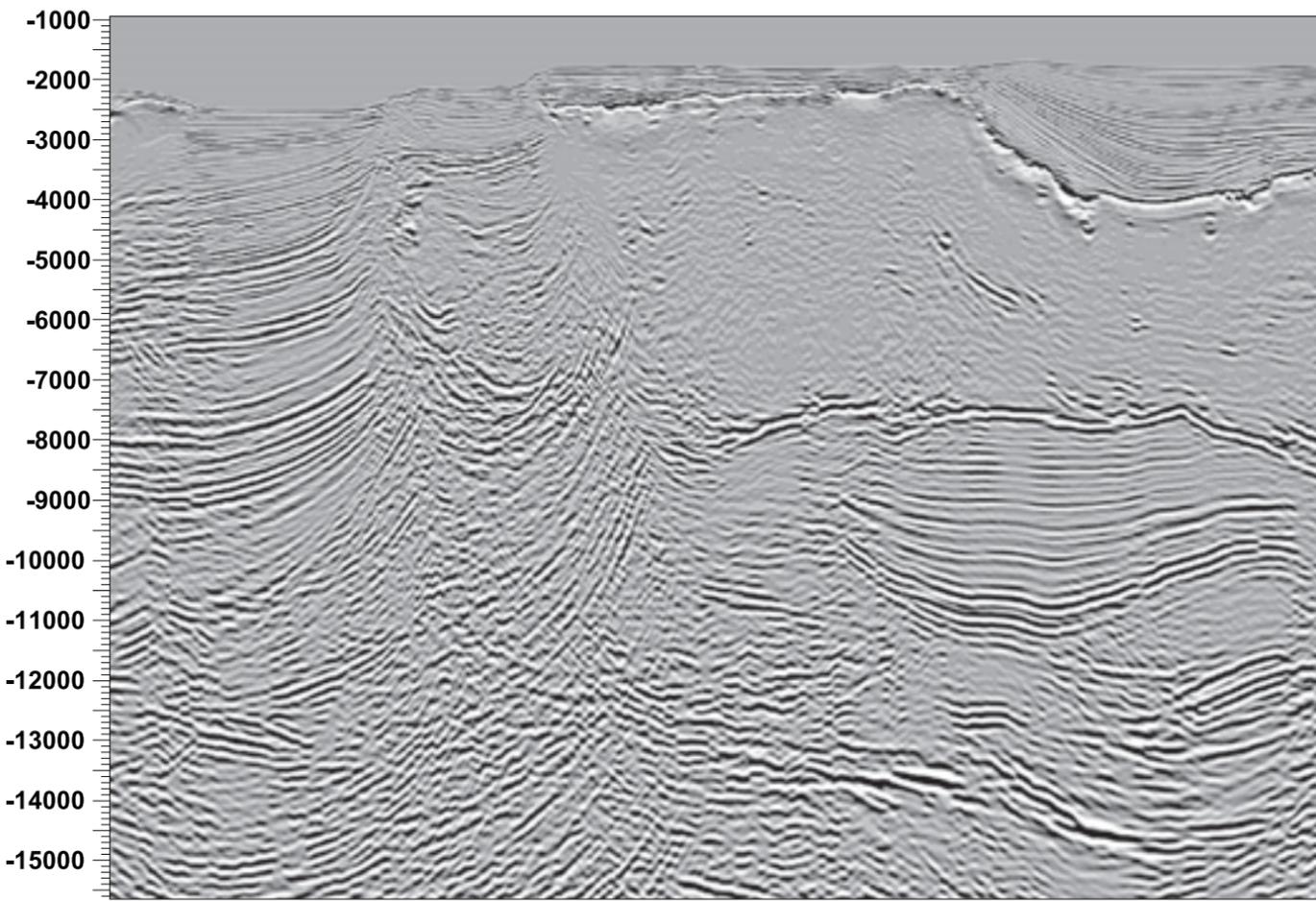
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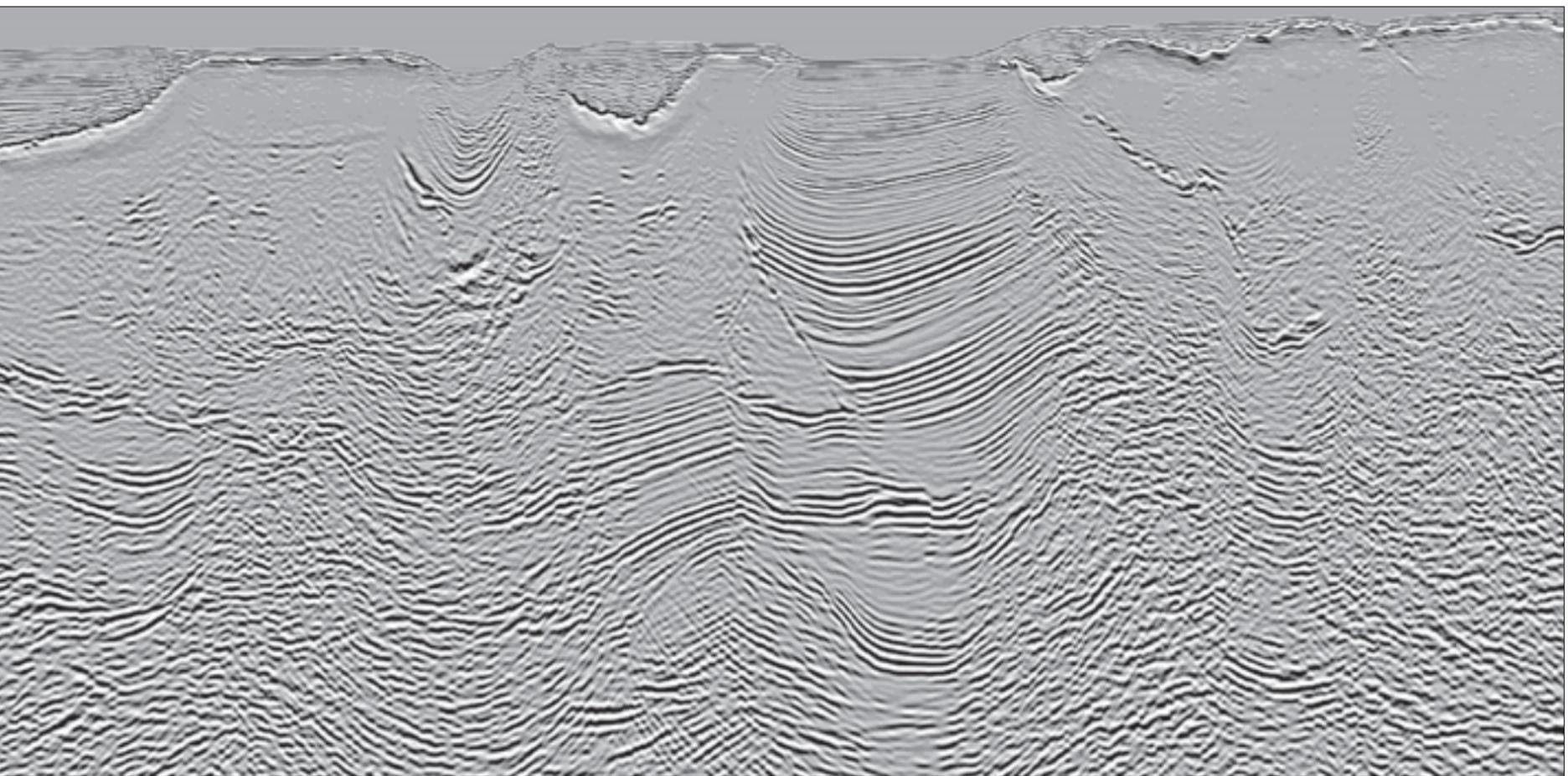
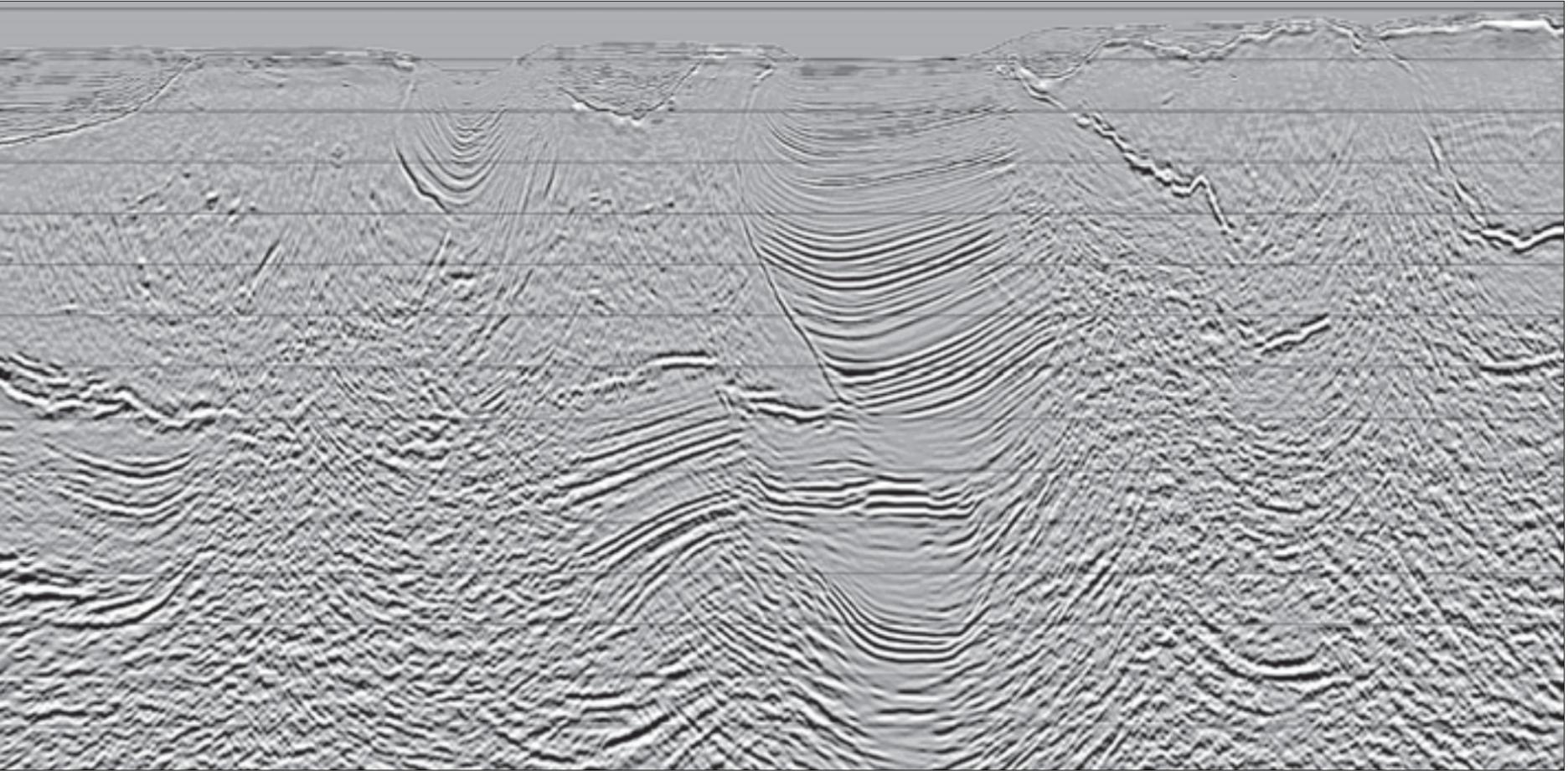
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Low Fold 3-D Working in Montana

Cutting Costs Without Quality Cuts

By DIANE FREEMAN
EXPLORER Correspondent

After years of successful exploration with 2-D seismic coverage, low-fold 3-D seismic programs are helping to cut costs in the search for overlooked gas traps in some areas in Montana.

Specifically, placing shot and receiver lines farther apart and conducting fewer sweeps helped drive down costs of a 3-D seismic survey of the Eagle Formation gas play in northern Montana, according to Eric Johnson, of Johnson Geophysical in Billings, Mont.

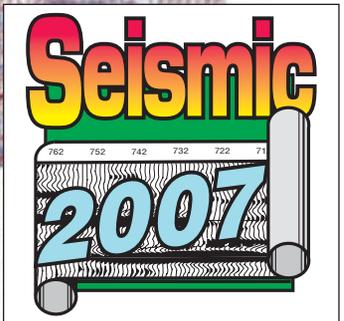
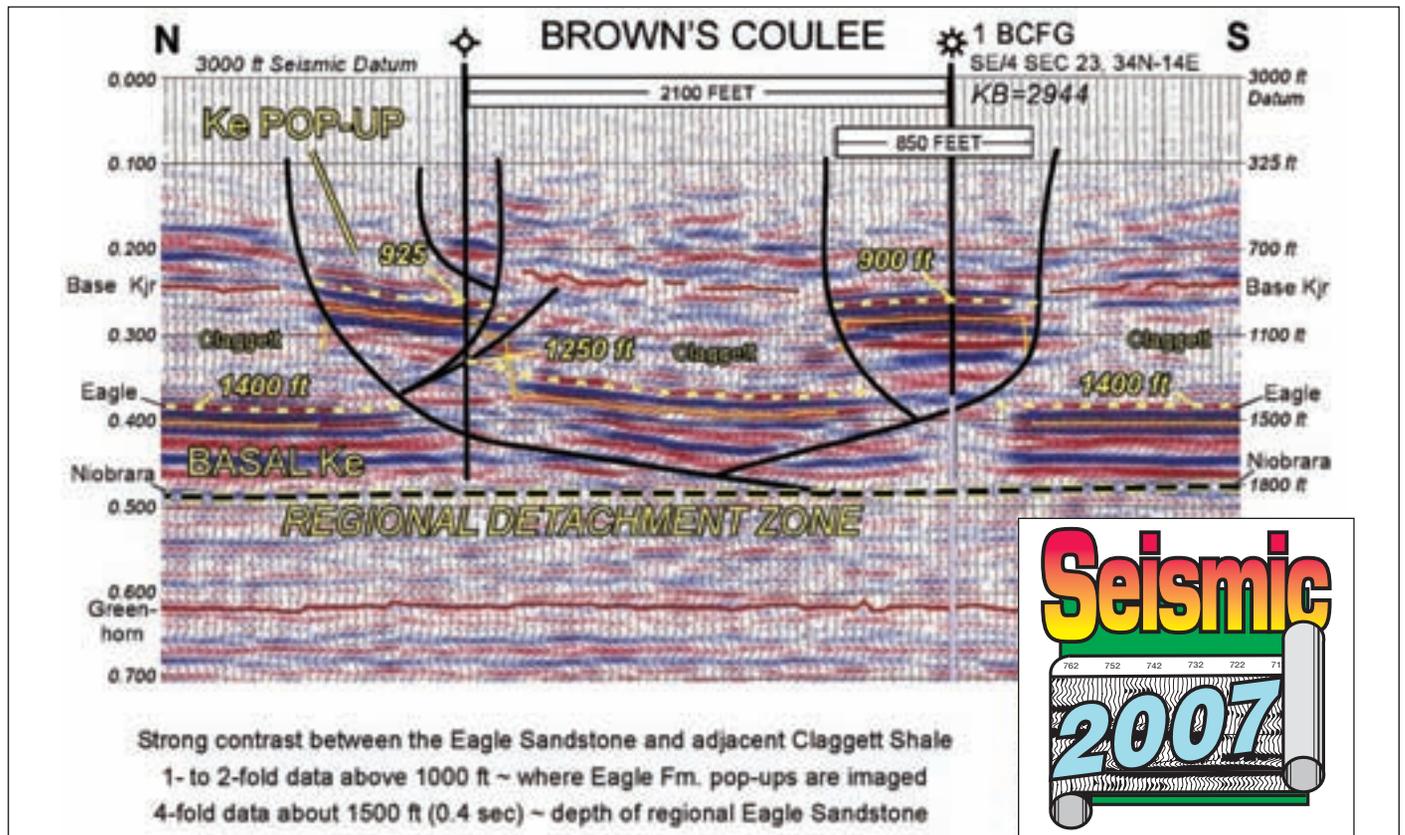
Johnson discussed the low-cost, low-fold way of designing a seismic survey during the annual 3-D Seismic Symposium sponsored by the Rocky Mountain Association of Geologists and Denver Geophysical Society.

Johnson said that by reducing some acquisition parameters companies can shoot 3-D and get more data for the money.

"Seismic costs are escalating along with drilling costs, and everybody is trying to keep the costs as low as possible," he said. "If saving money is your goal, the parameters you use for your 3-D survey can make a significant difference, while still acquiring useable data to evaluate your geological objectives.

"The number of sweeps affects the pricing," he noted, "as does the number of shots and receivers. If you find you can get by with lower parameters, you do save money."

Another way to cut costs, he



suggested, is to join with other companies working in the same area to split mobilization expenses in bringing in a crew.

"That is possible if there are several companies exploring in the area," he said. "It's a learning process," he continued.

"We don't get as good data as higher fold 2-D data, but 2-D lines can't image structure as accurately as 3-D. Better spatial imaging of structures and faults is a benefit of doing 3-D over 2-D."

In the last three years, cost-effective low-fold 3-D seismic surveys have been

used to exploit a prolific shallow gas area that surrounds the Bearpaw Mountains in north-central Montana.

Located in Montana's Hill and Blaine counties, the area has produced more

See **Johnson 3-D**, page 37

When its a question of Brasil seismic...

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Perceptions Surveyed

Price Still Sets the Industry's Beat

By LOUISE S. DURHAM
EXPLORER Correspondent

The good times continue to roll in the oil and gas industry – tempered with a soupçon of caution on the part of a number of the participants.

In fact, most “old hands” in the business have learned never to stop looking over their collective shoulders, always cognizant of the volatility indigenous to their chosen profession.

If you were to ask what weighs heaviest on these shoulders today, the answer likely would come as no surprise: The never-ending uncertainty of commodity prices.

“Many of us believe the amount of drilling will not increase, but might decrease with the extremely high costs of all oilfield services.”

This was the chief concern cited by companies polled via a recent survey of upstream U.S. energy companies – the fifth such survey in a series conducted by accounting, tax and business

advisory firm Grant Thornton.

The effort, which took place between mid-December and mid-January, focused on both large and small independents, and for the first time also

included oilfield supply and service companies.

“The service companies directly impact this segment through such things as drilling budgets and capital spending,” said Reed Wood, partner-in-charge of Grant Thornton’s energy practice. “Because of their structure, operations, activity, they can be viewed by independent operators as an early sign as to things that will happen in other segments of the industry.”

The survey questionnaire was sent to more than 200 companies, and more than 80 responded, according to Wood. The breakdown in response from public and private entities was 40 percent and 60 percent, respectively.

The Survey Says ...

In addition to the overriding concern over price uncertainty, the tabulated results indicate that crude oil appears to be gaining more respect on the domestic front.

In fact, Wood noted there was a balance in the concern and focus on oil and gas, whereas the previous two surveys showed a greater emphasis on gas. This time, 51 percent of the respondents indicated they will focus their activities on a combo of natural gas and oil, compared to 46 percent registering a sole focus on natural gas in 2006.

These folks also zeroed in on price thresholds considered critical for operations.

✓ Forty-one percent said the 2007 average price of natural gas must be \$8.43/Mcf to justify more than a 20 percent increase in U.S. drilling activity.

✓ Over half indicated a price below \$5/Mcf would curtail natural gas production.

✓ Only 10 percent expect natural gas prices to be high enough to support an increase in drilling this year.

Regarding crude oil price:

✓ Ninety-three percent said the average per barrel price of WTI crude would have to exceed \$60 to justify increased drilling activity this year.

✓ Sixty percent indicated crude oil drilling would be curtailed if prices sink to \$40.

Another survey finding Wood found to be particularly significant relates to environmental issues.

“There appears to be a clear awareness of environmental initiatives, potential for legislation agendas and increased expenditure with respect to what some call the green agenda,” Wood said. “Forty-six percent of the respondents will spend more money on environmental remediation or study in the future as compared to current levels.”

Demographics and the relative dearth of new recruits anticipated to become available has become an ongoing hot button topic in the industry – and employment issues were addressed in the survey.

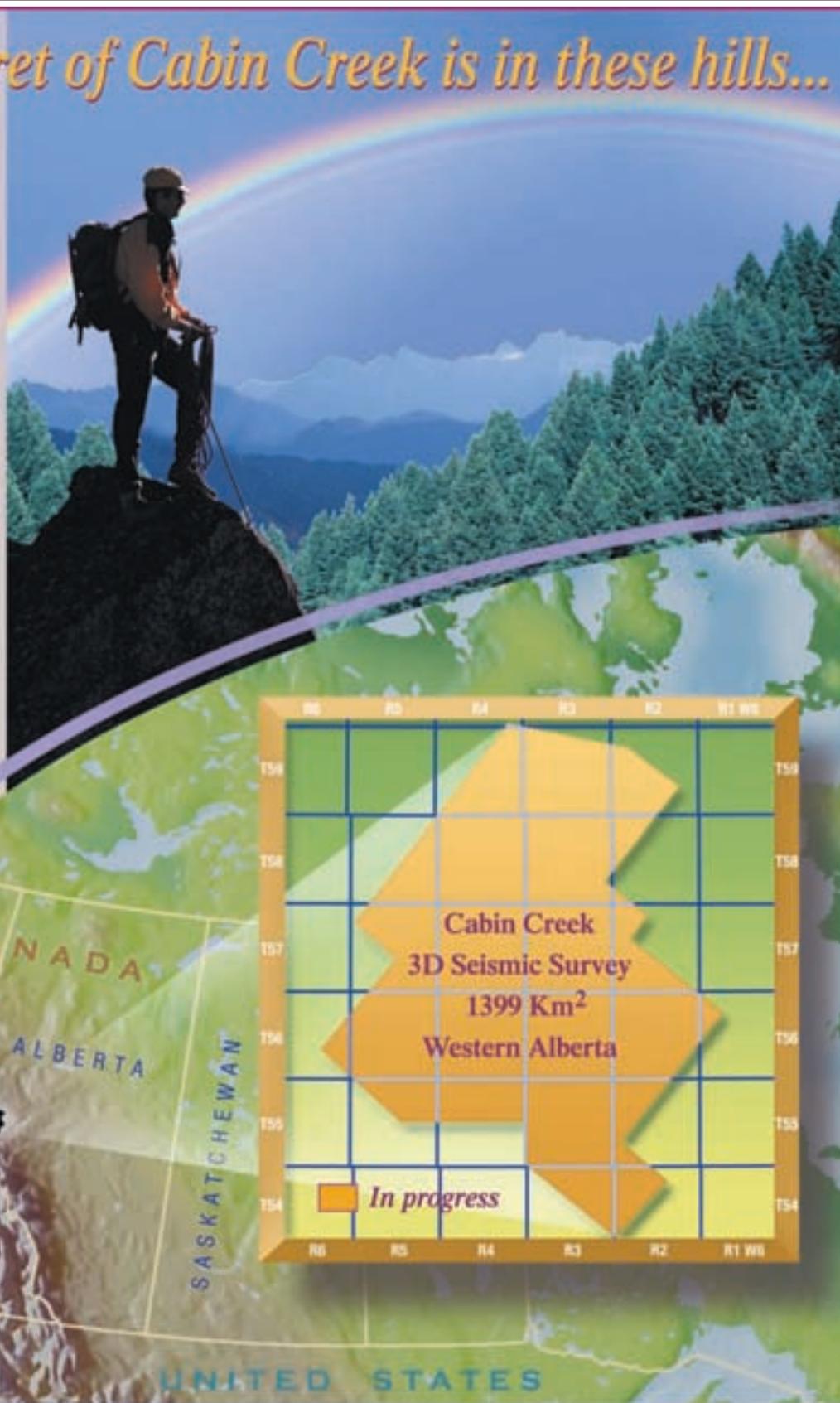
Sixty-nine percent of the respondents anticipate difficulties in hiring and retaining employees, compared to 65 percent who expressed this view in 2006; only 20 percent registered this same opinion two years ago.

A printed intro to the survey’s findings – “View from the Top: Energy Perspectives for 2007” – by long-time

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New Ideas for New Frontiers

continued on next page

Johnson 3-D from page 34

than 600 BCFG from the Cretaceous Eagle Sandstone, at depths ranging from about 500 to 1,400 feet deep.

"The strata containing the gas produce strong seismic reflections and the play is located below wheat and hay fields," he said, "a perfect place, seismically and topographically, for low-fold seismic data."

"This is an area with historically low exploration costs, where dry holes average about \$50,000 and small operators have strived to keep seismic costs low, in line with drilling costs," he said.

The 3-D programs were designed to

reduce cost in order to compete with 2-D seismic at \$6,000 per line mile and the low drilling cost. The low-fold 3-D seismic surveys were a way to provide affordable 3-D structural imaging.

"Small operators are willing to drill rather than shoot more seismic," he recalled. "With 2-D seismic, we missed a lot of gas."

Johnson said that 10 million cubic feet of gas will pay for a square mile of 3-D – and gas traps much larger than that can be overlooked with a 2-D survey.

"The data are only 1- or 2-fold above 1,000 feet deep, but the complex fault trends and structural traps are imaged surprisingly well due to the contrasting reflectivity of the shallow strata," he said.

Where the Lines Cross

About 100 miles west of this area, also

in Montana, Johnson's firm is conducting a 3-D survey in an area that has not been previously explored by seismic.

"We did a 3-D survey and the shallow data suffers somewhat," he said. "It's not perfect, but we're accepting less perfection in resolution to get two times the data shot. Imaging a larger area for our limited budget has helped us to better understand the structural trends."

Typically, 2-D seismic surveys require three or four line miles to evaluate a square mile, so they cost from \$18,000 to \$24,000 per square mile.

"The 3-D is twice as expensive, about \$45,000 per square mile," he said. "This includes about \$3,000 for permitting, \$5,000 for surveying, \$35,000 for field acquisition and \$2,000 for data processing."

"The cost of the 3-D seismic compares favorably with drilling cost and with

exploration risk," he said. "The superior spatial imaging and data migration of the 3-D seismic over intermittent 2-D lines have clarified fault orientations and traps, resulting in more optimum well locations."

Traps that had been overlooked or misinterpreted with 2-D lines spaced 1,500 to 2,000 feet apart were delineated and drilled, Johnson said.

"Careful record editing, velocity analysis and first-break muting are essential to optimize 1- and 2-fold data," he said. "Of course, a lower field effort requires a more hands-on effort to process the data."

He noted that processing represented less than 5 percent of the total project cost.

"This is not a place to cut corners," Johnson said. "Don't skimp on data processing, if you're going to skimp on the field effort." □

continued from previous page

industry notable Robert A. Mosbacher Sr. offered insightful comments on this topic.

"Although there are many independents who obviously will be adding to their employment there are many others, with whom I agree, that think the gap between the cost of pipe, drilling and other services and the present price for crude and natural gas has narrowed to a degree that net profits will not be increasing," Mosbacher said.

"Many of us believe the amount of drilling will not increase," he said, "but might decrease with the extremely high costs of all oilfield services. This leads me to believe that additional employment for independent companies that have been in business a long time is not likely."

"The companies which are newer will need additional personnel in several disciplines," he added, "and may continue to increase personnel."

Where the Action Is

The Gulf of Mexico continues to hold the most potential for oil and natural gas discoveries, according to survey results both this year and last. Next in line is the Rocky Mountain region, while Alaska has the third highest potential (replacing Canada from 2006).

Mosbacher noted there will be more true exploration wildcatting in the Rocky Mountains and other less heavily drilled areas than in the Gulf Coast.

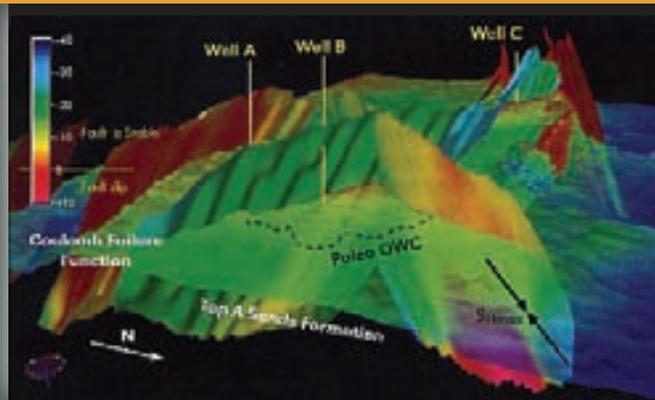
When it comes to 2007 capital expenditures, 65 percent of the respondents anticipate increased outlay, compared to 89 percent in 2006. On capital requirements, 79 percent expect to need more capital in the next five years, owing to robust capital spending budgets.

Mosbacher cited good news on this front.

"Equity has been remarkably easy to tap over the last year," he said, "and with a tremendous amount of money globally chasing relatively few opportunities, equity should continue to be available."

Wood believes the survey's findings "show an industry that is generally optimistic and strong but somewhat apprehensive about projecting increases in capital spending and drilling activities when the prices of natural gas and oil remain uncertain for the most part." □

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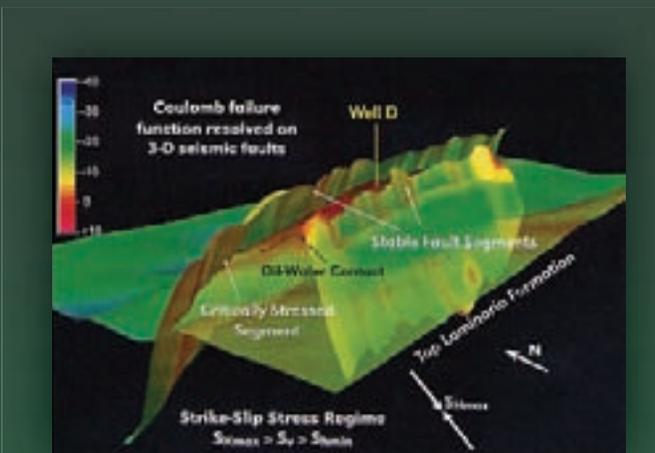
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Critically stressed fault segments (shown as yellow-red colors) are less likely to be good fault seals for trap integrity.



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Map courtesy of the U.S. Geological Survey

The U.S. Geological Survey's Tapestry of Time and Terrain Map of the United States.

Students' Curiosity Tickled Map Shows the Way To Inspire Interest

By KEN MILAM
EXPLORER Correspondent

Owen Hopkins wants to rock the schoolhouses – literally.

But that is down the road a ways. In the meantime, Hopkins has a plan to plant the seeds of geologic and scientific curiosity in students – and a map to get there.

Hopkins, an AAPG member and president of the Corpus Christi Geological Society, has thrown himself wholeheartedly

into the first phase of his educational mission to have a U.S. Geological Survey Time and Terrain Map of the United States mounted prominently and permanently in every school with fifth and sixth graders in the Coastal Bend area of South Texas.

And there is talk and hope of expanding the project to a national scale.

"He's been getting a great reception," said Paul Strunk, president of American Shoreline in Corpus Christi, a former AAPG treasurer and a member of the AAPG Foundation Board of Trustees.

Hopkins only launched his project in 2006, but by this past mid-March about 65 schools had received the laminated, framed maps, plus rock and bone specimens and a talk delivered by Hopkins or other local geologists.

A label on each map credits the CCGS for the gift.

The initial goal is to place the colorful, informative maps in 100 schools by year's end. Eventually, Hopkins wants to place maps in all 200 area schools.

At \$150 per map, the project will cost about \$30,000.

(Editor's note: The Tapestry of Time and Terrain Map is available for \$7 plus shipping and handling from the USGS Denver office at 303-202-4210. The additional cost is for lamination and framing.)

In his talks to the students, Hopkins tells them that they are now fifth or sixth graders and are about to learn something the younger students – and some of their teachers – don't know.

He relates four facts about the map. He draws on popular references like the book and movie "Jurassic Park," noting that Jurassic age rocks are a particular color on the map and those areas are where the pupils might find dinosaur footprints or fossils.

He asks schools to hang the maps at students' eye level in high traffic areas like hallways or cafeterias. He challenges his listeners to share something they know about the map with anyone they see looking at it.

"It might be another student, or even the principal," Hopkins said. "You might actually teach the principal something – how cool is that?"

Lighting the Fire

Hopkins' enthusiasm is contagious.

After he outlined his project at a CCGS meeting members donated \$8,000 – and as of April the society had collected \$15,000 from members and the community. The Don Boyd Continuing Education Fund also contributes to the project.

Other members have stepped up to make presentations at schools as well, Hopkins said.

Talking and networking has sparked interest at other geological societies. Hopkins said he has been invited to speak at meetings in Austin, Texas, and Pittsburgh, Pa., and geologists in Russia and Poland have expressed interest in mounting similar efforts.

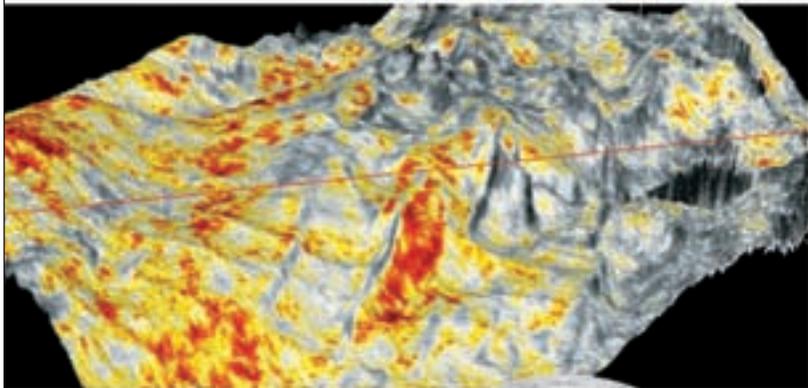
"Maybe this is something other societies could do," he said, noting that funding is a problem for many local organizations.

Strunk agrees that the idea could grow.

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"This needs to be looked at very closely from an overall AAPG standpoint," Strunk said.

"All societies should be doing this – every geological society in the United States – not just AAPG," Strunk said.

AAPG has several initiatives to bolster earth science education, including scholarships to students and grants to outstanding teachers.

"This goes beyond that," Strunk said. "This is stimulating scientific curiosity in young students and their teachers. His (Hopkins') entry is great, he leaves a good impression ... he's excited and we're excited."

A flyer distributed at a recent gem and minerals show inviting teachers to request a map for their schools netted 54 responses, Hopkins said.

More Than Maps

As encouraging as the response has been, "Maps in Schools" is just the first part of what Hopkins envisions as a "three-pronged educational attack," which he hopes to continue through 2010.

Phase 2 is "Safari in South Texas – 2007-08." Hopkins wants to expose students to ancient bones and fossils found regionally.

Again, Hopkins emphasizes taking the objects to the students, not vice versa.

A gravel pit west of Corpus Christi is a trove of Pleistocene mammal bones, he said.

"I've collected hundreds from there – I have a mammoth tooth as big as your head."

"The diversity of species in this county matches that of the La Brea Tar Pits," he added, another tidbit he likes to relay to students.

Texas A&M University at Kingsville has a huge collection of La Brea fauna bones stored in back rooms, Hopkins said.

"They have thousands of bones and fragments – all local. They have 12-foot tusks, bison, horses, tapirs, armadillos the size of Volkswagens, saber teeth

"They don't know what to do with them."

Hopkins' idea:

"These need to be in schools."

Whenever Hopkins speaks to a class, he leaves a rolled time-terrain map and some bones, fossils or rock samples for the classroom.

He wants a more visible, permanent place for specimens.

While display cases can be expensive, "every school has a trophy case," he said. "Why not dedicate a portion of each case to a bone?"

Hopkins would like to include artists' renditions of the complete skeleton and what the live animals, along with a paleogeographic map showing what the area looked like when the animal was alive.

Day Tripping

Back to rocking the schoolhouse. That is Phase 3 of Hopkins' vision.

He would like to include large, 300-pound specimens of sedimentary, metamorphic and igneous rocks into the landscaping in front of schools.

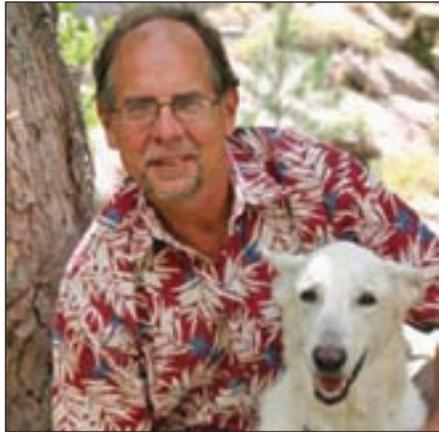
The boulders would be too big to steal, and each could have a brass plate bolted to it explaining its age, where it was found and how it was formed. Contributors to the project also would be credited.

Field trips are among activities cut back when schools are strapped for funds, Hopkins said.

"If trips are so expensive, then take the trips to the schools – take the outcrops to the schools," Hopkins said.

"You could have a field trip in your front yard," he said.

By sparking students' interest in



Hopkins and Simba

science early, schools might help raise students' performance on science tests, Hopkins said.

The Texas Assessment of Knowledge and Skills test includes 40 science

Hopkins only launched his project in 2006, but by this past mid-March about 65 schools had received the laminated, framed maps – plus rocks, bone specimens and a geologic talk.

questions, 10 of them dealing with earth sciences, he said. He was told at one school that students typically averaged 90-93 percent on life science questions but only 76 percent on earth sciences.

Hopkins is pleased and excited about the progress of the first phase of his self-proclaimed mission – and believes money will be found for the project.

"We have 345 members in a town of 300,000. I think we are making a

difference," he said.

Hopkins said the Corpus Christi society would have less trouble raising money for such a project than many others.

"I don't worry about money. I'm treating it like an oil deal – this is my prospect. Good prospects will get funded." □

(Editor's note: For more information, Hopkins can be contacted at owenh@suemaur.com.)

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Needed: Some Creative Approaches

Tight Shales Popular, Have Issues

By LOUISE S. DURHAM
EXPLORER Correspondent

It doesn't take an official proclamation to recognize that unconventional hydrocarbons have catapulted to the top on the oil patch buzz-o-meter scale.

One might even question if it's time to drop the "unconventional" qualifier, given the ongoing deluge of seminars, professional papers, industry luncheon talks, etc. spilling over the industry to address these resources.

But even though the array of plays such as tight sands, shale gas and coalbed methane have become the darlings of the industry – particularly in the United States – their inherent complexities continue to challenge the operators.

New approaches and new/refined technologies are a must-have to understand and economically produce these out-of-the ordinary reservoirs. Typical of this industry, the reservoir technology experts are meeting operators' needs head-on.

Much of the technology effort is focused on tight gas shales – not surprising, given the rash of new plays in various regions of the country. It is noteworthy that the gas in these tight rocks resides not just in the micro-pores but also is adsorbed on and in the organics.

"The bulk of land drilling in the U.S. today is tight gas shales," said Sidney Green, founder and former CEO of TerraTek – acquired by Schlumberger last year – and currently geomechanics business development manager for

"It takes unconventional technology to produce tight gas shales, and the issues have to do with the rocks themselves."

Schlumberger Data & Consulting Services.

"It takes unconventional technology to produce tight gas shales," he added, "and the issues have to do with the rocks themselves."

Those issues include:

✓ Tight gas shale has very low matrix permeability, i.e. nano-darcies, which industry historically would refer to as no permeability. The ability to measure the matrix permeability became an issue early on, demanding a process to perform this task.

✓ The fractured nature of these formations is another highly complicated issue encompassing fracture direction; frequency of fractures; and the manner in which they're open or not open.

✓ Shale formations tend to be non-homogeneous from a macro-scale down to the micro-scale. They're highly layered, which tends to give a non-homogeneous formation in the vertical direction, and they're also anisotropic in the horizontal

direction, meaning the properties differ even in the horizontal plane.

New Techniques

Getting a handle on the heterogeneity issue is crucial.

"If we accept that the medium is heterogeneous, possibilities open up for understanding and predicting phenomena," said Roberto Suarez-Rivera, Schlumberger scientific adviser and TerraTek's discipline manager-stimulation and production division. "What is relevant is how to deal with all the properties – clay maturation, clay types, kerogen maturation and the like – in a combined fashion."

In its efforts to identify the producing mechanism of these formations, TerraTek has applied detailed core analysis to measure the matrix properties of permeability, porosity and saturation.

Green noted this demanded the invention of a new procedure they dubbed TRA (tight rock analysis), which has become a standard in the industry.

The TRA is one of several new

procedures the company uses to evaluate these multifarious reservoirs.

One such process relates to petrographic analysis, i.e., looking at the micro-structure of the shale. Classifying shales requires examination of the micro-structure and subsequent comparison to actual measurement of porosity, permeability and saturation characteristics.

Another new technique deals with the measurement of non-homogeneous and anisotropic properties on cores. In addition to standard techniques measuring properties on samples taken at different directions, a scratch test provides a continuous profile measurement on formation core. The acquired signature is invaluable to correlate with logs for predicting other properties.

TerraTek also jumped into the realm of core log integration, i.e., the scaling issue that ranges from the micro-scale petrographic analysis to lab scale core analysis to logging wellbore scale and on up to reservoir scale.

Ultimately, the company wants to see the evaluation process move from lab measurements on cores on up to logging and even seismic technology for reservoir evaluation in the next decade or so.

This evolution includes the recent introduction of Schlumberger's sonic scanner tool, a new logging process with the potential to measure non-homogeneity and anisotropy.

"The sonic scanner has the ability to

See **Unconventional**, page 43



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WashingtonWATCH

'Hard Working' Congress Eyes CCS

(Editor's note: Allyson Anderson is a petrophysicist from Texas and the William L. Fisher American Geological Institute Congressional Science Fellow.)

By ALLYSON ANDERSON

As the William L. Fisher American Geological Institute Congressional Science Fellow, I've realized how important it is to have the input of scientific experts when making new policies on energy and natural resources.

In the past nine months I've had the great fortune of working on the U.S. Senate Energy and Natural Resources Committee under Sen. Jeff Bingaman (D-N.M.), the committee chairman. During my time with the committee, I've spent many hours working with other Senate staffers on a variety of topics, most of which are geologic in nature.

My main observation here is that there are many very motivated, intelligent staffers with a strong desire to make good policy. That said, there is a strong need for geologists, or scientists in general, to reach out to their congressman (or woman) and their staff to assist them in making good policy decisions, particularly in those areas that geologists play a critical role – energy and environment.

* * *

When I first came to the committee last fall I really had no idea what to expect from this Fellowship, much less the job and how Congress really works.

There is a large need for more scientists to reach out and help congressional staff make sound policy decisions.

I had a vague idea that Congress had been tackling some important energy issues, such as climate change, foreign oil dependency, etc., but did not appreciate the speed at which Congress would take on these topics in the 110th Congress.

I had the impression that lawmakers and their staff did not work the long hours that taxpayers would like them to. I had also heard that many of the staff are very young, inexperienced and disinterested in making sound policy decisions.

On all those issues, I couldn't have been more incorrect.

During my first three months of the Fellowship I was given liberal time to get up to speed on important policy, such as biofuels, gas flaring/venting reduction, geothermal energy and carbon capture and storage. During that time, I spent many hours contacting scientists in various related fields of expertise relevant to my policy portfolio.

It wasn't until January that I really began to appreciate the long hours the average staffer and congressman work, as well as the broad range of topics that staff are expected to know at a moment's notice.

There is very little time when Congress is in session to reach out to every interest group that is impacted by each policy decision. This is where I have really appreciated those groups and individuals who have contacted me with respect to my policy portfolio.

While there are many private interest groups that come to visit Senate staffers on a daily basis, there is a large need for more scientists to reach out and help congressional staff make sound policy decisions.

* * *

As I mentioned earlier, there are many important energy and environmentally related issues under scrutiny by Congress this year. I happen to be working on one such topic; carbon capture and sequestration (CCS).

I am sure that most EXPLORER readers know that carbon dioxide (CO₂) storage has been occurring in the oil patch for the past 20+ years in the form of enhanced oil recovery (EOR). While it has never been good for business to "lose" carbon dioxide to the formation (as that

means an oilfield operator will have to buy more CO₂ for the EOR operation), that perception is starting to change. Oilfield operators may get a break from the negative publicity, as they can promote EOR by showing that CO₂ is sequestered during the operation.

This is an important time for companies undertaking EOR operations, as many members of Congress are tackling the issue of geologic carbon sequestration as a viable option for reducing CO₂ emissions to the atmosphere. They look to EOR as the most immediate "low hanging fruit" option for carbon storage, in addition to increasing domestic oil production. CO₂ sequestration in depleted oilfields is only one portion of the geologic storage solution – policymakers are actively trying to learn more about saline formation storage capacity and using unminable coal seams for long-term geologic storage.

In the next several months important legislation related to CCS will be developed, introduced, debated and voted on. Already several pieces of CCS legislation have been developed both in the House and Senate.

Surprisingly this is a very non-partisan issue, with broad support for CCS from both major political parties.

Additionally, both chambers are working together to expedite CCS legislation. I would expect to see many

continued on next page

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Unconventional

from page 40

measure properties in different directions with a single log run," Suarez-Rivera said.

"Instead of the long time it takes to complete all these measurements in all directions, we now can come up with the same type of measurements in a single log run."

Different Developments

There's different strokes for different folks when it comes to developing innovative technologies to economically produce hydrocarbons from unconventional reservoirs across the board.

Core Laboratories, which is a long-familiar name in the realm of reservoir technology, is big on the consortia approach as a cost-effective, efficient approach to bring needed technology to the operators.

"Half of our work on reservoir problems is through JIPs," said Randy Miller, president of Core Labs' integrated reservoir solutions group. "Today, 80 percent of this work is in unconventional, especially in two large projects."

The Tight Gas Sands of North America Fracture Stimulation Optimization project includes 30 companies from the United States and Canada. The program has been active for three years and is still going strong.

"It's evaluating tight gas sand reservoirs from the pore scale looking at conventional cores," Miller said. "We're trying to solve a number of problems, like what's net pay, how much gas is in place, what are the geomechanical properties, fluid sensitivity issues and what is the appropriate stimulation design."

"It goes from the core through the petrophysics through the stimulation design," Miller noted, "and we also do post-frac production analysis."

"We're comparing and contrasting different tight gas sands – what's common to them and what's different, and how do you maximize or optimize production in a tight gas sand play versus another project."

The program provides info that can save big bucks in exploitation of these reservoirs. The companies get a better handle on the appropriate petrophysical model, formation pay, how to complete

and stimulate. The enhanced understanding of the reservoir also helps to select infill locations.

A second project – Gas Shales: Reservoir Characterization and Production Properties – is also focused on the United States and Canada and boasts 42 participating companies.

"We're doing the same thing," Miller said, "looking at the shales from core, reservoir properties, reservoir characterization scale and up through geomechanical properties, stimulation design and production analysis – developing petrophysical models to determine what constitutes a pay or gas zone in a shale."

"There's a number of shales in the Rockies currently being evaluated," Miller noted, "as well as the Gulf Coast region and along the East Coast, such as the New Albany shale. There's been a number of encouraging results from some of these other plays."

"In unconventional reservoir evaluation, these consortia are a very cost effective way for these companies to acquire technology and understand the reservoir," Miller said.

"For instance, each of these shale plays has some unique components, and what works in one area may not work in another."

International Targets

The recognition of tight gas sands as an important resource is taking hold beyond the United States, according to Miller, who is optimistic about the opportunity to leverage what has been learned stateside relative to tight gas sand formation evaluation and stimulation.

He predicts more focus on unconventional in Europe, South America, the Middle East (especially deeper gas reservoirs), Russia and China.

Miller noted also that while the United

States and Canada currently are leaders in the realm of coalbed methane, this will expand into Europe as well as India and China.

Of course, contracts in the international arena can be dicey undertakings in even the best of circumstances these days – and unconventional reservoir development brings its own set of baggage to the negotiating table.

Before any activity revs up, there will have to be a paradigm shift in the production sharing agreements typically common between the NOCs and the IOCs, which will reflect the manner in which these reservoirs are exploited.

"Right now a lot of these agreements discourage long-term input (capital) into reservoirs, and these reservoirs have a long life," Miller said. "Also, to continue development and keep gas production up requires extensive infill drilling." □

continued from previous page

more bills introduced, including those that take on:

- ✓ CCS oversight.
- ✓ Regulatory framework.
- ✓ Storage liability.
- ✓ Defining who owns the pore space.
- ✓ CO₂ as a commodity vs. a waste.

These policies are intended to set the stage for large-scale carbon storage projects in the next 10-plus years, thus it is critical that policy makers hear from geoscientists on the topic immediately.

This topic is just getting started, so there is no better time than now to reach out to your congressman with your scientific expertise.

Policy does impact science, so scientists should make every effort to positively influence science-based policy decisions. □

(Editor's note: Don Juckett, head of AAPG's Geoscience and Energy Office in Washington, D.C., can be contacted at djuckett@aapg.org; or 703-575-8293.)

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GEOPHYSICALCORNER

Reflections on Class Two Reservoirs

(The Geophysical Corner is a regular column in the EXPLORER, edited by Bob A. Hardage, senior research scientist at the Bureau of Economic Geology, the University of Texas at Austin.)

By DIANA SAVA
and BOB HARDAGE

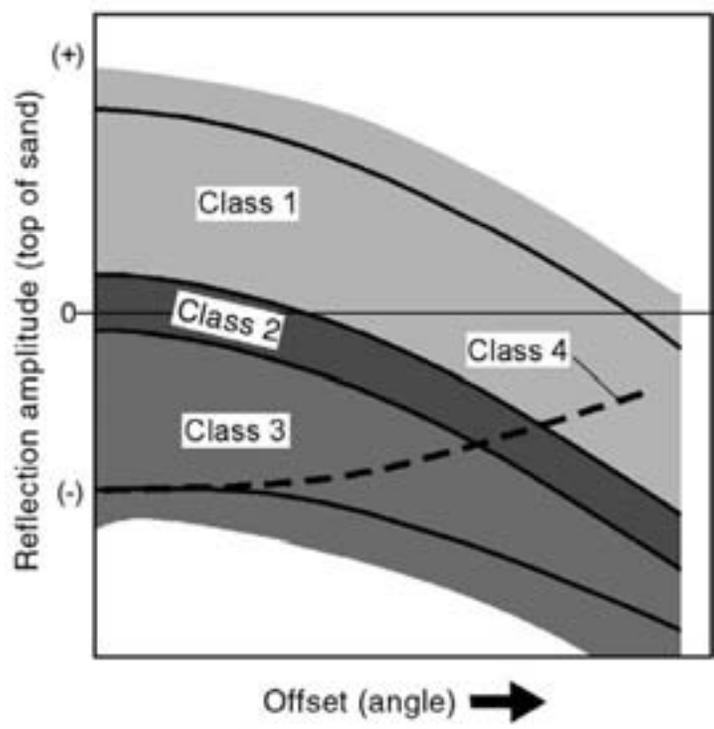
Geophysicists define gas reservoirs as Class 1, 2, 3 or 4, depending on their P-P amplitude-versus-angle (AVA) response. The P-P AVA behaviors on which this classification scheme is based are shown as generalized curves in figure 1.

Although this reservoir terminology originated in the Gulf of Mexico and was applied initially only to sandstone reservoirs, the nomenclature is now used across basins worldwide and is applied to reservoirs other than gas-bearing sandstones.

Inspection of figure 1 shows that:

- ✓ A Class 1 reservoir exhibits a strong, positive P-P reflection response at normal incidence, and that response then decreases as the angle of incidence increases.
- ✓ A Class 2 reservoir has a small P-P response (either positive [Class 2A] or negative [Class 2B] polarity) at normal incidence, and its P-P response becomes more negative as the angle of incidence increases.
- ✓ A Class 3 reservoir has a strong,

Figure 1 – Domains of P-P AVA responses for Class 1, 2, 3 and 4 reservoirs. Typical P-P reflectivity curves are drawn for each P-wave AVA reservoir class.



negative P-P response at normal incidence that becomes more negative as the angle of incidence increases.

- ✓ A Class 4 reservoir has a strong, negative response at normal incidence, just as does a Class 3 reservoir, but its P-P response decreases (becomes less negative) with increasing angle of incidence.

Only Class 2 reservoirs are

considered in this article because Class 2 reservoirs are faint, low-amplitude P-P events and sometimes are almost invisible in P-P seismic data.

The reason for this invisibility is explained by the Class 2 reflectivity curves in figure 1, which show that a Class 2 target does not generate an appreciable amount of common-phase reflection signal over the first third or

half of the incidence-angle range used in most seismic data-acquisition programs.

* * *

One Class 2 reservoir that has been widely publicized is the Alba reservoir in the UK sector of the North Sea. P-P and P-SV seismic images across this particular reservoir have become classic data examples of multi-component seismic reflectivity behavior for Class 2 reservoirs among the geoscience community and will be used in this discussion.

Among the published P-P and P-SV profiles across Alba are those displayed as figure 2 (page 45), which show that the Alba target produces a minor response in P-P image space but a bold reflection package in P-SV image space.

This image comparison illustrates that Class 2 reservoir interpretation can be difficult in a conventional seismic stratigraphy study that uses only P-P seismic data, but can be on a more rigorous foundation when both P-wave and S-wave data are available and elastic wavefield stratigraphy is utilized for prospect evaluation.

To illustrate the P-P and P-SV reflectivities associated with the Alba reservoir, we represented the target as

continued on next page

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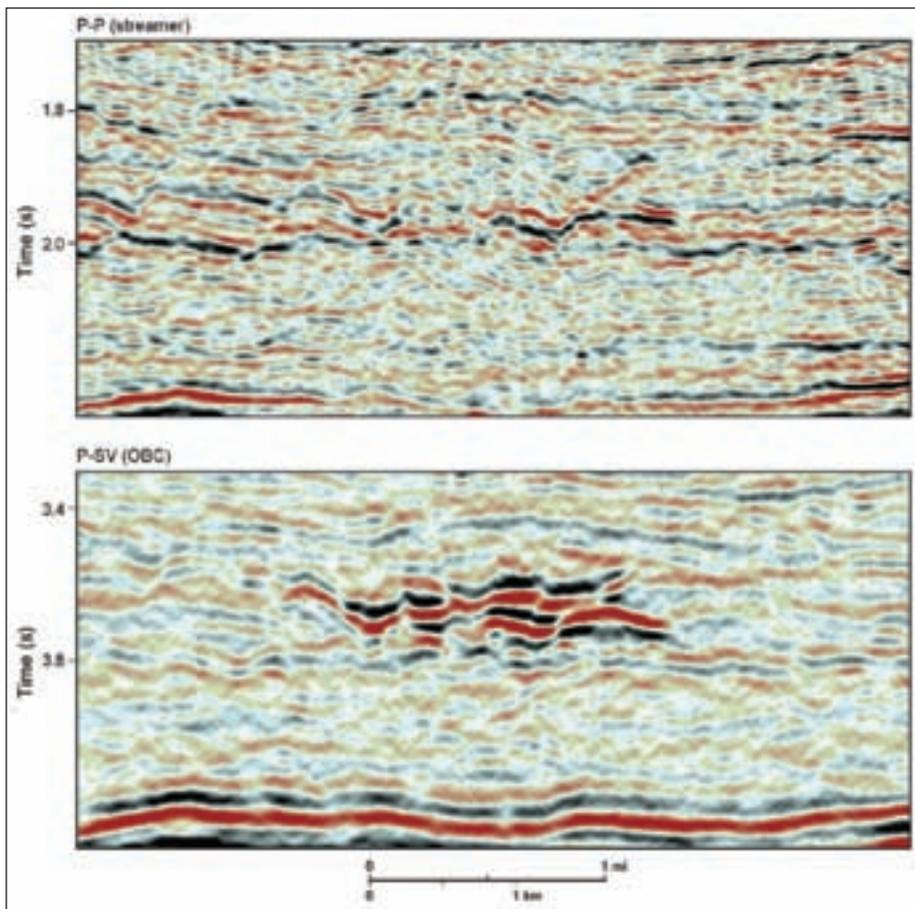


Figure 2 – P-P towed-streamer profile (top) and P-SV profile constructed from 4C OBC seismic data (bottom) acquired across Alba field, North Sea. Contact the authors if you wish to know the citation for these published data.

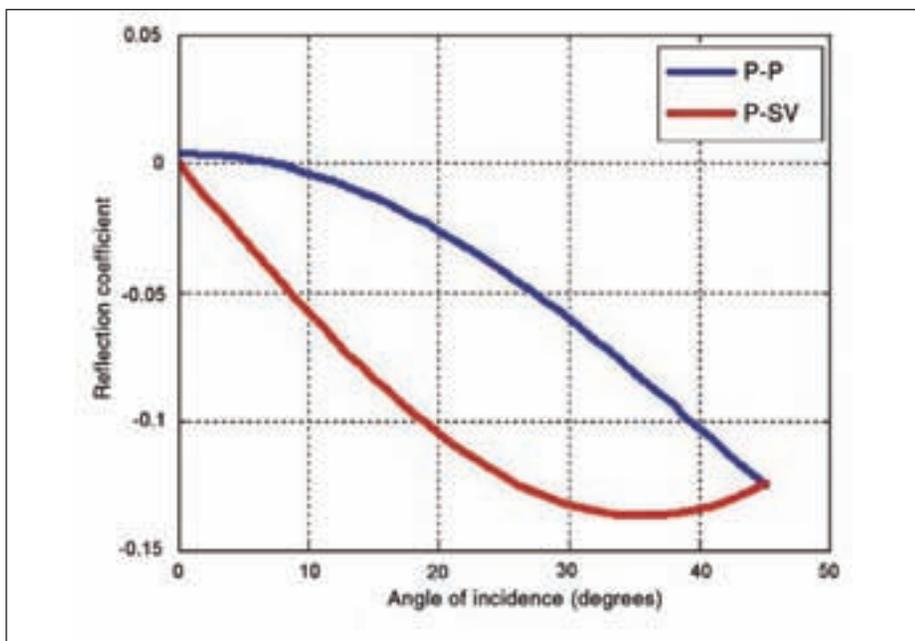


Figure 3 – P-P and P-SV AVA responses across the top of the Alba reservoir.

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a simple, two-layer Earth model defined by averaging published log data across the reservoir and its bounding units. Resulting reflectivity responses for the target interface are shown in figure 3 (above).

The P-SV and the P-P reflectivity curves have zero and near-zero values, respectively, at normal incidence and then slope toward negative values. As the incidence angle increases, P-SV reflectivity reaches a magnitude of -5 percent quickly at an incidence angle of ~8 degrees and continues to increase to almost -15 percent at an incidence angle of ~30 degrees.

In the seismic reflectivity world, these reflection coefficients are huge.

In contrast, P-P reflectivity does not reach a magnitude of -5 percent until the incidence angle is almost 30 degrees. The implication is that P-SV reflections from the Alba reservoir (and from all Class 2 reservoirs in general) are much more robust than P-P reflections at all angles of incidence.

An important conclusion is that multi-

component seismic data and elastic wavefield stratigraphy allow exploitation of Class 2 reservoirs that cannot be properly interpreted with single-component data and conventional (P-P) seismic stratigraphy.

* * *

Some explorationists are now learning that multi-component seismic data and elastic wavefield stratigraphy concepts are essential for imaging Class 2 reservoirs.

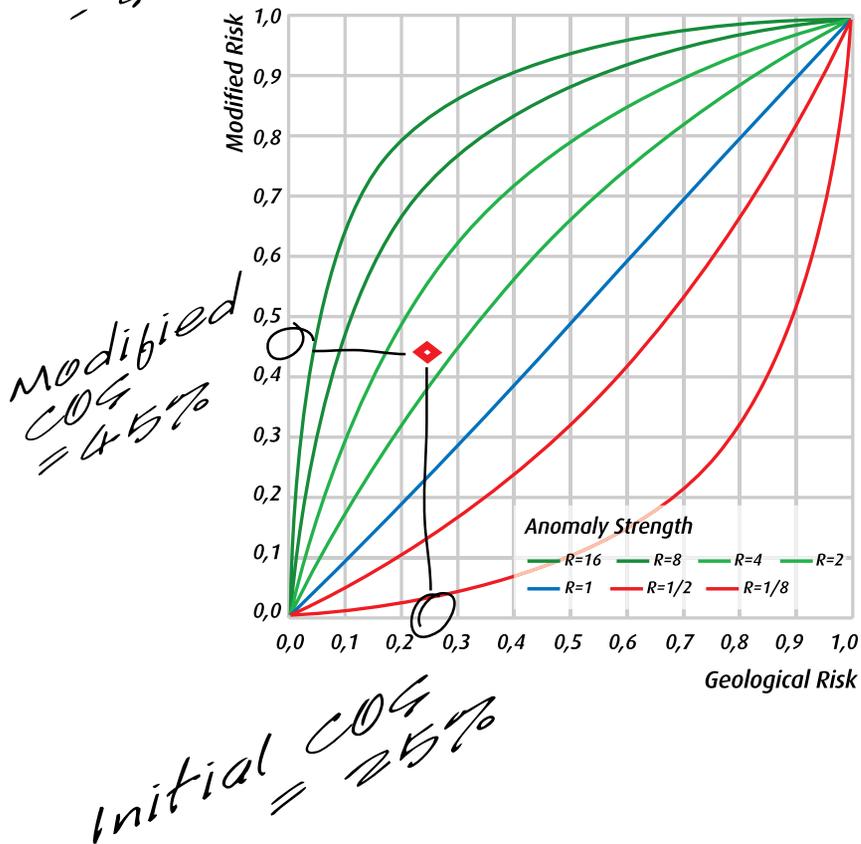
A recent example of such an application is the 4C seismic survey done by Petrobras across its deep-water Roncador field, in which P-SV data allowed an important Class 2 reservoir that could not be seen with P-P data to be exploited. This case history can be found in SEG's April 2006 *The Leading Edge*.

(Editor's note: Sava and Hardage are both with the Bureau of Economic Geology, the University of Texas at Austin.)

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REGIONS AND SECTIONS

Best Practices Make Best Meetings

(Editor's note: Regions and Sections is a regular column in the EXPLORER offering news for and about AAPG's six international Regions and six domestic Sections.

News items, press releases and other information should be submitted to the EXPLORER/Regions and Sections, P.O. Box 979, Tulsa, Okla. 74101.

Contact: Carol McGowen, AAPG's Regions and Sections manager, at 1-918-560-9403; or e-mail to cmcgowen@aapg.org.

This month's column continues a report on the "best practices" group at the recent AAPG Leadership Conference.)

BY CAROL MCGOWEN

Regions and Sections Manager

In the April EXPLORER we began sharing proven ideas for effective operation of the AAPG Regions and Sections, a recommendation from this winter's AAPG Leadership Conference.

This month, we continue with more "best practices" that focus on our local annual meetings.

Historically, annual meetings have been a tradition of the AAPG domestic Sections. However, the best practices described in this month's article are applicable to any locally organized AAPG member meeting or conference, whether in a U.S. Section or international Region.

The first best practice featured here is the recent AAPG Southwest Section annual meeting, which boasted attendance twice the number expected.

We'll also examine (see box, next page) best practices contributed from the Eastern, Pacific and Gulf Coast Sections, all of which provide insight into specific aspects of other successful annual conferences.

* * *

Geographically, the Southwest Section covers most of two U.S. states, Texas and New Mexico. While small in area, it represents nine affiliate societies; its total AAPG membership ranks fourth largest in size among the Sections and sixth largest among all Sections and Regions combined.

When asked to identify the key factors contributing to the success of the annual meeting held in April in Wichita Falls,

Texas, Craig Reynolds, Southwest Section president, and Bill Stephens, annual meeting general chairman, were quick to agree on seven essential elements of a winning annual meeting:

✓ **Timely theme.**

The conference theme is more than just a catchy title used in brochures and posters; it sets the tone and direction for the overall conference planning effort.

Stephens advises other Section and Region leaders to determine not only their members' interests, but also the interests of others outside their immediate Section or Region.

"The theme 'Unconventional Challenges-Innovative Solutions' turned out to express what people in our Section do," Stephens said. "We also tried to

attract members outside our Section, like those in the Mid-Continent Section."

The theme also was a reference to the regional Barnett Shale play through the use of innovative technology; the Barnett Shale formation has emerged as the largest natural gas field in Texas and the hottest on-shore play in the United States.

✓ **Marketing.**

This is crucial, according to the Southwest Section meeting organizers.

"You have to get the idea into people's head to come to the convention," Reynolds said.

Both Reynolds and Stephens appealed to their personal connections, marketed to

continued on next page

Tips for Boosting Your Attendance

Here are some marketing tips for how to create momentum and help boost attendance numbers for your Region or Section annual meeting.

✓ Have well-known presenters – secure big-name presenters in time to include in early marketing.

✓ Have an eye-catching logo – use a consistent visual image on flyers, in the EXPLORER ad, in affiliate society newsletters and on a Web site.

✓ Word of mouth – the convention committee members constantly promote the meeting throughout their business, professional and social circles.

✓ EXPLORER advertisements – Sections and Regions are offered one free quarter-page ad per year in the AAPG EXPLORER. Additional quarter-page ads may be donated by AAPG affiliate organizations within the Section or Region.

✓ Advertisements in newsletters of

affiliate organizations – the Southwest Section reached out to major oil companies and to the many shale players in Houston by advertising in the Houston Geological Society newsletter.

✓ E-mail blitz – AAPG provides this free service to members.

✓ Distribute flyers at other Section or Region conventions – during the months leading up to the Southwest Section meeting, flyers were handed out at NAPE, the AAPG annual convention, etc. □

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fellow geologists and broadened the base of conference attendees by marketing to non-geologists. Everyone knew that the two were committed to making the conference a success.

"I kept registration brochures with me and made numerous personal visits," Stephens said. "Many people showed up because they are friends."

Wichita Falls, Texas, is fortunately located between Dallas-Fort Worth and Oklahoma City, where a significant number of people either work in the Barnett Shale or own gas shale interests.

"We marketed the meeting to attract those people," Reynolds said.

For the past year leading up to the conference, both men got the word out by doing a lot of networking through their jobs, by discussing the conference during business meetings or while reviewing prospects. They even went to offices of petroleum engineers and landmen who were working in Barnett Shale plays and who might want to learn the effects of geology on how they would lease their acreage.

✓ **Technical program.**

"Bryan Brister's work experience in academia was a key credential for serving as technical program chair for (our) meeting," Stephens observed, "The Call for Papers yielded some results, but direct solicitation of potential presenters by someone who knows the academic community yielded the best results for the technical program."

At Brister's direction, the "unconventional challenges/innovative solutions" theme and the current example of the Barnett Shale play became the common thread that extended throughout the technical program. The theme was repeated in presentations, poster sessions, short courses and even a Barnett core session, something that had never been done at a Southwest Section meeting.

Concurrently, non-shale topics also were presented to keep shale gas players engaged throughout, while also offering programming with a broader interest for those not working in shale.

Theme-related field trips reinforced the technical program and offered convention goers once-in-a-lifetime experiences.

✓ **Keynote speaker.**

Conference organizers invited a well-known speaker to address a timely topic – Dan B. Steward, this year's AAPG Explorer of the Year for his work on the Barnett shale. For the Southwest Section keynote, Steward gave a very informative address on current gas shale exploration and production techniques.

In addition to the draw of a popular speaker on a popular topic, Steward's new book was available for sale at the conference, was marketed in the conference program and promoted on the conference flyers and Web site. He was even available to sign books on site.

AAPG affiliates Fort Worth Geological Society and North Texas Geological Society had recently sponsored writing of Steward's book and its printing was completed just in time for the Southwest Section meeting – partly luck, partly deliberate planning.

✓ **Sponsorships.**

Sponsorship request letters, including the conference flyers, were mailed to approximately 200 potential sponsors. By including the flyers, potential donors get a preview of what the meeting is all about and exactly what they are being asked to sponsor.

The conference organizers continually networked their contacts, talked

See **R & S**, page 61

Other 'Best Practices' That Could Help

Other "best practices" that could help you in planning an annual meeting include:

✓ **Eastern Section:** Opening session and other program elements.

The Eastern Section has a long tradition of opening each annual meeting with an opening session and honor and awards ceremony, where all Section officers are recognized and the president and meeting chair both speak.

Also recognized are the attending AAPG Executive Committee members, the executive director and the national officer candidates. All three Division presidents address the audience.

In addition, the Section has sessions sponsored by the three Divisions and an

all-division luncheon.

✓ **Pacific Section:** Regional industry joint meetings.

The meeting format that works well for the Pacific Section is the regional annual meeting; the Section instigated joint meetings with SPE and GSA, in addition to the usual participation from SEPM and SEG.

The Pacific Section takes the lead by organizing a convention committee that draws from various areas (not just the local society).

✓ **Gulf Coast Section:** Convention continuity committee.

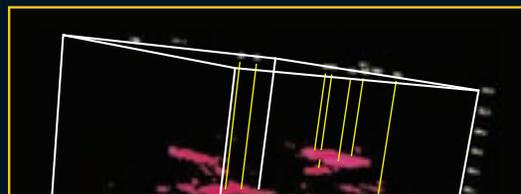
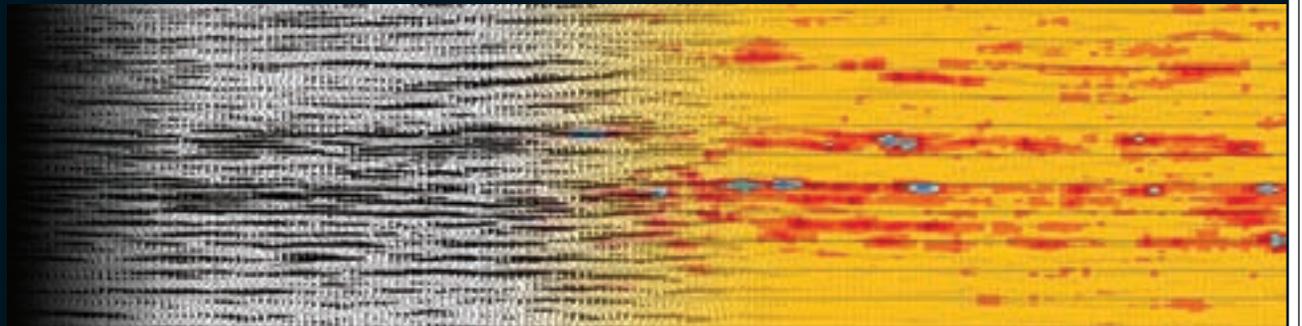
In the past each convention committee was faced with trying to put together a

convention, and since most of us are oil and gas people we were reinventing the wheel each time. The new Continuity Committee consists of: the GCAGS president; the previous year's general chairman (who also heads the committee); the previous year's president; the current general chairman; and the incoming general chairman.

The goal is to develop a template for how to run a convention so small societies can host; to establish a convention bank account that will include the credit card information necessary to take convention registration payments; and saving electronic committee reports, documents and spread sheets that can be utilized by upcoming convention committees. □

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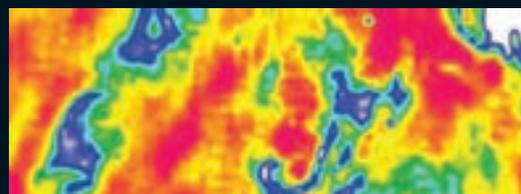
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PROFESSIONAL NEWS BRIEFS

Tim Allen, to geology team leader-northern asset (Brent), Shell E&P, Aberdeen, Scotland. Previously principal geologist, RPS Energy, Dorchester, England.

Jim Bennett, to geoscientist, Schlumberger, Houston. Previously vice president, Klepp Environmental Services, Hillsborough, N.J.

Gerry Blackshear, to geoscience manager, Comstock Resources, Frisco, Texas. Previously geoscientist-growth and new opportunities, EnCana Oil & Gas, Dallas.

Sokari Percival Braide, to Shell-sponsored professor of geology, University of Port Harcourt, Port Harcourt, Nigeria. Previously senior regional geologist, Shell Nigeria E&P, Lagos, Nigeria.

Timothy R. Cook, to senior project manager-facility closure group, Golder Associates, Wixom, Mich. Previously environmental project management consultant, Ford Motor Land Development, Dearborn, Mich.

Adam DeVries, to geologist, Chesapeake Energy, Oklahoma City. Previously geologist, Dominion E&P, Oklahoma City.

Shannon Dulin, to associate geologist, Chesapeake Energy, Oklahoma City. Previously geologist, Lario Oil and Gas, Denver.

Steve Gast, to Peru country manager,

ConocoPhillips/Burlington Resources Peru, Sucursal Peruana, Houston. Previously manager-integrated earth modeling, ConocoPhillips, Houston.

William E. Gee, to senior geophysicist, Chesapeake Energy, Oklahoma City. Previously staff geologist, Minerals Management Service, New Orleans.

Richard A. George, to senior staff biostratigrapher, Paleo-Data, New Orleans. Previously biostratigrapher, Total Biostratigraphic Services, Slidell, La.

Jon W. Giffin, to senior geologist, Chesapeake Energy, Oklahoma City. Previously advanced senior geologist, Marathon Oil, Houston.

Don Harville, to manager-Reservoir Technology Center, Chesapeake Energy, Oklahoma City. Previously manager-rock properties, Core Laboratories Canada, Calgary, Canada.

David A. Hatcher, to exploration manager, Royalty Exploration, The Woodlands, Texas. Previously consulting geologist, Royalty Exploration, The Woodlands, Texas.

Matt Herrin, to associate geologist, Chesapeake Energy, Oklahoma City. Previously student New Mexico Technology, Socorro, N.M.

Alan W. Jackson, to senior geologist, Chesapeake Energy, Oklahoma City. Previously vice president-geosciences,

Freedom Energy, Edmond, Okla.

Michelle Johnson, to geologist, Chesapeake Appalachia, Charleston, W.Va. Previously geologist, Continental Resources, Mount Vernon, Ill.

Madhurendu B. Kumar has been awarded the Ben H. Parker Memorial medal by AIPG. Kumar is director of the geological oil and gas division for the state of Louisiana's Office of Conservation, Baton Rouge, La.

Robert A. "Bob" Lamarre, to vice president-exploration, Black Diamond Minerals, Denver. Previously president, Lamarre Geological Enterprises, Denver.

Henry M. Lieberman, to senior advanced geologist, international new ventures, Marathon Oil, Houston. Previously senior geological adviser, Occidental Oil & Gas, Houston.

Daniel B. Linger, to senior explorationist, Crimson Exploration, Houston. Previously staff geologist, lower 48 exploration, ConocoPhillips, Houston.

Lowell K. Lischer, to president, Texas Onshore Resources, Houston. Previously consulting geologist, San Antonio.

Jim Lowe, to consulting geologist, Devon Energy, Houston. Previously senior staff geologist, Anadarko Petroleum, The Woodlands, Texas.

Herb Martin, to exploration/exploitation manager-western division, Devon Energy, Oklahoma City.

Previously exploration supervisor-southern division, Devon Energy, Houston.

Louis J. Mazzulo, to senior geologist, Brigham Exploration, Austin, Texas. Previously western U.S. exploration manager, Mediterranean Resources, Austin, Texas.

Allen Middleman, to senior geologist, Chesapeake Energy, Oklahoma City. Previously Rockies geoscience supervisor, ConocoPhillips, Midland, Texas.

Steven R. Moore, to exploration planner, BHP Billiton, Houston. Previously section leader-GOM deep shelf gas, BHP Billiton, Houston.

William J. Moulton, to vice president-technical, Treador Resources, Dallas. Previously senior international geophysicist, Treador Resources, Dallas.

Duncan Nightingale, to director-business development, Danagas, Sharjah, United Arab Emirates. Previously general manager, EnCana International (Oman), Muscat, Oman.

Mark Pasley, to senior staff geologist, Qarun Petroleum, Apache Egypt Companies, Cairo, Egypt. Previously senior geologist, BP Egypt, Cairo, Egypt.

Iain Percival, to independent consultant and academic adviser,

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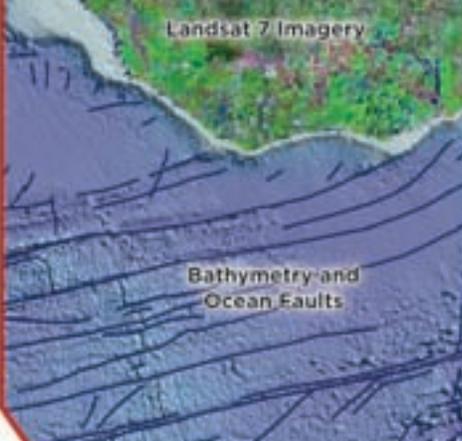
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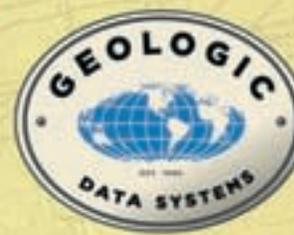
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Geologic Fault Maps



Bathymetry and Ocean Faults



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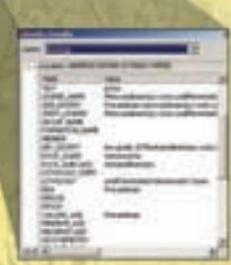
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Polygon attributed with age and lithology

continued from previous page

Westhill, Scotland. Previously retired from Shell International, Rijswijk, Netherlands.

Bogdan Popescu, to country manager, Zeta Petroleum Romania, Bucharest, Romania. Previously senior vice president-upstream, Rompetrol, Bucharest, Romania.

Michael J. Quinn, to senior geologist, Plains Exploration & Production, Lafayette, La. Previously senior staff geologist, Chevron, Lafayette, La.

Edward Ramirez, to senior vice president-exploration and production, Toreador Resources, Dallas. Previously vice president, Toreador Resources, Dallas.

Tom Schroeder, to senior staff geologist, El Paso International E&P, Houston. Previously senior staff petrophysicist, El Paso E&P, Houston.

Kelly Shultz, to associate geologist, Chesapeake Energy, Oklahoma City. Previously hydrogeologist, Enercon Services, Oklahoma City.

Terry Shyer, to president and chief operating officer, GHK Exploration, Oklahoma City. Previously vice president-planning and evaluation, Devon Energy, Oklahoma City.

Carl Standley, to associate geologist, Chesapeake Energy, Oklahoma City. Previously student, Brigham Young University, Provo, Utah.

Linda R. Sternbach, to senior geophysical adviser, Occidental Worldwide New Ventures, Houston. Previously senior geophysicist, Kerr McGee/Anadarko, Houston.

Bob Stupp, to senior geophysical adviser, Oxy Elk Hills, Bakersfield, Calif. Previously chief geophysicist, Carneros Energy, Bakersfield, Calif.

Aki Tazawa, to managing director and general manager, The Egyptian Petroleum Development Co. (EPEDECO), Cairo, Egypt. Previously general manager-Latin America business department, Teikoku Oil Co., Tokyo, Japan.

Cameron Thompson, to geology intern, Chesapeake Energy, Oklahoma City. Previously student, Oklahoma State University, Stillwater, Okla.

Sheree Thompson, to senior exploration geologist, Alpine Inc., Edmond, Okla. Previously geological consultant, Agile Seismic, Houston.

Luis Vergara, to head of regional geology, RWE Dea Egypt, El Cairo, Egypt. Previously senior exploration geologist (Poland), RWE Dea AG, Hamburg, Germany.

Paul Wagenhofer, to development geophysicist, ROC Oil (Bohai), Beijing, People's Republic of China. Previously regional geophysicist, ROC Oil, Sydney, Australia.

Matthew Weinreich, to associate geologist, Chesapeake Energy. Previously student, University of Akron, Akron, Ohio.

Jennifer White, to petrophysicist, Chesapeake Energy, Oklahoma City. Previously senior petrophysicist, Anadarko Petroleum, The Woodlands, Texas.

Eileen Wilkinson, to exploration manager, Shell Egypt, Cairo, Egypt. Previously planning and portfolio manager, Shell Middle East, United Arab Emirates.

Robert E. Zilinski Jr., to international geological adviser, Direct Petroleum Exploration, Denver. Previously senior geoscientist, Western Gas (Anadarko), Denver. □

(Editor's note: "Professional News Briefs" includes items about members' career moves and the honors they receive. To be included, please send information in the above format to Professional News Briefs, c/o AAPG EXPLORER, P.O. Box 979, Tulsa, Okla. 74101; or fax, 918-560-2636; or e-mail, smooore@aapg.org; or submit directly from the AAPG Web site, www.aapg.org/explorer/pnb_forms.cfm.)

Matson, Braunstein Award Winners Announced

The AAPG award winners for best technical presentations at the recent Annual Convention in Long Beach, Calif., have been announced.

The winners will be recognized during the opening ceremony at the next annual meeting, set April 20-23 in San Antonio.

The winners are:

George C. Matson Memorial Award

(for best oral presentation)

✓ **Cathy L. Farmer**, with BP America, Houston, for the paper "Structural and Sedimentological Evolution of the Ultra-Deep Gas Play Fairway – Gulf of Mexico

Shelf, Texas and Louisiana."

Her co-authors were Debra H. Phillips, R.H. Benthien, D.V. Dailey, B.W. Horn, D.G. Derbecker and Ken Hargrove, all also with BP America.

Jules Braunstein Memorial Award

(for best poster presentation)

✓ **Jose I. Guzman** and co-authors Rod Sloan, Shengyu Wu and Shaoqing Sun, for "A Comprehensive Classification of Seals Based on Worldwide Subsurface Analogs."

The authors all are with C&C Reservoirs, Houston.

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'Members Only' Packed With Benefits

By JANET BRISTER
Web Site Editor

Questions at the annual convention are a reminder that a review of AAPG Web offerings and features is sometimes timely and helpful.

Questions from Long Beach were a reminder to review "Members Only" – that part of our Web site containing features you as an Active AAPG member will have access to – as well as our Divisions.

For example, once you enter the Members Only area, all AAPG members have access to the BULLETIN Archives – that's all BULLETINS published since 1917 – and AAPG Pay-Per-View, which includes many other abstracts and publications produced by other petroleum geoscience groups.

Both are located at the top and to the right of this page.

Members who opt to receive their BULLETIN electronically will find the Bulletin Online button here, too.

* * *

Now let's focus on the list of links located on the same page under the big red "Welcome" line.

The Geographic Search (the big black box) is a cool tool that lets you draw a square around a geographic location to get all articles in the Bulletin Search database focused on that area.

Most of the other links are self-explanatory, but this review might reveal some features you may have missed.

✓ Pay Dues – Yes, it is that time of



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Map-based Search
(AAPG Bulletin)
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- [EMD Members Only Area](#)
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Members who enter the "Members Only" area of the AAPG Web site have access to several special features; all visitors to the Web site have access – if they want it – to an animated creation (below) that will tell you the top headlines of the day. The graphic, like the news, changes daily.



year again; use this handy link to renew your membership.

✓ AAPG Directory – Find other members of AAPG and their contact information.

✓ Review/Change My Profile – Behind this link you may review the contact information AAPG has in its database. Also, note your birthdate; in many cases we have the birth year but not the actual date, and some of us prefer to not cross over to the next number prematurely.

✓ Change My Password – Want something easier to remember (or concerned about identity theft)? Change your password here as often as you like.

✓ Print Receipts/Print Membership Card – For your bookkeeping convenience, this feature lets you print an actual receipt of your AAPG purchase. Also, should you lose your membership card, load some heavier paper into your color printer and you may print a new one.

✓ Make a Purchase – These links take you into the Bookstore, where you may purchase AAPG publications, CDs, maps and other products. You also can register for educational and meeting events.

✓ Discussion Forums – Over 10 public forums are available; private forums, for those involved based upon your access privileges, are also here.

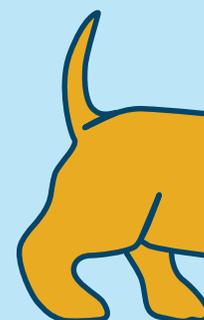
✓ Make a donation to the AAPG Foundation – This is always a good idea.

✓ Intersociety Membership – Enables

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MEETINGS OF NOTE

(* Denotes new or changed listing.)

2007 U.S. Meetings

June 13-16, American Association of Petroleum Landmen, annual meeting, New Orleans.

* June 18-21, Society of Independent Earth Scientists, annual meeting, Monterey, Calif.

* Aug. 17-19, AAPG Leadership Conference, annual event, Keystone, Colo.

Aug. 23-24, Summer North American Prospect Expo (with AAPL), annual meeting, Houston.

Sept. 9-11, Mid-Continent Section, annual meeting, Wichita, Kan.

Sept. 16-18, Eastern Section, AAPG, annual meeting, Lexington, Ky.

Sept. 23-28, Society of Exploration Geophysicists, annual meeting, San Antonio.

Sept. 23-29, Association of Environmental and Engineering Geologists, annual meeting, Universal City, Calif.

Oct. 6-9, Rocky Mountain Section, annual meeting, Snowbird, Utah.

Oct. 9-14, AAPG Foundation Trustee Associates, annual meeting, Maui, Hawaii.

Oct. 21-23, Gulf Coast Association of Geological Societies, annual meeting, Corpus Christi, Texas.

Oct. 28-31, Geological Society of America, annual meeting, Denver.

Nov. 10-14, Society of Petroleum Engineers, annual meeting, Anaheim, Calif.

2007 International Meetings

June 11-14, European Association of Geoscientists and Engineers, annual meeting, London, England.

Aug. 19-25, Society for Organic Petrology, Canadian Society for Coal Science and Organic Petrology, and the International Committee for Coal and Organic Petrology, joint annual meeting, Victoria, Canada.

Sept. 4-7, Offshore Europe (SPE), annual meeting, Aberdeen, Scotland.

Nov. 18-21, AAPG European Region, Athens, Greece.

Dec. 4-6, International Petroleum Technology Conference, (AAPG, EAGE, SEG, SPE), annual meeting, Dubai, U.A.E.

2008 U.S. Meetings

* Feb. 7-8, NAPE-North American Prospect EXPO-AAPL, annual event, Houston.

April 20-23, AAPG Annual Convention, San Antonio.

Feb. 24-27, Southwest Section, AAPG, annual meeting, Abilene, Texas.

March 29-April 2, AAPG Pacific Section, annual meeting, Bakersfield, Calif.

Sept. 3-7, AAPG Foundation Trustee Associates meeting, Jackson Hole, Wyo.

Sept. 14-20, Association of Environmental and Engineering Geologists, annual meeting, New Orleans.

Sept. 29-Oct. 1, Society of Petroleum Engineers, annual meeting, Denver.

* Oct. 5-9, Geological Society of America, annual meeting, Houston.

Nov. 10-13, Society of Exploration Geophysicists, annual meeting, Las Vegas.

2008 International Meetings

* March 3-5, GEO-Middle East Geosciences Conference/Exhibition, annual meeting, Manama, Bahrain.

* March 24-26, AAPG Prospect & Property Expo-London, annual event, London, England.

May 26-28, Geological Association of Canada-Mineralogical Association of Canada, annual meeting, Quebec City, Canada.

* June 2-5, European Association of Geoscientists and Engineers, annual meeting, TBA.

June 9-11, GEO Asia, annual meeting, Kuala Lumpur, Malaysia.

Oct. 26-29, AAPG International Conference and Exhibition, annual meeting, Cape Town, South Africa.

2009 U.S. Meetings

June 7-10, AAPG Annual Convention, Denver.

Oct. 7-11, AAPG Foundation Trustee Associates, annual meeting, Ponte Verde Beach, Fla.

Oct. 18-21, Geological Society of America, annual meeting, Portland, Ore.

Oct. 25-30, Society of Exploration Geophysicists, annual meeting, Houston. □



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Good browsing! □

Registration Opens This Month

Technical Program Readied for Athens

Something new has been added to the reasons why the European Region Energy Conference is shaping up to be a significant meeting, for both the profession and the science of geology.

Organizers have added a closing session to the meeting – an event that will celebrate and provide perspective to the findings of the technical program by recognizing the oral and poster presentations that best reflect the meeting's intent of "challenging our myths."

The AAPG European Region Energy Conference and Exhibition will be held Nov. 18-21 in Athens, Greece – the first joint venture meeting between AAPG and the AAPG European Region.

The meeting's theme is "Challenge Our Myths." The complete technical program and registration both will be available in early June.

It will offer 348 technical presentations – 228 oral papers and 120 full-day posters – with five concurrent sessions.

The sessions and exhibition will be held in the Megaron International Conference Centre in the heart of Athens.

Technical program highlights will include:

- ✓ A session on "Untraditional Theories and Ideas in Global and Large Scale Geology," which will examine the basis for the concept of subduction zones.

- ✓ Updates on recent exploration and production within key petroleum regions in the Mediterranean, North Africa, Middle East, Caspian, Black Sea, Russia,

North Sea, Norwegian Sea and the Barents Sea.

- ✓ Updates on carbonate and clastic reservoirs, structural geology, heavy oil, unconventional resources and resource estimation.

- ✓ A look at the energy supply and demand picture.

Greece's multi-dimensional history and culture also will provide the setting for a number of social activities, including:

- ✓ Visits to classical and historical locations in and around Athens –

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including Acropolis and Agora – as well as sites away from Athens including Cape Sounion and Delphi.

- ✓ Visits to archaeological and Byzantium museums, as well as art galleries such as the National Gallery and Vorres Gallery.

- ✓ Visits to high-tech locations at the Hellenic Centre, planetarium and Olympic Complex Centre.

- ✓ Day trips and excursions to nearby islands of Aigina and Spetses.

- ✓ Trips to vineyards and wineries in Attica.

More information is available online via the AAPG Web site at www.aapg.org/athens. □

Abstract Time Opens for San Antonio

The planning has begun and the first announcement has been mailed for the next AAPG Annual Convention, which will be held April 20-23 in San Antonio.

The meeting's theme is "Deliver the Conventional; Pursue the Unconventional," and members of the hosting South Texas Geological Society already have laid the foundation for what promises to be an exciting meeting.

The convention's technical program, which will involve forums as well as the usual paper and poster sessions, will be built around 12 areas. They are:

- ✓ Hydrocarbons from Shale and Coal.
- ✓ Deepwater Slope to Basin Systems.
- ✓ Structural Geology.
- ✓ Sedimentology and Stratigraphy.
- ✓ Reservoir Characterization and Modeling.



- ✓ Hydrocarbon Systems and Basin Analysis.

- ✓ New and Expanded Plays in North American and Global Basins.

- ✓ Geospatial Technology and Astrogeology.

- ✓ Environmental Concerns Related to Resource Development.

- ✓ Alternative Energy.

- ✓ Geoscience and Policy.

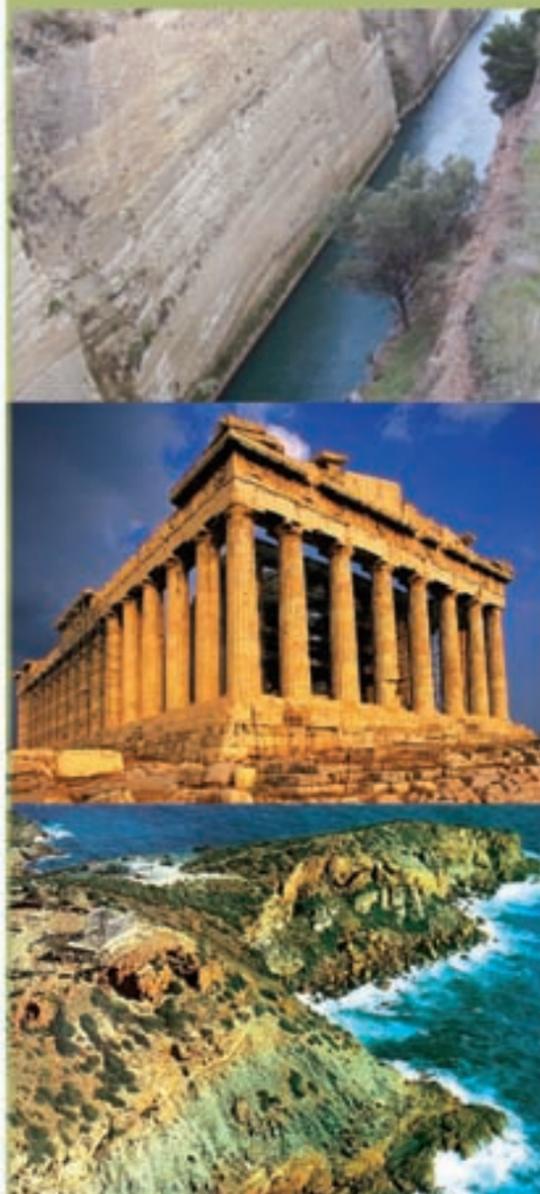
- ✓ Student Presentations.

Abstracts, which should be submitted online at www.aapg.org/sanantonio, are due Sept. 27.

Rounding out the program will be short courses, field trips and various social activities, including a traditional "A Night in Old San Antonio" party.

As usual, the convention also will include a dazzling exhibition showcase of the newest technology and geologic information, plus a variety of sponsorship opportunities – and for those wanting to participate in those areas, now is the time to make your contacts.

For either exhibition space or sponsorship opportunity details contact Marveta McNeel at 1-918-560-2692; or e-mail to marveta@aapg.org. □



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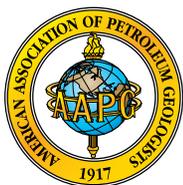
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Kenneth Todd Feldman
Robert W. Fisher
Thomas A. Fitzgerald
In memory of John L. Ponder
Michael Follis
Gary W. Ford

See Foundation, next page

New Named Grant Established

A new named grant has been established by the AAPG Foundation to recognize a qualified and deserving student whose project uniquely characterizes the nature of outstanding student research.

The new Grants-in-Aid Committee Grant will be used to financially help a deserving geosciences graduate student complete his/her field research work.

Trustee Associate and Grants-in-Aid Committee chair Pete MacKenzie contributed the initial amount needed to establish the Grants-in-Aid Committee Grant.

Additional contributions to the fund are needed, however, and can be made to AAPG Foundation, P.O. Box 979, Tulsa, Okla. 74101, or online at

<http://foundation.aapg.org/contribute.cfm>.

A list of this year's Grants-in-Aid recipients can be found in the special advertisement on page 54.

* * *

Marta S. Weeks has done it again.

Weeks, who already provided funding for four AAPG Digital Products University Subscriptions, has now provided funding to endow a fifth school – this time for Columbia University in New York City, in memory of L. Austin Weeks.

Currently 31 universities are AAPG



Weeks

Foundation recipients of digital products subscriptions, which provide students and faculty at each university access to the entire AAPG digital collection.

That includes over 600,000 pages of maps and geological information from AAPG's digital library.

* * *

Two new members of the AAPG Foundation Trustee Associates have been announced. They are:

□ Peter Dea, independent, Golden, Colo.

□ Jeff Rayner, independent, Carpinteria, Calif.

Their joining brings the Trustee Associates number to 263. □

EMD Elects Leadership For 2007-08

The Energy Minerals Division has announced the following election results:

□ President-Elect (president 2008-09) – Creties Jenkins, DeGolyer and MacNaughton, Dallas.

□ Vice president – Larry M. Knox, Dominion Exploration & Production, Houston.

□ Treasurer – Neil S. Fishman, U.S. Geological Survey, Denver.

Elected as EMD councilors were:

✓ Gulf Coast Section – Michael A. Wiley, consultant, Canyon Lake, Texas.

✓ Mid-Continent Section – M. Ed Ratchford, Arkansas Geological Commission, Little Rock, Ark.

✓ Pacific Section – James G. Clough, Alaska Geological and Geophysical Survey, Fairbanks, Alaska.

✓ Rocky Mountain Section – Laura L. Wray, Geo-Productions and Lighthouse Consulting, Denver.

✓ Southwest Section – Jeffrey R. Levine, consultant, Richardson, Texas.

✓ Canadian Region – Andrew P. Beaton, Alberta Geological Survey, Edmonton, Canada.

The new board members will assume their positions on July 1. Douglas G. Patchen, West Virginia Geological & Economic Survey, Morgantown, W.Va., will serve as president, and Elizabeth "Betsy" Campen, Campen Consultants, Billings, Mont., secretary. □

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* National Cancer Institute, Cancer Trends Progress Report–2005 Update. 5-year survival rates improved for all sites (of cancer) combined.



Foundation from previous page

Steven D. Frankamp
Christopher Dale Franks
In memory of John J. Chapman

John B. Frederick
Earl Edward Gaertner
David H. Glenn
Edmund Richard Gustason
Thomas John Heck
William A. Heck
Donald Ray Hembre
Raymond Paul Henkel
Janice L. Hill
Sumner (Dave) Hixon
Robert D. Hoffman
Owen R. Hopkins
John Alan Hord
Julius Homer Johnson
Thomas E. Johnson
Steven D. Jones
Thomas L. Jones Jr.
Charles F. Julian
Thomas C. Kartrude
David Crile Kisling
J. Dennis Loren
Laurence O. Luebke
Robert W. Maxwell Jr.
Jerry Glen McCaskill Jr.
In memory of R.P. "Lux" Wilkinson

James S. McGhay
Sandra Meyer
Rodney Lee Michel
Eva P. Moldovanyi
In honor of Susan S. Sander

Ernest R. Morrison
Joachim Peter Mueller
William J. Neal
William E. Nellist
Ronald F. Nichols
William D. O'Brien
Anne V. Oldham
John Peter Olson
Charles F. Oudin III
Charles Kenneth Petter Jr.
Cynthia Crowson Pierce
Ronald W. Pritchett
Elizabeth A. Ramsey
Penne M. Rappold
In memory of William Craig

Norman R. Rowlinson
David Cooper Salter
Robert R. Sartain
Sharon M. Sartain
In memory of Jerry Cooley

Melvin C. Schroeder
Anthony J. Skeryanc
James L. Sleeper Jr.
John Charles Smith
John Frank Sobehrad
Marion Eugene Spittler
Richard Graham Stanley
Robert Kenneth Steer
In memory of Kenneth C. Steer
Meredith Russell Stipp
David Henry Suek
Sonia Swartz
Glen C. Thrasher
Carolina Torres
Dennis B. Tower
Glen Edward Vague Jr.
Nancy Susan Vaughan
Tom Franklin Walker
Anna M.R. Wells
Cliff Merrell West Jr.
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William V. York
Frederick B. Zelt

Katrina Emergency Relief Efforts
Andrew Myron Hrycushko

L. Austin Weeks Memorial Undergraduate Grant Fund
Michael A. Dinsmore

Professorial Grant Endowment Fund
Matthew R. Cane

Roy M. Huffington Distinguished Lecture Fund
Albert Haertlein

E.F. Reid Scouting Endowment Fund
Ronald L. Hart
Bryan Haws

Eugene F. Reid Dibblee Fund
Kay L. Pitts

Special Publications Fund
Jack C. Pashin □

MEMBERSHIP AND CERTIFICATION

The following candidates have submitted applications for membership in the Association and, below, certification by the Division of Professional Affairs. This does not constitute election, but places the names before the membership at large. Any information bearing on the qualifications of these candidates should be sent promptly to the Executive Committee, P.O. Box 979, Tulsa, Okla. 74101. (Names of sponsors are placed in parentheses. Reinstatements indicated do not require sponsors.)

Membership applications are available at www.aapg.org, or by contacting headquarters in Tulsa.

For Active Membership

Alaska

Blodgett, Robert Brent, U.S. Geological Survey, Anchorage (K.B. Sralla, D.W. Houseknecht, C.G. Mull)

California

Edgerton, Deborah Ann, Aera Energy, Bakersfield (reinstatement); Wempe, Wendy, Schlumberger Water Services, Sacramento (M.A. Jacobs, R. Maric, B. Smith)

Colorado

Ellis, Eugene G., U.S. Geological Survey, Lakewood (reinstatement); Sheehan, Laura R., Venoco, Denver (K. Morrato, A.O. Elgerd, K.S. Parsons)

Missouri

Evans, Kevin Ray, Missouri State University, Springfield (R.H. Goldstein, W.L. Watney, K.J. Bird)

Texas

Bergman, Steven Clark, Shell Exploration R&D, Houston (G. Steffens, A. Bally, F. Dula); Johns, Kyle R., Denbury Resources, Plano (J.A. Mulligan, C.P. Doubek, C.L. Kightlinger); Phillips, Gary T., Texland Petroleum, Forth Worth (J.N. Namy, B.E. Lee, K.W. Davis); Riess, R. Barrett, Core Laboratories, Houston (reinstatement); Thomas, Paul Anthony, Oil States Trading, Abilene (reinstatement)

Australia

Harrison, Dennis Milton, Blue Heeler Petroleum Services, Carindale (reinstatement)

Canada

Anderson, Greg Howard, BNP Resources, Calgary (G.A. Bilcox, J.B. McKercher, B. Brownless); Bruder, Nathan, West Energy, Calgary (G.R. Bloy, B.D. Wignall, K. Meyer)

England

Bee, Alastair George, Richmond Energy Partners, Middlesex (I.A. Vann, A. Fraser, J. Goff); Burton, Lisa Michelle, Badley Ashton and Associates, Lincoln (D.M. Bliefnick, S.W. Lokier, D. Payne); Howlett, Paul, African Arabian Petroleum, Kingston (B. Mervoyer, R. Ghenima, A.D.L. Sharp); Kostic, Boris, Badley Ashton & Associates, Horncastle (K. Adamson, M. Ashton, D.M. Bliefnick)

Japan

Shiraki, Hideaki, ICEP, Tokyo (S. Sasaki, Y. Yaguchi, H. Taketomi)

Saudi Arabia

Alnaji, Nassir Saeed, Aramco, Dhahran (R.F. Lindsay, G.W. Hughes, A.M. Afifi); Grover, George A. Jr., Aramco, Dhahran (C.J. Heine, A.S.F. McWilliams, J. Melvin); Singh, Varsha, PetroSA, Cape Town (J.B. Aldrich, C.P.N. Davies, D.S. Broad)

Thailand

Tanprasat, Surassawadee, Bangkok (N.F. Hurley, J. Kaldi, D.S. Anderson)

Certification

The following are candidates for certification by the Division of Professional Affairs.

Petroleum Geologist

Colorado

Lowrey, Ronald Ovel, American Oil & Gas, Denver (reinstatement)

Texas

Goss, Chris Gene, Jones Energy, Austin (J.L. McGrew III, G.L. Stevenson, S.J. Taylor)

France

Ogunkoya, Olusola Olufemi, Total S.A., Pau (G.O. Oboh, O.T. Odusote, A.A. Adesida)



MULTIPLE HIRES IN ENERGY—SCIENCE, ENVIRONMENT, AND POLICY RESEARCH

The Jackson School is building a premier education and research program in Energy—Science, Environment and Policy Research. We seek scientists at the forefront of their disciplines attracted to challenging areas of scholarship that require collaboration across disciplines and programs. We seek to address compelling questions within the broad theme of determining how we can create an energy future that is sustainable and environmentally and economically robust. These questions include, but are not limited to:

- How can we integrate classically separated disciplines (geomechanics, geochemistry, tectonics, stratigraphy, petrophysics, geophysical imaging, regional/basin scale studies) to advance interrelationships at the forefront of energy and environmental science?
- How do fluid-rock interactions and the interplay between mechanical and chemical processes influence fluid flow and storage in the subsurface?
- How can we improve identification and recovery of energy resources by comprehensive integration of information at all scales, integrated numerical modeling, and innovative automated and continuous monitoring?
- Can we solve the compelling environmental issues associated with the extraction and use of fossil fuel energy sources, including water and land use, and carbon sequestration?
- Can we develop energy policies founded on solid scientific and engineering information and innovative approaches that will simultaneously promote environmental stewardship and energy security?

Over the next three years we will hire six or more faculty and scientists who complement our existing strengths. We are interested in a wide variety of research areas ranging from rock/fluid systems, subsurface sensing, tectono-stratigraphy, carbon management, energy economics and policy, basin-scale analysis and modeling, and resource and reserve geoinformatics. We also encourage applications from innovative scientists in other areas related to energy—science, environment and policy.

Opportunities exist at any level, and can be within or in combination with any Jackson School Unit—the Department of Geological Sciences, the Bureau of Economic Geology, or the Institute for Geophysics. The schedule of appointment is also negotiable.



MULTIPLE HIRES IN EARTH SURFACE AND HYDROLOGIC PROCESSES

The Jackson School is building a premier education and research program in Earth Surface and Hydrologic Processes. We seek outstanding scientists at the forefront of their disciplines who are attracted to challenging areas of scholarship that require collaboration across disciplines and programs. We seek to address compelling questions in surface and hydrologic processes within the broad theme of determining how surface and hydrologic processes are influenced by their dynamic setting at the interface of the lithosphere, atmosphere, hydrosphere, and biosphere. These questions include:

- How do climate, ice sheets, and tectonics interact to define the distribution and character of sea level change?
- How do coastal zone geology, biology, biogeochemistry, and hydrology respond to surficial processes, particularly to sea level change?
- What are the impacts of climate variability/change and land use change on water, nutrient, and sediment cycles?
- What is the integrated result of the interplay between tectonic deformation, climate change, and biota on the Earth's surface and on the supply, distribution, and storage of sediments?
- What are the physical, chemical, ecological processes and social forces that will determine the sustainability of our water resources?

Over the next three years, we will hire six or more faculty and scientists who complement our existing strengths. We are interested in a range of research areas from quantitative geomorphology to hydrologic-biologic interactions to societal impacts and resource sustainability, and capabilities ranging from modeling landscape dynamics to remote sensing, shallow environmental geophysics, aerogeophysics, and monitoring groundwater and coastal systems. We also encourage innovative scientists in other areas related to surface and hydrologic processes to apply. Opportunities exist at any level and within any Jackson School Unit—the Department of Geological Sciences, the Bureau of Economic Geology, or the Institute for Geophysics. The schedule of appointment is also negotiable.

Send applications and inquiries to: Office of the Dean / Jackson School of Geosciences, The University of Texas at Austin / PO Box B, University Station / Austin, TX 78713.

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IN MEMORY

Payton Victor Anderson (AC '46)
Midland, Texas

Robert Howell Barnes (AC '65)
Nashville, Tenn.

John Otis Clay, 84
Monroe, La., May 15, 2006

Donald Gene Cook, 80
Kerrville, Texas, March 21, 2007

Stephan M. Eisner, 82
Oklahoma City, Oct. 13, 2006

Douglas H. Gardner, 66
Lafayette, La., Jan. 3, 2007

Harold Ernest Jones, 87
Midland, Texas, Feb. 25, 2007

Bill Merl Keller, 78
Oklahoma City, Sept. 13, 2006

John C. Lee III (AC '78)
Cincinnati, Ohio

Douglas Ladson McBride Jr., 81
Roswell, N.M., Jan. 8, 2007

George B. McBride, 85
El Paso, Texas, April 18, 2007

William Ballou Miller, 80
Corpus Christi, Texas, Jan. 27, 2007

Burdette Adrian Ogle (AC '48)
Santa Barbara, Calif.

Forbes Smith Robertson, 91
Chesterfield, Mo., April 20, 2007

Clark Thomas Snider, 95
Wichita, Kan., Feb. 28, 2007

Dan Martin Sullivan, 78
Bloomington, Ind., Jan. 10, 2007

Coy Leon Watson, 88
Midland, Texas, Jan. 3, 2007

Cornelius Simon Verhoeven (AC '50)
Ardmore, Okla.

Gene Jacob Wiloth (AC '57)
Centennial, Colo.

(Editor's note: "In Memory" listings are based on information received from the AAPG membership department. Age at time of death, when known, is listed. When the member's date of death is unavailable, the person's membership classification and anniversary date are listed.)

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W.G.A. 2007 Field Conference
August 1 -5, 2007
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The theme of this year's WGA field conference is "The Powder River Basin – From Margins Looking In". Conference presentations will include a broad range of subjects from accurate mapping of the basin to examinations of the area's environments major industries. We will be examining the Minnelusa/Muddy formation oil and occurrences plus additional outcrops in the Black Hills. Field trips will circle the basin with excursions to the interior. Stops will include but are not limited to ISL (in-leaching) operations at the Smith Ranch Uranium Mine, surface facilities at Homestake Mine, a tour of the Black Thunder Coal Mine near Gillette and a visit to Hot Springs Mammoth Site.

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Any special needs, dietary or ambulatory please note here:

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|---|-----------------|-----------------|
| ____ Technical Session, Aug. 2 (Includes ice breaker on evening of Aug. 1; continental breakfast and lunch on Aug. 2) | \$125 | \$175 |
| ____ Field Trip, Black Hills, Aug. 3-5 (Limited to 40 participants) | \$250 | \$300 |
| ____ 2007 Guidebook "Topics in Wyoming Geology" (Prepublication price) | \$65 | \$100 |
| ____ 2007 Guidebook tax: WY residents 5% | \$4.25 | \$4.75 |
| ____ Non-members: join WGA and save (2007 membership) | \$35 | |
| Totals | \$ _____ | \$ _____ |

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Mail, Fax or Email this registration form to:
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Photos provided by Mark Radomski

Upclose and personal: The Calgary students were able to view the syn-sedimentary slump-related faulting seen within the Capistrano Formation.

Thank You

Planning, Sponsors Made Trip Possible

By MARK RADOMSKI
Over the past academic year students from the University of Calgary's AAPG Student Chapter planned and raised funds for a trip to the AAPG Annual Convention in Long Beach – and all the planning paid off as 12 students flew to California and participated in what was an educational and fun-filled week.

Prior to the start of the conference the student chapter members went on a field trip – led by Morgan Sullivan of Chevron (Houston) and Stephen Hubbard of the University of Calgary – to the famous Capistrano Formation outcrop located at San Clemente State Beach.

There we explored the wave-cut bluffs along the beach while discussing the geometry and reservoir architecture of the submarine channels and slope turbidite deposits so easily visible at this location.

It was a gorgeous, warm sunny day in southern California – made even more enjoyable by the news that back home in Calgary it was -5 degrees Celsius and snowing.

Once the conference commenced

the students were busy running from presentation to presentation during the day, taking full advantage of the exciting technical program. Evenings were spent unwinding at the Student Chapter banquet put on by the AAPG, Halliburton reception, and Saudi Aramco reception held inside the Long Beach Aquarium.

For the students it was a great conference, with much networking and learning experienced by all.

The University of Calgary AAPG Student Chapter now hopes to make a trip to the AAPG convention an annual event.

We would like to thank Dr. Sullivan for leading our field trip and all our sponsors in Calgary whom made this event happen; they include BP Canada, Canadian National Resources Ltd., Chevron Canada, EnCana, Imperial Oil, Talisman Energy and the faculty of science at the University of Calgary.

All of us students really do appreciate it! □

(Editor's note: Radomski is president of the University of Calgary AAPG Student Chapter.)



In Calgary, it was snowing – but members of the University of Calgary AAPG Student Chapter who were able to attend the AAPG Annual Convention in Long Beach took advantage of California weather by visiting and studying the sedimentary structures seen within the Capistrano Formation.

READERS' FORUM

Graduated Dues (GD)

The House of Delegates passed the Graduated Dues (GD) Amendment (GDA) in Long Beach, Calif., by an approximate majority of 90 percent. As a member of the ad hoc Graduated Dues Committee (GDC) and its chair for one year I welcomed this outcome.

Unlike our sister societies, AAPG's GDA is geographically neutral, but like them it depends upon self-reporting the general level of personal gross income (PGI). This is a weakness in the process that was discussed on three instances with GDC members participating. (GDC rejected a GD model that had no PGI factor as too complicated with multiple dues steps based on years of membership.)

Some GDC members were concerned about PGI reporting as being an invitation for abuse. The Society of Petroleum Engineers (SPE) experience of only a small percentage of members opting for lowest dues categories offset that somewhat.

However, there has been no general verification of PGI by SPE and *therefore that society does not know if there is an abuse problem*. AAPG will face the same situation.

The GDC nevertheless unanimously recommended the GDA after considering several other options. All GDC members did not volunteer their rationale, but for me it was clearly a "greater good" question. *i.e., greater good can be achieved for the Association by the GDA than existing or other choices.*

Opposition to the GDA was led by the former AAPG treasurer. I believe he identified the weaknesses of the amendment very well and wrote two

Editor's note: Letters to the editor should include your name and address and should be mailed to Readers' Forum, c/o AAPG EXPLORER, P.O. Box 979, Tulsa, Okla. 74101, or fax (918) 560-2636; or e-mail to forum@aapg.org. Letters may be edited or held due to space restrictions.

essays in opposition. These constituted pre-notice of his and others' statements and opinions offered on the floor of the House on April 1.

I did not find the past treasurer's comments out of line and certainly I took no offense to his positions. He provided a very useful and meaningful element to the vigorous debate. It is important in parliamentary procedures to illuminate all the dark corners of proposals so as to allow Delegates to form well-based opinions. Perhaps some felt the process too stressful, but that is the way it works. We are an association of independent thinkers (mostly!) – not a club. It is worth noting that the chair did not admonish any speaker at the HoD meeting.

It remains to be seen if some of the past treasurer's points prove meaningful or meaningless. Certainly, with Berlin-based Transparency International's 2006 Corruption Perceptions Index showing worldwide extremes, the past treasurer's comments about failure to verify income is concerning. (At the top, Finland, Iceland and New Zealand all at 9.6, and at the bottom, Haiti with 1.8).

Against this background I was disappointed and disturbed to read "AAPG Executive Committee Comments" in the May EXPLORER. Not content with a lopsided victory and not willing to just be self-congratulatory and move on, they singled out the past treasurer for criticism. Freedom of speech as a right, and above

that as a necessity, seems lost in their comments.

Finally, I believe we should honor the past treasurer (not criticize him) for the courage to challenge all of us to prove our case.

Patrick J.F. Gratton
Dallas

(Editor's note: The Executive Committee in no way impeded nor will impede open discussion on items of interest to the Association. Indeed, discussion was and is encouraged. Because of the importance of the graduated dues structure, we must move forward together for the greater good of the Association.)

"From each according to his ability to pay, to each according to his financial needs."

Karl Marx would have been very proud of the International Brotherhood of Geological Workers, formerly the American Association of Petroleum Geologists. Congratulations, comrade delegates! The revolution lives on in your new graduated dues regime!

But may I caution you, as a loyal comrade for the last 30 years, to take care to implement the program ruthlessly, as I fear there may be reactionary forces that will refuse to accept their correct social burden and who will try to disrupt and sabotage your progressive and visionary dues regime by inappropriately claiming

the reduced fee.

Take it from me comrades: I have lived among the notorious reactionaries in Texas for over 30 years now, and 99 percent of them would tell you that their gross personal income is none of your business.

In my opinion, they will all need to be re-educated. Good luck!

John T. Detmar
Fredericksburg, Texas

BULLETIN Impact

I was very interested in the report in the April EXPLORER about the Conasauga shale gas play in St. Clair and Etowah Counties, Ala. This play illustrates an evolution of ideas from an article published in the AAPG BULLETIN in 2001 (Vol. 85, Thomas, W.A., Mushwad: Ductile duplex in the Appalachian thrust belt in Alabama).

In that article, I proposed the concept of a mushwad, a tectonically thickened mass of shale in a thrust belt, and I suggested that the mushwad style of deformation had implications for the geometry of prospective conventional traps in the roof rocks of any mushwad. It was, of course, well known that the abandoned well, which really proved the mushwad structure, had had numerous gas shows.

What the BULLETIN article demonstrated was the large volume of potential shale gas, and that became the basis of the exploration concept. The play began with leasing within the year after the article was published, and drilling followed soon thereafter.

Only the operators could say for sure what was the impact of the "mushwad

See **Forum**, next page

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For more information or to receive a 2007 SEG San Antonio Annual Meeting Announcement, contact:

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Stamp Proposal Falls Short

The effort to issue a commemorative postal stamp honoring the 150th anniversary of the legendary Drake well (November EXPLORER) has fallen short.

Lois McElwee, coordinator for the Oil City, Pa.-based Oil 150 Committee, reported that the United States Postal Service Citizens' Stamp Advisory Committee rejected the nomination.

"We tried everything we could," she said. "We even had support from the American Philatelic Society, but to no avail."

Even without the stamp, the committee isn't licked and the plans to celebrate the anniversary continue.

"We are currently looking into producing a very special postal cache,

possibly with earlier commemorative stamps in the package," McElwee said. "These would go along with other merchandise we are starting to produce."

About 50 years ago, the postal service issued a \$.04 stamp honoring the first 100 years of the country's petroleum industry – a stamp that might be included.

In the meantime, other merchandise commemorating the sesquicentennial is being produced.

"We have some items such as lapel pins, key chains and car magnets with others still in the design stage or the review stage," she said.

Keep an eye on the developments at the oil150.com Web site. □

Forum

from previous page

article" on their exploration play. This shows an interesting succession from academic research on thrust-belt structure to an immediate application in the exploration industry, and the AAPG BULLETIN was the medium for the transfer of information!

William A. Thomas
Lexington, Ky.

Climate Change and AAPG

Some AAPG members, maybe many, are reluctant to accept that human activities (and hydrocarbon usage) have been responsible for climate change. Other members, myself included and maybe less in number, believe that such a relation exists.

Reading Jack Century's letter (March

EXPLORER), I feel reconciled with AAPG and most thankful for his courage and wisdom.

Many AAPG members do work in very respectable companies that have expressed doubts about hydrocarbon effects on climate, and whose medium range plans insist on ever-increasing oil usage. Other companies, less in number, are prudently investing in alternative energies and have expressed concern about what is happening to Earth.

So, it is clear that AAPG should leave the answer of the riddle "hydrocarbon usage vs. climate change?" to each member's opinion and should not provide a corporate dictum, as it would appear that is being imposed on us.

There is then the question of "What do we do, if hydrocarbon usage affects climate?" The answer is given in the question of the caterpillar to Alice (Lewis Carroll's *Alice's Adventures in Wonderland*): "What size do you want to be?"

Previously Alice had recited "You are old, Father William," and when the young son asked his sage father "how he could turn a back-somersault in the door, even if he had grown most uncommonly fat," his father answered him, "In my youth... I kept all my limbs very supple by the use of this ointment-one shilling the box. Allow me to sell you a couple?"

In line with Alice's observations in *Wonderland*, we notice how climate change has had to do with a growing number of uncommonly fat (obese people) in our world. For people and countries to become supple again will require them to sacrifice, to be more efficient, to prize and reward its top professionals and to be happier with less CO₂.

Anyway, there are not enough resources in the world to give everybody the "W" Standard of Living."

Jon Sanjuan Etxebarrieta
Bakio, Spain

He Liked It

Regarding Simon Winchester's *The Map That Changed the World*: I purchased the CD and book at the recent AAPG Annual Convention in Long Beach. I really appreciate Simon Winchester's completed study on the life and achievements of William Smith – in particular, his historical account of the practical geologist who was the first authentic stratigrapher and geologic mapmaker.

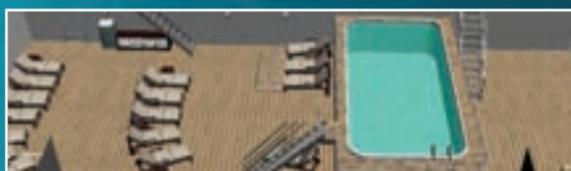
William Smith was remarkable in many ways. I was impressed by his extensive travel in a time when it was so difficult to travel. He had the solid makings of a modern day oil finder, willing to give up so much in pursuit of his geologic studies.

William Smith is now closer to my heart than I ever thought possible, thanks to this book.

John T. Williams
Ventura, Calif. □

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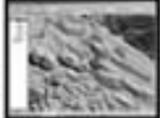
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R&S
from page 47

enthusiastically about the meeting and eventually, secured enough sponsorships to underwrite the cost of the entire meeting.

Sometimes, it is an effective technique to ask local area businesses to sponsor a specific event like a field trip or all-convention luncheon. The Southwest Section, however, took the approach of selling sponsorship "levels" for various dollar amounts. This enabled unrestricted donations that could be applied to any conference expense.

✓ **Exhibitors.**

Exhibitors want to be seen, and conference attendees want easy access to the exhibit hall. The Southwest Section meeting accomplished both by positioning exhibitor booths in close proximity to the technical and poster sessions.

The exhibitors were centrally located adjacent to the opening session hall to ensure the best traffic flow. This location made it easy for conference attendees to walk through the exhibits in only a few minutes between program sessions.

Meeting organizers also designed the conference layout to require people to pass through the exhibits en route to the bar and food.

✓ **Memorable social events.**

"Once people are here, you want it to be a successful convention – one people will remember and come back to another year," said Reynolds, who, in addition to serving as Southwest Section president has considerable experience organizing and running social and philanthropic events.

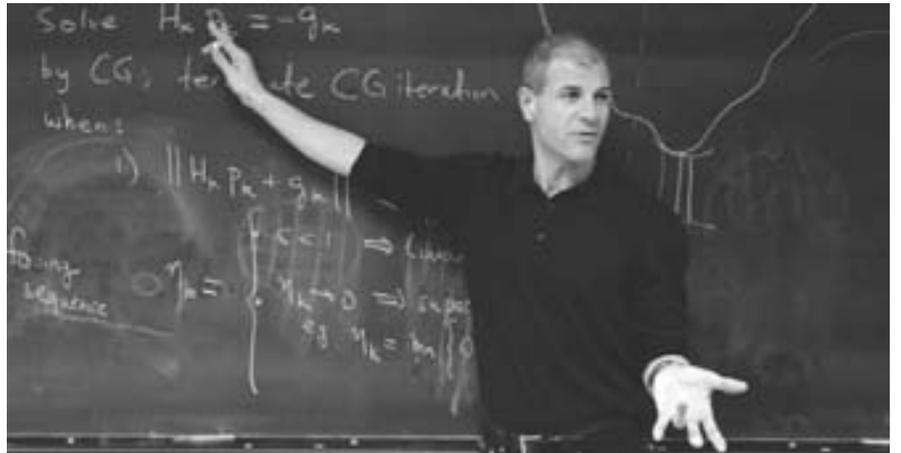
"If something out of the ordinary happens, try to handle it immediately and move forward," he said. "With many strong events, people will remember the positive things and forget the glitches."

Reynolds had local entertainment and catering contacts to call on; he knew from experience that "the conference crowd is captured at the icebreaker, so put your best foot forward at this event."

Other proven practices include keeping the music volume at a level where people can talk, and always providing complimentary drink tickets and free food at the icebreaker and Monday evening social dinner.

Sponsorships make providing complimentary food and drink possible.

"Above all," he said, "don't run out of food." □



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- Preferably, a proven record in the production of scientific publications or client reports.

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DIRECTOR'S CORNER

Politics, Science Processes Different

By RICK FRITZ

A trip to Washington, D.C., is always eye opening.

My taxi driver there was from Afghanistan and was very knowledgeable; we had a long talk about his country and world politics. It was a good introduction to Capitol Hill.

I was there attending the annual AGI Leadership Conference at the American Chemical Society building, where several speakers discussed the best ways to influence legislation.

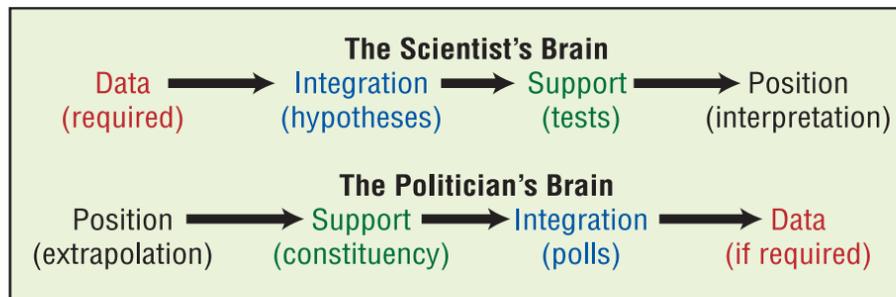
AAPG's GEO-DC office had helped build the program, along with GSA and AGU. The goals were to:

- ✓ Gain an understanding of policymakers' perceptions, interest and need for science in making policy decisions.
- ✓ Develop strategies to enhance the understanding of science among policy makers and their staff.
- ✓ Consider ways to bring scientists and policy makers together.
- ✓ Suggest guidelines and resource that can be used by geoscientist to help them communicate science to policymakers.

* * *

One of the best comments was a description of the thought process of a congressman compared to that of a scientist.

The accompanying graphic above is my modified version of that description. It makes you understand how difficult it



is sometimes for scientists and politicians to communicate – however, it is important to note that a politician is often required to make decisions within a relatively short period of time, data or no. They do not always have time to wait for scientist to check all the data, build multiple working hypotheses and come to a conclusion.

The key point, which was repeated several times, is you must sell your position. Make sure presentations to policymakers are compelling, short and to the point, with preferably a one or two-page white paper.

* * *

The effect of the media also was discussed. The rhetoric in Washington, D.C., can be wild, so it is difficult for scientists on this issue to get their information to legislators without the media presenting it in a different context.

One item that came across crystal clear is how global climate change is influencing legislation. For example, the same people who were anti-nuclear a few years ago are now saying that its time to

reconsider this source of energy.

On the way east to D.C., I was reading a letter to the editor of a local newspaper. The writer was railing against Congress for scheduling daylight savings several weeks earlier this year, thus causing an extra hour of sunlight each day and amplifying the effects of global warming.

Hmm ... I'm still thinking about that one.

AAPG's ad hoc Committee on Global Climate Change probably did not consider the "daylight savings time enigma" when they were reviewing AAPG's statement.

* * *

An overarching theme of the meeting was the importance of "grassroots" in influencing legislation. AAPG has had recent influence through the GEO-DC office and the DPA Governmental Affairs Committee contact system in influencing legislation to provide offshore access off of the Virginal coast. Over 1,500 responded.

For geoscientists who want to start

influencing legislation, it is time to use our local contacts and visit our congressmen, especially House representatives in their districts. Congressmen in Washington are pressed for time and are constantly deluged with lobbyists and special interest groups – one congressman described his life as "watching TV that someone else keeps changing channels."

At the grassroots level there is more opportunity for discussion and feedback.

AAPG's GEO-DC office along with the Governmental Affairs Committee are building a template for developing these local contacts and will set a program in place to help promote a grassroots effort.

* * *

Each time I travel to Washington, D.C., I always am amazed at how it actually works.

As an Oklahoman, I can't end a column on politics without a quote from our favorite son, Will Rogers, who said, "If I studied all my life, I couldn't think up half the number of funny things passed in one session of Congress."

He also was quoted to say, "If you ever injected truth into politics you have no politics."

Perhaps this is a good goal for a geoscientist.

Division Passes 15-Year Mark

DEG Planning for San Antonio

By JANE S. McCOLLOCH

Spring has been a busy time for DEG with the AAPG Annual Convention in Long Beach, Calif., and the Southwest Section meeting in Wichita Falls, Texas.

The DEG had an excellent technical program and a well-attended luncheon in Long Beach. Many thanks to Don Clarke, DEG vice chair/oral and poster session co-chair/awards chair, and Bob Menzie, DEG oral/poster session co-chair, for their outstanding efforts and hard work.

Thanks, also, to our DEG luncheon speaker, Lee Gerhard, for his thought-provoking presentation, and to our DEG luncheon sponsors – Tidelands Oil Production and D.B. Stephens and Assoc.

The Southwest Section meeting in Wichita Falls, Texas had a first-rate program and outstanding hospitality. Thanks to Southwest Section president Craig Reynolds, general chair Bill Stephens and DEG Southwest Section representative Kevin Hopson for all their efforts.

* * *

Much effort is going into the preparation for DEG programs and activities at upcoming meetings. A summary of DEG programs and activities for the 2008 AAPG Annual Convention in San Antonio includes:

Sessions

- ✓ Innovative Methods for Management of Produced Waters.

Field Trips

- ✓ Hydrology of the Edwards Group: A Karst Aquifer Under Stress.

- ✓ Karst Hydrology and Edwards/Trinity Aquifer Case Studies.

- ✓ Application of Near-Surface and Borehole Geophysics to Site Characterization.

- ✓ Integrated Approaches to Site Characterization and Remediation.

- ✓ Climate-Change Impact on Petroleum Facilities: Planning for Sustained Energy Flow (AAPG/DEG).

- ✓ Uranium and Ground Water: Issues and Solutions (DEG/EMD).

- ✓ CO₂ Sequestration: Geologic Challenges and Successes (EMD/DEG).

- ✓ Recent Advances in Oil Shale Technology (includes environmental impact) (EMD/DEG).

- ✓ GIS and Remote Sensing for Hurricane Monitoring and Environmental Assessment (EMD/DEG).

Forums

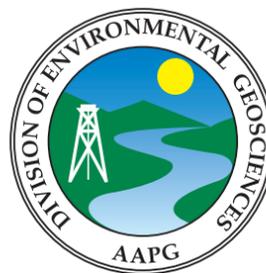
- ✓ Global Climate Change: Past and Present.

Short Courses

- ✓ Seismic and Near-Surface Geophysical Techniques for Environmental Assessment and Remediation.

- ✓ 3-D Environmental Site Characterization and Groundwater Modeling: Computer Applications.

- ✓ Field Safety for Field Trip Leaders.



Preparation also is under way for the 2008 AAPG International Convention and Exhibition in Cape Town, South Africa, which will include DEG-related themes and involvement. Michael Jacobs and Chip Groat are working on DEG participation; Jacobs has been working with the Cape Town chairs, and contacts have been made to solicit technical participation in environmental session talks/programs/forums.

* * *

Update: AAPG Special Volume On CO₂ Sequestration

Matthias Grobe, chair of the EMD/DEG CO₂ Book Committee and lead editor, reports a total of 45 papers have been submitted and have received technical reviews.

The current target date for submission to the AAPG publications department is October.

Proposed chapters are:

- ✓ Carbon Dioxide Sequestration in Geological Media – Current Status and Challenges.

- ✓ Regional Assessment of CO₂ Geological Sequestration Potential.

- ✓ Methodologies for Evaluation of Sites for Geologic Carbon Dioxide Sequestration.

- ✓ Experience and New Results from Current Geological Sequestration Projects.

- ✓ Modeling and Simulation of Carbon Dioxide Geological Sequestration.

- ✓ Insights from Natural Carbon Dioxide occurrences.

- ✓ Monitoring Sequestration Performance.

- ✓ New Approaches to Carbon Dioxide Sequestration in Geological Media.

- ✓ Economics and Regulatory Aspects of Carbon Dioxide Sequestration.

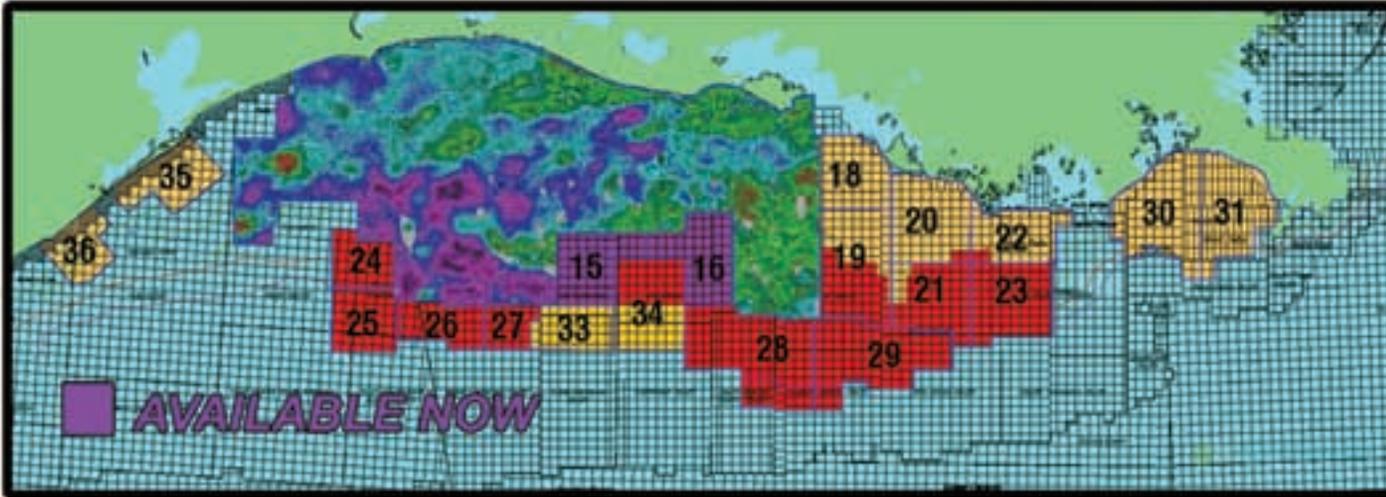
* * *

As AAPG's Division of Environmental Geosciences marks its 15th anniversary this year, it is most appropriate to recognize the hard work of the many individuals and groups that have contributed to the success of DEG and its quarterly peer-reviewed journal *Environmental Geosciences (EG)*.

Many thanks to the DEG membership who support the Division and the EG through their dues, to all who have contributed and those who continue to contribute to the success of the DEG. □

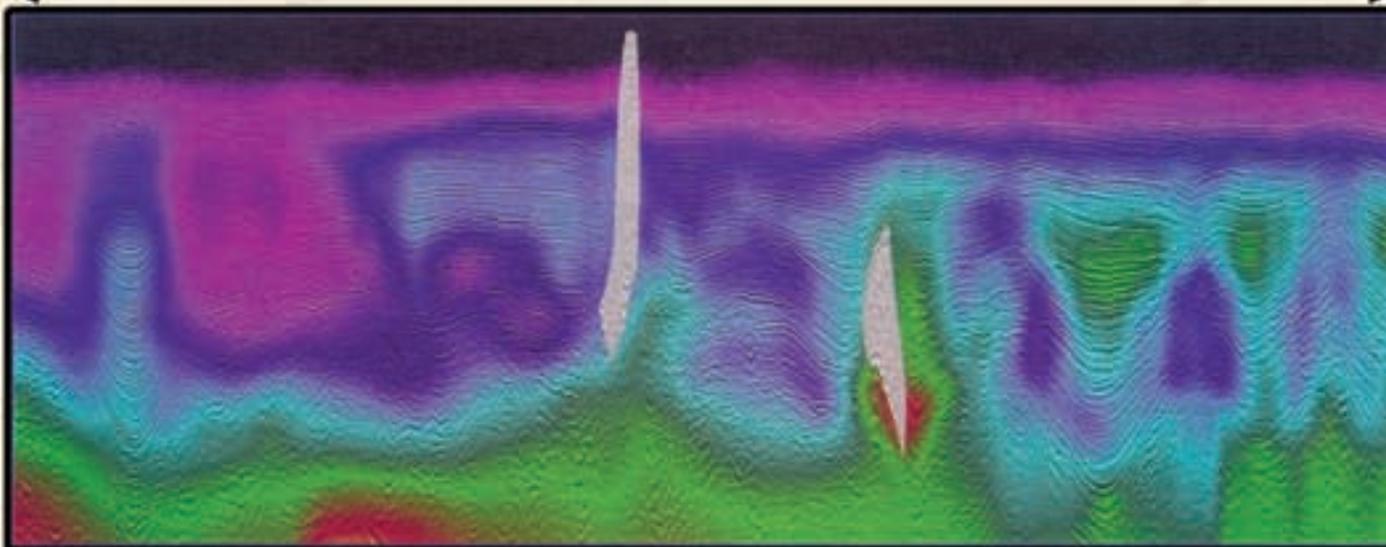
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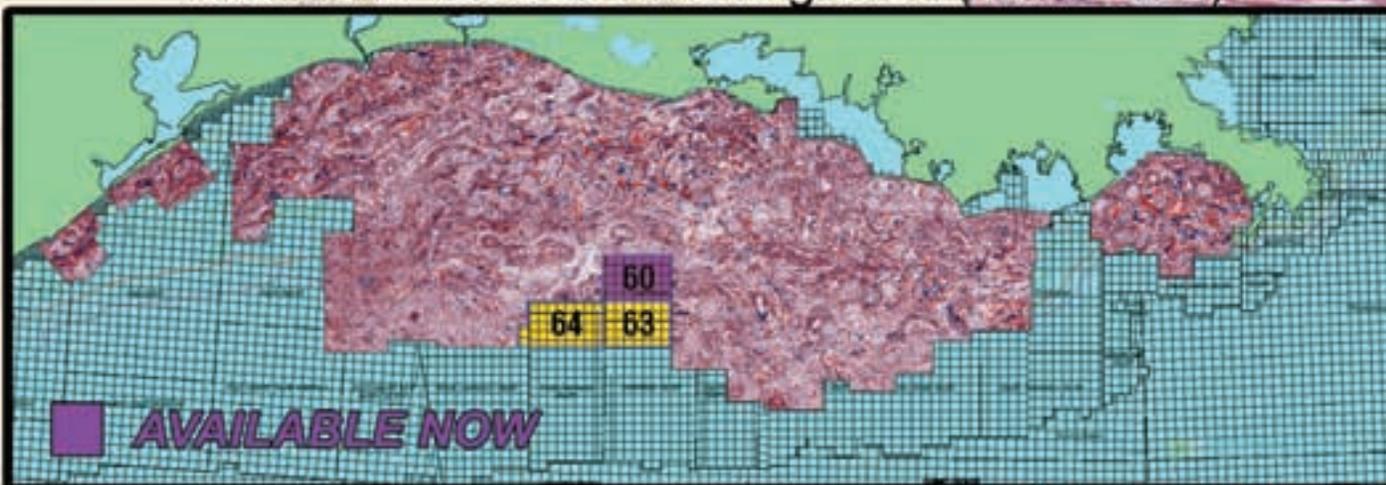
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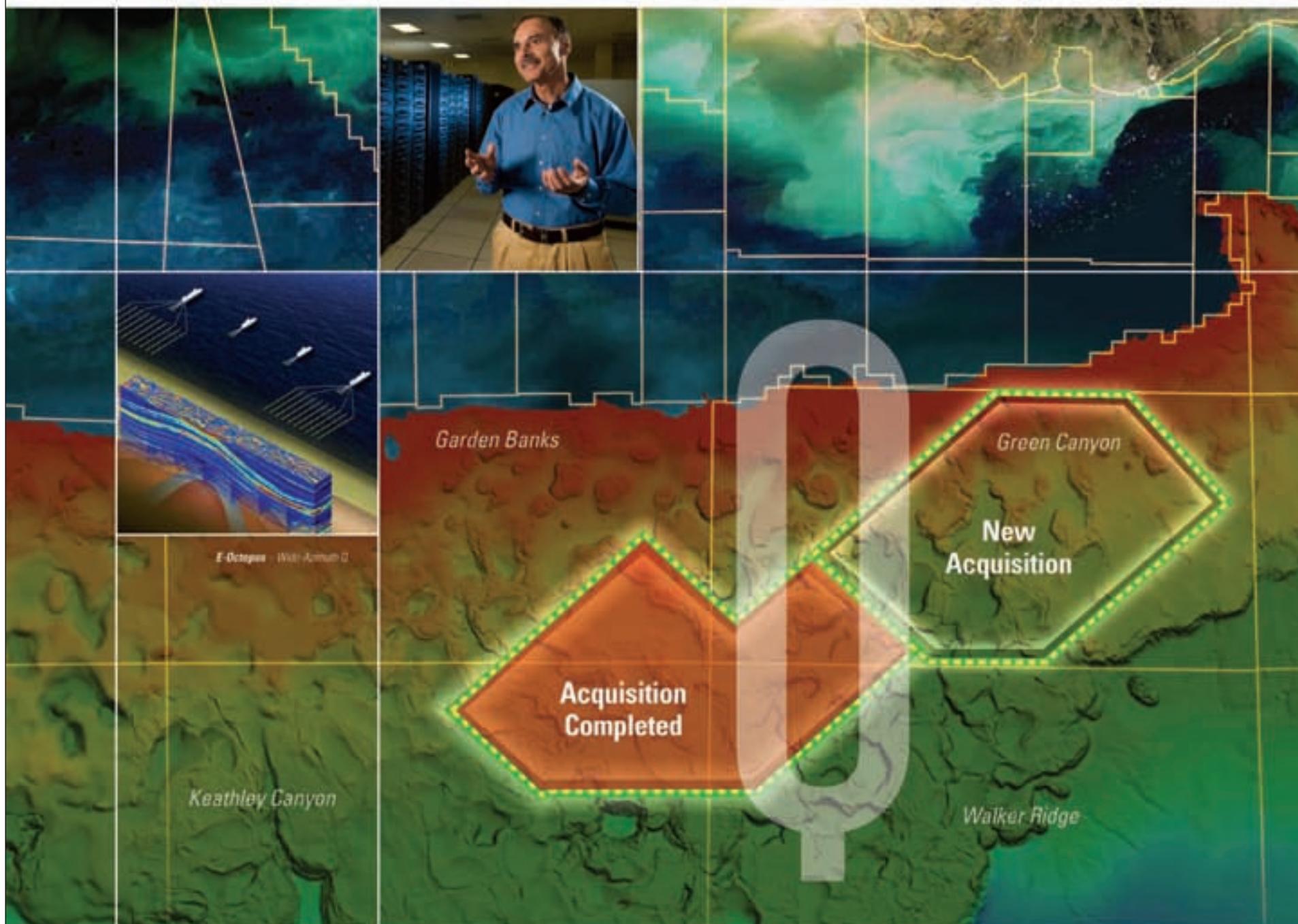


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