

Where Have all the Geoscientists Gone?

...and Why it's a Big Problem for the
Energy Sector

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Executive Summary

The oil & gas industry's well-recognized human resource crisis is worsening as an acute shortage of geoscientists intersects with a growing demand for geologists and geophysicists.

Without sufficient geoscientific staff experienced in acquisition and divestiture (A&D) demands, independent oil companies that either want to acquire new properties or divest themselves of potential producing assets may not have the right team to make the most profitable decisions.

An immediate answer to the crisis is to turn to proven consulting firms for successful A&D projects. The long-term solution remains rooted in increased education and training.

The Big Problem

A global recession, dwindling hydrocarbon resources, and rising exploration and production costs are cyclical issues that pale in comparison to the oil and gas industry's biggest problem -- its longstanding crisis of an exponentially shrinking pool of skilled and experienced professionals. This predicament is exacerbated by the world's insatiable demand for oil and gas; a demand that may go unmet for the seemingly simple reason that the industry's human resources are at capacity.

At a time when natural resources are at a premium, the demand for geoscientists could not be greater. However, there simply are not

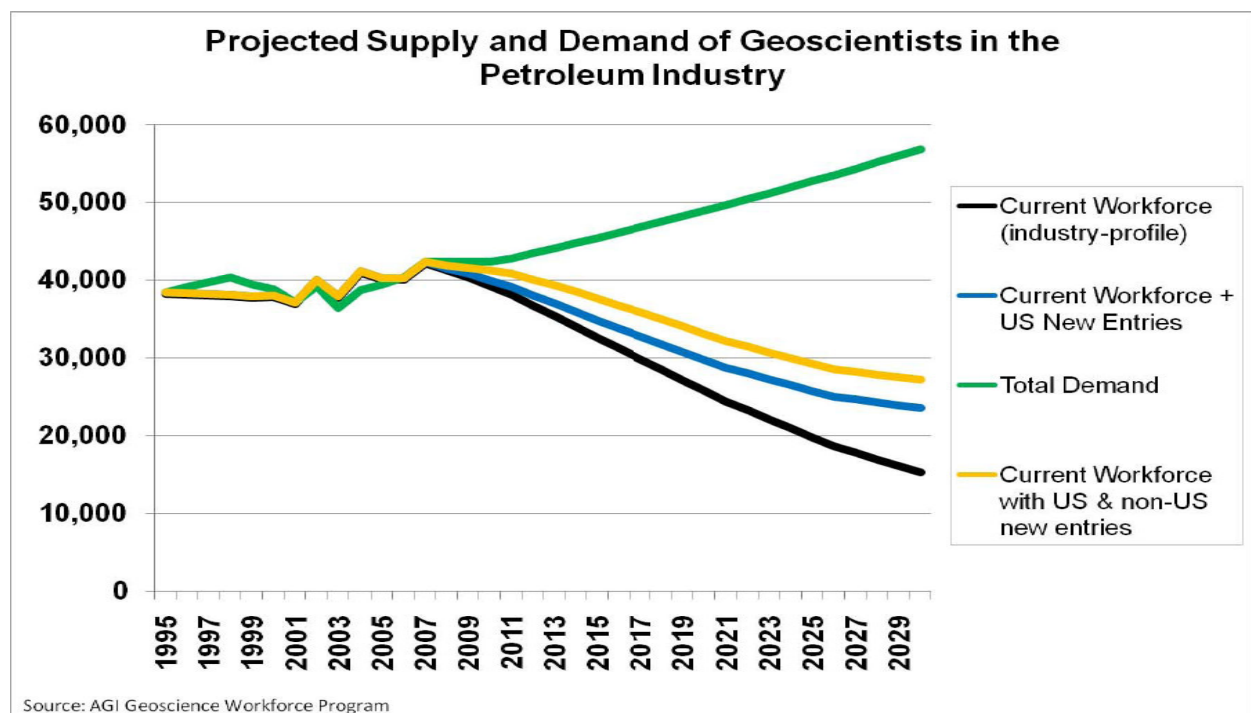


Figure 1 AG Geoscience Workforce Program.

enough geoscience graduates to meet demands during the next decade. This growing shortage of geoscientists requires action now, warned the University of Akron Geology Professor Dave Steer, who is the newly elected president of the National Association of Geology Teachers (NAGT). Steer recently addressed the topic during his keynote address at the 2008 American Geological Institute Member Society Council Meeting in Houston.

The shortage of geoscientists comes at a time when demand for them is actually increasing because of current market conditions in traditional sectors, as well as in emerging industries. Subsequently, not only is the

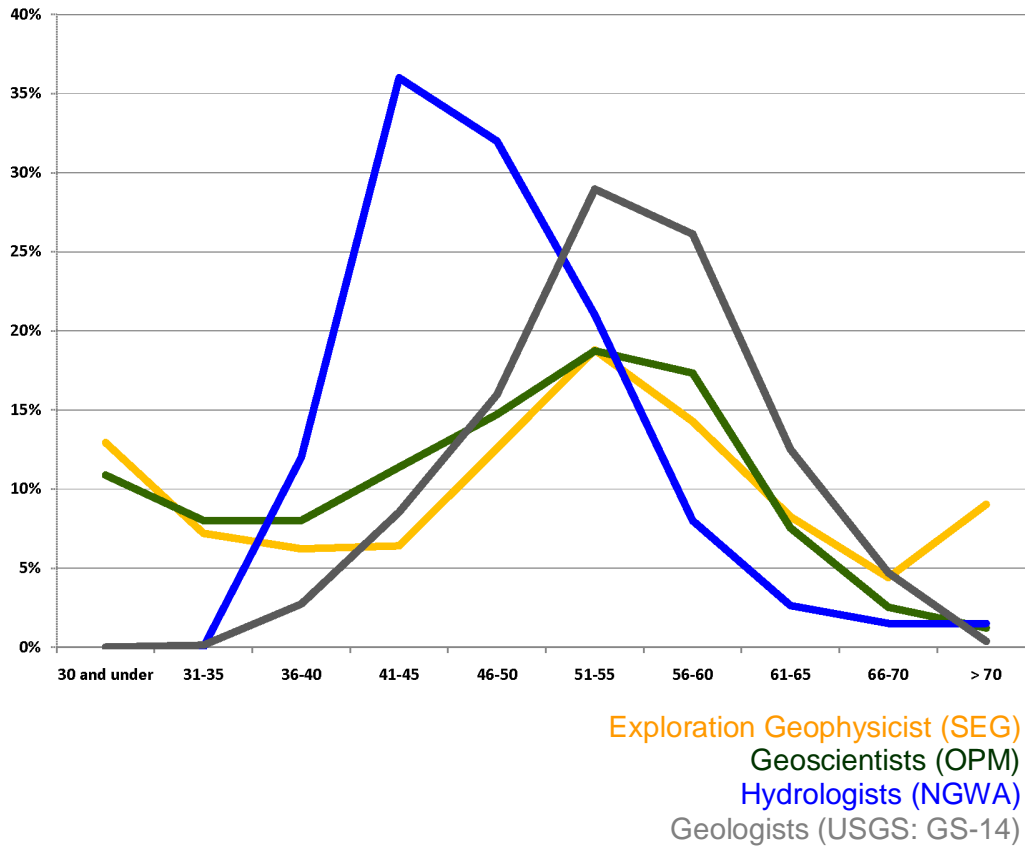
oil and gas industry clamoring for geoscientists, there is also an emergent need for geoscientists in the growing climate change arena, according to Steer. This is supported by the U.S. Bureau of Labor Statistics' (BLS) research, which predicts a 25 percent increase in employment among environmental scientists and a 24 percent increase for hydrologists between 2006 and 2016. In addition, environmental scientists will be needed to help planners develop and construct buildings, transportation corridors and utilities that protect water resources and reflect efficient and beneficial land use, according to the most recent BLS Occupational Outlook Handbook.

The need for geoscientists is growing exponentially, although the majority of geoscientists in today's workforce are within 15 years of retirement age. According to a recent American Geological Institute (AGI) Publication, the percentage of geoscientists in the 31- to 35-year-old age bracket is less than half the percentage of geoscientists in the 51- to 55-year-old age bracket, demonstrating a marked imbalance in age amongst professional geoscientists.

This recent imbalance has slowed, in part, due to the economic downturn, which has caused some professionals to delay retirement because of retirement savings losses. But even before the recession, national labor trends from 2000 to 2006 indicated that the proportion of 65- to 74-year-olds that remained in the labor force increased from nearly one in five to one in four, according to census figures. However, even if there were enough junior geoscientists or recent graduates to immediately replace retiring geoscientists, it could take seven to ten years to close the knowledge gap that would result from the loss of seasoned geoscientists.

There is no substitute for experience. Despite computer advances, sophisticated software still requires an advanced skill set gained through years of experience and training. So, even with

Figure 2 Data Sources: Society of Exploration Geophysicists (SEG), U.S. Office of Personnel Management (OPM), National Groundwater Association (NGWA); USGS Workforce Demographics and Trends, Peter T. Lyttle 33rd IGC, Oslo, Norway, August 10, 2008 (USGS)



advanced data rendering and manipulation technology, errors can easily be made if a program is used improperly or the data are misinterpreted, potentially resulting in costly dry holes. The experienced human eye is far more capable of solving puzzles, including that of finding oil and gas, than any computer – that is why “human-powered” geoscience is so critical. Thus, no software can replace the need for strong technical supervisors and senior management to mentor technology-enamored, inexperienced employees.¹

Geoscientists Urgently Needed for Increasing A&D Activity

The gloomy economy is also serving to boost the demand for geoscientists in the oil and gas industry. The economic credit crisis and

¹ Nester, D. (2004) So, kid they tell me you have talent? *World Oil*

dropping crude prices are setting the stage for an oil industry consolidation in North America, in which cash-rich energy companies are predicted to continue growth by purchasing smaller, cash-constrained companies unable or unwilling to borrow. This predicted consolidation will increase Acquisition and Divestiture activity, for which geological services are a necessary step in the process.

Simply put, cash is king, and without it, producers unable to get once readily available credit are being forced to sell assets to service debt. David Heikkinen, an analyst with energy-focused investment bank Tudor Pickering Holt & Co, echoed this sentiment in a recent *Wall Street Journal* article when he stated, "There are a lot of property packages on the market right now."²

In this buyers' market, cash-flush energy companies have a distinct advantage over highly leveraged, cash-strapped companies, which often lack the internal expertise to adequately handle the acquisition/divestiture process. A selling company may quickly come to realize that a lack of qualified, experienced geoscientists equates to a lack of internal support for successful A&D. With divestitures especially, seasoned geoscientists assure diligence "beyond the sale" by overseeing the total asset portfolio to determine which assets to consider including in a package, and which assets have significant upside exploration potential that equates to higher value. Geological and geophysical interpretation experts also staff data rooms, both virtual and physical, to ensure documentation is collected in a single place/space, seamless communications with potential buyers (and sellers) and reduced overhead costs. Additionally, this type of expertise is needed to review resources and identify opportunities to leverage more assets and to work with prospective buyers throughout the due diligence process.

Geoscientists are also key to the success of the other party, otherwise known as the acquiring company. Here, their expertise is needed to help identify geologic trends and targets, as well as to classify target fields and analog fields prior to data room review. They also provide scientific risk and reserve analysis.

Short-Term Answer: Consulting Companies Offer Immediate Experience

The inability to hire and retain experienced geologists, geophysicists, petroleum engineers, and landmen is so pervasive that many companies are luring qualified professionals out of retirement as contract employees or part-time help in order to meet business demands. Alternatively, oil

² Casselman, B. (2008) **Cash-Rich Oil Firms Snap Up Assets**. *The Wall Street Journal*

and gas companies are tapping the experienced resources of geological and geophysical (G&G) interpretation consulting companies that offer a full range of services, including regional geologic studies, exploration evaluation, integrated field studies, and increasingly important A&D assistance.

Today, a significant number of the most experienced geoscientists are part of these integrated third-party G&G consultancies. When appropriate, these firms deliver integration of all geological information and seismic data, by experienced, knowledgeable professionals. The immediate deliverables include comprehensive evaluations with integrated seismic and petrophysical attribute analysis, with the chief advantage gained by using consulting firms' senior-level, versus less experienced, geoscientists being *time*. Experienced, senior-level geoscientists can complete a job more quickly, more efficiently and with a higher level of accuracy. The result can be shortened cycles of successful A&D.

Long Term Solution: Education is the Key

Fixing the root problem is critical, though. Corporate citizens among the oil and gas companies also support geosciences education efforts as a corporate philanthropy. For example, geoscientists from several companies tackled the oil and gas industry's human resource crisis head on during a recent event in Houston. The INEXS-sponsored event launched the Judson Mead Geologic Field Station of Indiana University's Endowment Campaign - Touching the Heart, Inspiring the Mind - to address not only the oil and gas industry's human resource crisis, but also the lack of field training available to geoscientists. There has been a dramatic decrease in available field courses, which has gone from 250 in the 1980s to less than 70 now. The Judson Mead Geologic Field Station in the Tobacco Root Mountains of Montana is recognized as one of the top geosciences field programs and facilities in the world. Lee J. Suttner, Ph.D., and Robert Shrock, Ph.D., Emeritus Professor of Geological Sciences and Director of Development for the Field Station, emphasized the importance of the program by stating, "The demise of field station programs seriously jeopardizes our nation's ability to train the future workforce of geoscientists in the critical skills that are essential for careers in energy and environmental industries."

Large major oil companies have invested in global training centers to provide hands-on experience annually to nearly 10,000 students. Shell, for example, takes a multi-pronged approach to recruiting graduates, according to the careers page of its [Web site](#). One is Shell Recruitment Day, which is an eight-hour day of exercises, presentations and a group discussion to determine the level at which potential employees cope with different business scenarios and to assess each candidate's potential for

business or technical leadership. The second method is participation in the Gourami Business Challenge. Gourami is a fictional country and is the setting for Shell's interactive business challenge - held in a number of locations worldwide in which candidates work with a team to develop and present a viable five-year business plan. Shell's final recruiting method is the tried and true internship route.

As many industry geoscientists are reaching retirement age, there is an increasing desire to ensure the legacy of knowledge in future generations. Education initiatives for grade school children are championed by a group called GeoFORCE. The mission of GeoFORCE Texas is to inspire the next generation of geoscientists, foster increased diversity in the Science, Technology, Engineering & Mathematics (STEM) workforce, and create an increased awareness of the importance of the geosciences in the communities that the program serves. GeoFORCE employs curriculum content and teaching strategies that enable students to apply curriculum to real life situations and provides opportunities for students from varied backgrounds to learn effectively. GeoFORCE Texas was launched to address the pressing need to inspire the next generation of geoscientists through a collaboration of academics, government and industry (i.e. BP, Chevron, Devon, ConocoPhillips, ExxonMobil, Marathon Oil, Shell Oil, Vulcan Materials), according to its [Web site](#). Additionally, the American Geological Institution's (AGI) Education Department has created a comprehensive portfolio of geoscience educational materials and resources for students and teachers — from kindergarten to high school and beyond. Through AGI, geoscientists can provide Earth science enrichment for students, especially in school programs at the K-12 level. The free outreach guide is available at <http://www.agiweb.org/education/aapg/index.html>.

Conclusion

The oil and gas industry's biggest problem is its longstanding crisis of an exponentially shrinking pool of skilled and experienced professionals. The lack of invaluable senior-level experience is blamed frequently on the feast-or-famine cycles of the industry in the 1980s and 1990s. Many former oil and gas workers did not return to the table after the famine; thereby leaving a new millennium legacy of aging, irreplaceable executive leadership on the brink of retirement. Alex Mills, president of the Texas Alliance of Energy Producers, noted in a June 8 press release that following the crashes of 1986, 1994, and 1998 many professionals left the industry permanently for other less volatile industries. Industry's extreme swings also brought on a wave of industry consolidations. Since the early 1980s, the industry has witnessed a wave of mergers and

acquisitions that have resulted in not only a new group of major oil companies, but also job layoffs.

Fast forward to present day -- demand for hydrocarbons is at record peaks, while the geoscientists needed to locate it are increasingly hard to find. The relatively few experienced geoscientists available are retiring in record number, while recent graduates are being lured into emerging environmental fields.

The 2008-2009 economic recession has one redeeming value: it has spared the oil and gas industry the loss of some of its most experienced geoscientists who have chosen to stay employed to recoup some retirement savings losses. Many of these senior-level geoscientists are spending some of their delayed "retirement" as resident experts at geological and geophysical interpretation consulting firms.

The slumping economy is another reason that G&G interpretation services are in high demand. The cash and credit crunch will usher in a wave of A&D activity, for which geological services are necessary. The lack of qualified, experienced geoscientists equates, however, to a lack of internal support for A&D. Again, G&G consulting firms represent an immediate remedy. The long-term solution is education and training.

About INEXS

INEXS™ is a relationship-driven geological and geophysical interpretation consulting company offering a full range of services (regional geologic studies, exploration evaluation, integrated field studies, A&D assistance) – all evaluated and delivered using the latest technologies by highly skilled and experienced human beings.

About Craig Davis

Craig Davis is the president of INEXS™, which he co-founded in 1990 to provide premium quality geophysical and geological consulting services to the worldwide oil and gas industry. He is actively involved with the management of many of the company's projects, and is responsible for most of the large projects for major oil companies that include field evaluations, packaging and selling producing assets and major acquisitions.

In 2003-2004, Davis led a team of seven geoscientists to review, interpret, package and sell the exploration upside potential for 108 producing fields in the Gulf of Mexico for Unocal. Davis has led exploration teams on various field development and exploration projects for customers in Venezuela, Turkey, the UK, Indonesia, Eritrea, Norway,

India, The Netherlands, and numerous locations in Texas, Louisiana and the Gulf of Mexico.

Davis graduated from Indiana University in 1980 with a BS in Geology, and began working the mid-continent of the U.S. for Texaco in Tulsa. He moved to Houston to join Monsanto Oil Company in 1982, and worked the deepwater flexure trend and the Green Canyon 18 field. In 1983, Monsanto transferred Davis to London to work on the Ivanhoe and Rob Roy field developments in the North Sea, with a focus on a new 3D acquisition and ensuing interpretation using then-new workstation technology concluding in 1985. He moved to Copenhagen in 1986 to join Tri-D, and worked on several regional projects for the Danish Energy Agency. Landmark Graphics recruited Davis back in London to head up IT technical services for Europe/Africa/Middle East for two years. In 1989, Davis moved back to the US with Landmark, and founded INEXS the following year.