

# THE PERMIAN BASIN'S ROLE IN ENERGY EDUCATION: A CRITICAL NEED FOR AN ENERGY DEPENDENT WORLD

W. Hoxie Smith  
Midland College

## ABSTRACT

The Permian Basin has a reputation as the cradle of onshore oilfield technology. A major oil-producing region, it has long served as a training ground for the domestic oil and gas industry. Today, the oil and gas industry is on the front end of a serious labor shortage, with an impending loss of senior expertise to retirement. University programs in petroleum engineering and the geosciences have declined in enrollment as a result of reduced hiring by oil and gas companies. The industry has a poor public relations image that further alienates young talent. During the 1980s, unstable energy prices resulted in over a half-million job losses in the industry. The last twenty years have seen major reductions of the workforce through mergers, divestments, and deployment of new advances in automation and data gathering systems. Education will play a key role in solving the serious labor shortage that already affects domestic oil and gas operations. The Permian Basin, with its high level of oilfield expertise and the availability of Midland College's Petroleum Professional Development Center (PPDC) as a venue for continuing education, can help educate young talent and keep experienced professionals at the leading edge of technology. Short-term, companies will need to provide incentives to keep talented professionals working longer. Long-term, the PPDC's role may include outreach programs to high school and college students; industry's role may include summer jobs and intern programs to encourage students to pursue oil and gas careers. Ultimately, industry, government and academia will need to work together to make meaningful headway in assuring a viable workforce for the domestic oil and gas industry.

## INTRODUCTION

The existing oilfield infrastructure, a wealth of experienced technological expertise, and the high caliber of local continuing education facilities make the Permian Basin a smart choice for those energy investors "Banking on the Permian Basin". This basin has long been recognized as the hub of domestic oil production. And, there is an old saying in the oil business, "you find oil where it exists". Since the Santa Rita No. 1 well blew in on May 28, 1923, the Permian Basin has chronicled a colorful history of oil booms and busts. From the age of wildcatters to today's world leadership in secondary and tertiary oil recovery projects, the Permian Basin has become the premier training and technology arena for the onshore oil and gas industry worldwide. The Basin produces about 20% of the United States' crude oil supply and contains roughly 42% of the oil and gas wells in Texas, as well as 60% of Texas water injection wells (Railroad Commission of Texas, 2004).

It is no wonder that west Texas and the Permian Basin, particularly Midland/Odessa, is the leading region for the development of oilfield technology services. It is also a haven of continuing education for the oil and gas industry, and a mentoring arena for experienced professionals passing on their hard-earned knowledge to young graduates embarking on careers in the oil and gas industry. For years, oil and service companies have sent their newly hired personnel for a stint in the Permian Basin to get "practical" experience as an initiation to the oil business.

This paper discusses the critical need for energy education and the role of Midland College's Petroleum Professional Development Center (PPDC). The PPDC evolved from the July 2004 merging of Midland College's Petroleum Geotechnology Training Center (PGTC) and the former Permian Basin Graduate Center (PBGC). It also identifies Permian Basin expertise as a valuable resource for mentoring the education process.

## THE NEED FOR CONTINUING EDUCATION AMID AN UNPRECEDENTED ENERGY LABOR SHORTAGE

Today's oil and gas industry faces an unprecedented labor shortage. An incipient experience drain from retiring oil and gas professionals, rapid technological changes, and a critical national dependency on energy supplies necessitates a plan of action. Visionaries within the industry foresee the existing labor shortage worsening in the

coming years unless younger talent is recruited at a much higher rate. At the same time, university programs are graduating fewer geologists, geophysicists, and petroleum engineers (Figures 1 and 2). The National Petroleum Council reported in 1999 that more than 40% of the industry's scientific workforce would retire this decade (Hoeven, 2004).

The up-and-down cycles of the 1970s and 1980s coupled with a breakdown of world energy prices in the mid-eighties resulted in a major shakedown of the domestic oil and gas industry that has not been reversed. According to Governor John Hoeven (2004) of North Dakota and Chairman of the IOGCC's Petroleum Professionals Blue Ribbon Task Force, "We've lost about half a million jobs in the industry from roughnecks to engineers and over 50% of our folks in the industry, our oil and gas professionals, are targeted to be retiring in the next 7 to 10 years. We also face a continuing decline in both undergraduate and graduate school enrollment for the oil and gas profession."

The IOGCC reports that investment in the industry's infrastructure, and in refineries and other facilities necessary for the delivery of energy to the global economy has dropped significantly. The last major refinery was built in Louisiana over 26 years ago (Baxter, 2002).

Historically, major oil companies had large research and development centers. These industry think tanks stimulated ideas, developed the tools, and birthed new capital ventures. However, as companies sought to cut fat and improve the bottom line during times of unstable energy prices, the centers have virtually disappeared. As the developers of new technology, universities and contract service companies have replaced the R&D arms, but they too have felt the lack of proper funding and the tightening of publicly funded budgets over the last decade (IOGCC, 2002).

The information age, the growth of the Internet, and major advances in hardware and software, combined with other major developments in seismic technology, horizontal drilling, and advanced instrumentation have allowed the industry to do more with less, consolidating its manpower needs while significantly increasing efficiencies. According to the IOGCC (2002), "this set of unique factors has allowed the energy industry to reduce technical manpower requirements at a rate that has more than offset the lack of recruiting and hiring over the last 15 years. However, future improvements in efficiency from the technical revolution will not be sufficient to offset the impending loss of senior expertise that will occur in the next 7-10 years." (Figure 3)

In Permian Basin oil and gas operations, this labor shortage is already apparent. A recent article by Mella McEwen in the August 1, 2004 edition of the *Midland Reporter Telegram* is titled, "Oil Industry Struggling to Fill Labor Needs". She states, "The Permian Basin Oil industry is putting out help wanted signs." Drilling and workover contractors have got plenty of work, but the challenge is in finding experienced and dependable workers. As a result of large staff cuts during the past decade, coupled with a hesitancy to add new workers, the oil and gas operators are at capacity. Morris Burns, Executive Vice President of the Permian Basin Petroleum Association is quoted in the article, "Not only is there a shortage of laborers, but of professionals: geologists, engineers, and landmen." He underscores the point that "colleges are not graduating as many professionals as they once did, and many of those graduating are foreign students who come here for their education and then go elsewhere. Alex Mills, President of the Texas Alliance of Energy Producers adds, "You can't produce energy unless you can find it, and you can't find it unless you have people able to do the work." (*Midland Reporter Telegram*, August 1, 2004) (Figure 4)

#### **SOLUTIONS: THE ROLE OF CONTINUING EDUCATION AND MIDLAND COLLEGE'S PETROLEUM PROFESSIONAL DEVELOPMENT CENTER**

All signs point to a critical need for infusion of young talent into the industry and, just as importantly, the continuing education of existing professionals. Not only do we need to be innovative in drawing young talent to our industry, but also we should use the Permian Basin's pool of expertise as a mentoring arena, providing guidance and good stewardship to meet the challenges ahead for the industry.

To tackle the large problems that face our industry, on a national scale, the United States lacks a unified effort of government, industry, and academia. As a result of the ubiquitous impact that energy has on the economy and environment, the political fallout surrounding the industry has created a negative public image for the industry. Yet, energy is the engine that drives America. Improving this image so that younger talent is drawn into the industry provides a substantial challenge. The Permian Basin, especially Midland/Odessa as communities dependent on the

oil and gas industry, is in a position to make a coordinated effort that the country lacks as a whole. The oil and gas technological experience residing in the Permian Basin is unmatched anywhere in the world. And, investors and operators who are looking for the right environment to conduct their business (with a workforce that stays on the leading edge of energy technology) cannot find a better location to invest their energy dollars.

On July 1, 2004 the former Permian Basin Graduate Center (PBGC), a 37-year-old institution known for its quality continuing education program for the oil and gas industry, combined its resources with Midland College's Petroleum Geotechnology Training Center (PGTC). The consolidation of the two programs has created a dynamic new continuing education program, the Petroleum Professional Development Center (PPDC). The PPDC expands Midland College's ability to offer the latest in petroleum continuing education to area professionals. The Center is one of seven mid-career training centers worldwide recognized by the American Association of Petroleum Geologists (AAPG) and has the support of regional operators and service companies through an Industry Advisory Board. The Board gives ongoing feedback to the program's administrators in regard to specific training and skills needed by industry.

In response to demonstrated training needs, the role of the PPDC is to tap Permian Basin expertise, as well as national and international expertise, to educate the workforce. Facilities available at the PPDC include two state-of-the-art computer labs located at the Midland College main campus. These labs are equipped with dual-monitor Dell computer systems running Microsoft 2000 and Linux operating systems. The Center has over \$6,000,000 of donated software licenses including the foremost industry tools for geophysical and geological interpretation. The PPDC also has lecture halls, computer labs, and a distance learning room at Midland College's Advanced Technology Center located in Midland at 3200 W. Cuthbert. The third and newest location of additional facilities is at the corner of Main and Illinois in downtown Midland at the former Permian Basin Graduate Center. These quality facilities, hardware and software, as well as the professional experience of the Center's instructors, make the PPDC arguably the best oil and gas continuing education program available anywhere. The program offers pertinent courses to geologists, geophysicists, engineers, landmen, pipeline personnel, IT personnel, managers and supervisors, technicians, operations personnel, oil and gas accountants, and division order analysts. The Center also has the flexibility to offer customized proprietary courses on an "as needed" basis.

During the spring of 2004, the Center hosted technology workshops for the Permian Basin and Trans-Pecos Chapters of the Society of Petroleum Engineers. It also hosted an Environmental Regulatory Seminar for the industry, involving area Environmental Professionals, the Railroad Commission of Texas, the Texas Commission on Environmental Quality and the New Mexico Oil and Gas Conservation Division. Through its alliance with Oil and Gas Consultants International (OGCI) and its' PetroSkills curriculum, the Center has attracted students from surrounding oil and gas producing states and from countries as far away as Oman and Australia. The Center also plays host to a number of oil and gas related computer user groups.

In the coming years, perhaps the largest challenge facing the PPDC is to develop outreach education programs to attract high school and college students to oil and gas careers. Ours is a crucial and exciting industry, but it is also a widely misunderstood industry. At the family table, many adults refer simply to "big oil" when energy prices are high, as if we were at the mercy of a large conspiracy that manipulated the energy prices that our country and world economies so sorely depend upon. It is no wonder that youngsters shy away from a job market that has such an unfavorable public image.

### A CRITICAL JUNCTURE

We stand at a critical point. On March 12, 2004 Mr. Mark Maddox, the Acting Assistant Secretary for the Office of Fossil Energy, U.S. Department of Energy, addressed the Energy Council and the Interstate Oil and Gas Compact Commission's (IOGCC) Joint Meeting in Washington, DC. Among his remarks were the following:

- Total energy consumption is expected to increase at an annual average rate of 1.5 percent, or about 40 percent over the next 20 years.
  
- During that period, petroleum demand is projected to grow to over 28 million barrels a day. That's an increase of 45 percent. And most of the oil we need will be imported. Imported oil meets about 54 percent of demand today; the EIA estimates that number will rise to 70 percent by 2025.

- Annual demand for natural gas is forecast to increase by 38 percent, to more than 31 trillion cubic feet in 2025. The National Petroleum Council, in its recent comprehensive report to Secretary Abraham on natural gas supply, estimates that conventional domestic natural gas resources will be able to meet only 75 percent of that demand. We will rely increasingly on imported Liquefied Natural Gas and Arctic natural gas from Alaska and Canada to make up the difference.
- Coal demand is expected to increase by 47 percent.
- A 40 percent increase in total energy demand ... 45 percent for oil ... 38 percent for natural gas ... 47 percent for coal...
- And here's one last statistic to remind us all of the importance of fossil fuels to American life: The United States relies on fossil fuels for about 85 percent of the energy it consumes – and forecasts indicate our reliance on these fuels could exceed 87 percent by the year 2025.”

## CONCLUSIONS

Today's oil and gas industry faces an unprecedented labor shortage. And, although America's economic engine runs on fossil fuel, the industry has dramatically decreased its recruiting of new hires over the last decade. Subsequently, university degree programs are not graduating the number of geologists, geophysicists and petroleum engineers needed for vital petroleum science careers. And as a large portion of the current workforce approaches retirement, the problem is worsening. Factors that allowed operators to reduce manpower, mostly as a result of technological efficiencies, will not be sufficient to offset the predicted loss of expertise.

Short-term solutions to the labor shortage will include incentives to keep talented professionals working longer, and to attract young talent into the industry at faster rates by providing well-paying jobs. The high rate of technological change makes it increasingly important to provide continuing education to the existing workforce on an ongoing basis. Highly concentrated training within days instead of weeks or months is preferable since industry faces both a lack of expertise and a lack of time to develop knowledgeable, productive personnel.

Long-term solutions include innovative outreach programs to attract high school and college age students into the oil and gas industry by improving the industry's public image and by accurately portraying the exciting technological challenges and long-term rewards of working in the industry. Industry can also develop quality intern programs and provide scholarships for particular areas that meet their needs. Any long-term solution will need a coordinated effort between government, industry and academia.

The Permian Basin is fortunate to have experienced professionals with a wealth of oilfield expertise. The area should be used as a mentoring arena for younger professionals. Midland College's Petroleum Professional Development Center is a local facility that actively recruits this expertise, providing a venue for quality continuing education to the oil and gas workforce.

## ACKNOWLEDGMENTS

I also want to thank Dr. Emilio Mutis with The University of Texas of the Permian Basin, Department of Geology, and Dr. James Lough of Lock Haven University, Pennsylvania for their assistance in reviewing this paper.

## REFERENCES CITED

- Baxter, M., Railroad Commission of Texas, State of the Oil and Gas Industry, submitted remarks, December 4, 2002.
- Henkhaus, M., Railroad Commission of Texas, Report provided at the Permian Basin Environmental Regulatory Seminar, May 11, 2004.
- IOGCC Petroleum Professionals Blue Ribbon Task Force Report, Interstate Oil and Gas Compact Commission 2002 Midyear Meeting, Traverse City, Michigan, June 10, 2002.
- IOGCC Petroleum Professionals Blue Ribbon Task Force, Preliminary Recommendations, July 2002.
- IOGCC manpower publication, "The Petroleum Pros", Petroleum Professionals Blue Ribbon Task Force, Final Report and Recommendations, July 8, 2004.

Maddox, M., Acting Assistant Secretary, Office of Fossil Energy, U.S. Department of Energy at the Energy Council/IOGCC Joint Meeting, Washington, DC, March 12, 2004.

McEwen, M., August 1, 2004, "Oil Industry Struggling to Fill Labor Needs", Midland Reporter Telegram, Midland, Texas.

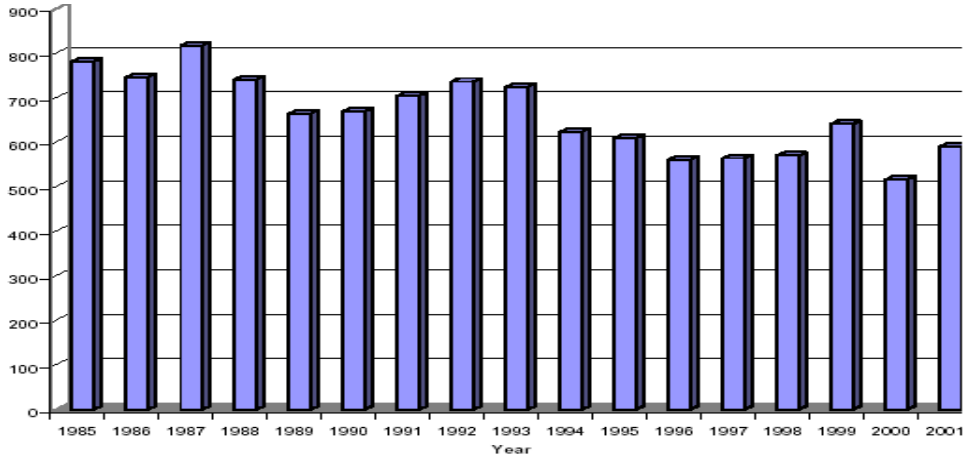


Figure 1 - Students Enrolled in Petroleum Engineering Graduate Programs (after IOGCC, 2002)

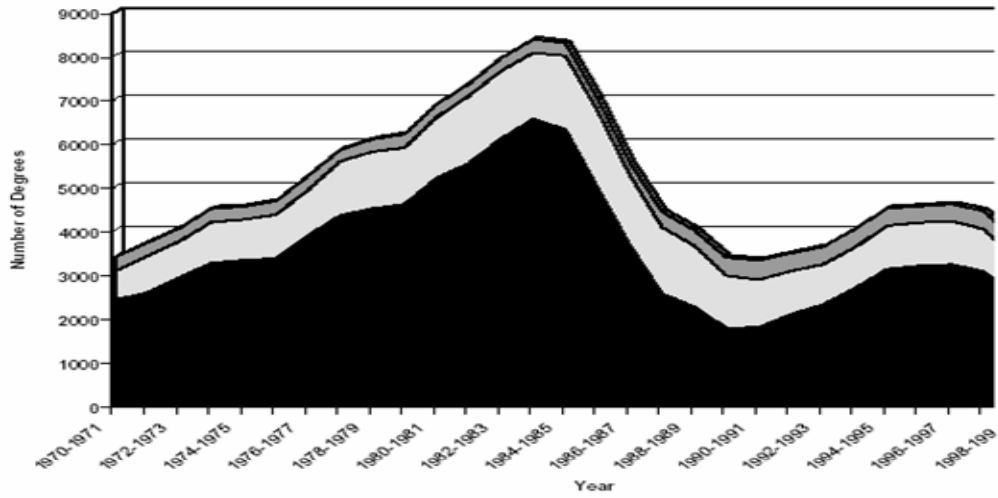


Figure 2 - U.S. Earned Degrees in Geology by Year (after IOGCC, 2002)

### Oil & Gas Industry Age Brackets

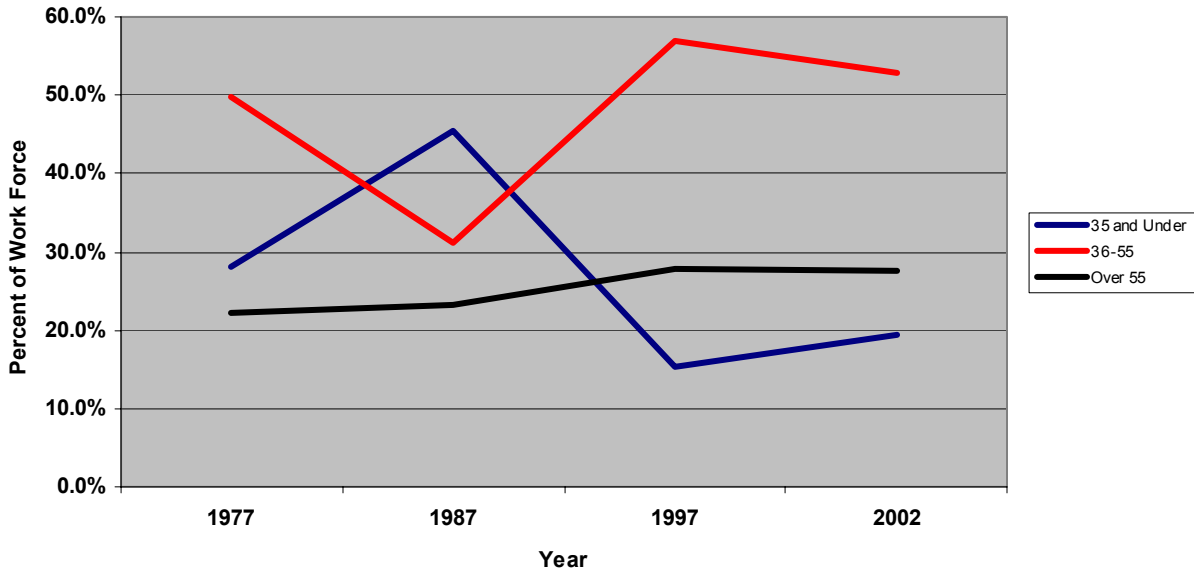


Figure 3 - Percent of Workforce for Age Groups 1977-2002 (after IOGCC, 2004)

### Degree Level of Workforce

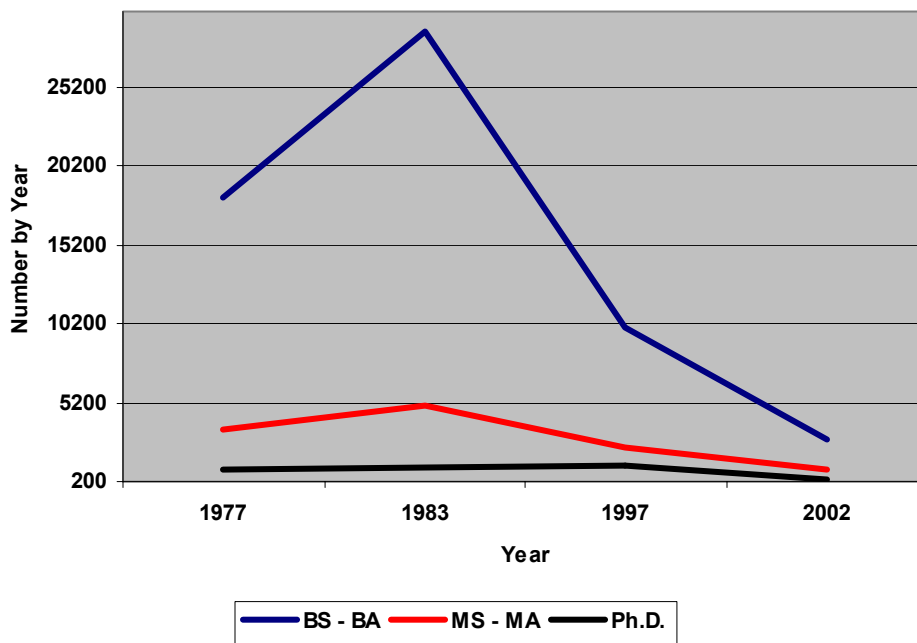


Figure 4 - Degrees in Number by Year Composing Workforce (after IOGCC, 2004)