DISADVANTAGES AND BENEFITS OF HORIZONTAL WELLS

Abstract

Horizontal well technology was originally developed for use in petroleum production and underground utility installation, but recently has been adapted for environmental remediation applications. In the environmental remediation industry, horizontal wells provide unique characteristics and advantages that can improve the effectiveness of established soil and groundwater cleanup technologies now using traditional vertical well techniques. The “steering” capability associated with some horizontal well drilling techniques allows installation in areas containing underground utilities, vertical wells, and other subsurface obstructions. Horizontal wells can be installed beneath buildings and other surface structures, allowing access for treatment to areas generally inaccessible to vertical wells. The orientation of horizontal wells compared with vertical wells may require fewer wells to achieve similar remediation goals due to the greater surface area associated with the lengthwise screened area of these wells. Horizontal screens provide greater surface area in contact with contaminated soil or groundwater, allowing more effective transfer of materials used for remedial treatment. In this paper the horizontal well technology and a review of the economic benefits and disadvantages of horizontal wells are included. Although horizontal wells have been drilled as early as 1927, the major thrust of drilling horizontal wells started in 1980. Initial wells were short length wells (about 250 ft. long wells). In 1985, the first medium radius horizontal well was drilled using a down-hole mud motor. Since then, using horizontal wells has become a common practice. Today, the medium radius drilling technique is the most commonly used drilling method.

Introduction

Some of the early horizontal well efforts date back to 1930. After World War II, with the advent of jet perforation, major industry efforts were focused on casing the drilled hole and perforating in the desired zones. The field implementation of this perforation technique was a great success and at least for a while horizontal drilling took a back seat. In the late 70’s and early 80’s, with oil prices around $35 a barrel, interest in horizontal wells was reignited. The purpose of the horizontal wells was to enhance well productivity, reduce water and gas coning, intersect natural fractures and to improve well economics. In the early 80’s, Elf Aquitaine, a French company, introduced horizontal wells to the oil industry to produce a heavy oil carbonate reservoir in the Rospo Mare Field, offshore Italy, in the Adriatic Sea. At the same time, in the U.S., several companies were using horizontal wells to reduce gas coning in the Abo Reef in New Mexico. They were also using horizontal wells to intersect fractures in the fractured carbonate reservoirs in Oklahoma, Kansas and Texas. The drilling technique used by Elf Aquitaine was very different from that used in the U.S. The Elf technology involved drilling long radius (1000 ft. turn radius, see Fig. 1) and long length (a few thousand ft.) wells. They were also using down-hole motors to turn the bit and drill wells. To date, this long radius drilling technology remains suitable to develop offshore fields around the world. In the U.S., initial efforts were with the “short radius” drilling technique where turn radius was around 30 ft. The wells were drilled using stabilizers, knuckle joint and flexible collars. A mushroom type, helical collar joint was used to provide necessary flexibility to the drill pipe to turn from the vertical to the horizontal direction in a short distance. Well completion was either open-hole or with a slotted liner. The typical well length was 100 to 300 ft. The major disadvantage of this drilling technology was its limited completion options and high cost of drilling. In the mid-eighties, the cost of drilling the 30 ft. radius well was of the order of $2000 to $3000 per ft.
To minimize this drilling cost, and to drill long length wells, a medium radius drilling technology was developed. Turn radius for the medium radius wells was about 300 ft. to 600 ft. and it utilized down-hole motors. To date, medium radius technology remains the most common method to drill horizontal wells. This drilling method provides various completion as well as artificial lift options. It is quite common to see well lengths varying from 1000 ft. to 5000 ft, short radius technology has also evolved over time and there has been significant cost reduction. This, however, remains a niche market mostly in low productivity wells in the U.S. and parts of China. In the U.S., small independents with marginal wells (production rate less than 10 BOPD) use low cost, short radius technology to enhance well production (Ali, S., et al., 2002).

**Benefits of horizontal wells**

Horizontal well remediation systems are usually faster, cheaper, and more effective than the baseline technology of vertical wells. They provide:

1. Higher rates and reserves as compared to vertical wells. These results in less finding cost and less operating cost per barrel of oil produced. In the U.S., as shown in the example in this paper, in places where vertical well operating costs are $7 to $9 per barrel of oil, the horizontal well operating costs are $3 to $4 per barrel.

2. For many horizontal well projects, the finding (developing) cost, defined as well cost divided by well reserves, is about $3 to $4/bbl. This is about 25% to 50% lower than the cost of buying proved producing reserves (O’Driscoll, K.P., et al., 2000)

3. To produce the same amount of oil, one needs fewer horizontal wells as compared to vertical wells. This results in reduced need for surface pipelines, locations, etc.

4. Improved access to contaminants at sites with surface restrictions (e.g., buildings),
5. Improved hydraulic control along leading edge of contaminant plume,
6. Minimal surface disturbance because fewer wellheads may be required,
7. Ability to monitor beneath contaminant sources (e.g., tanks, pits, lagoons),
8. Increased surface-area contact with contaminants,
9. Reduced operating expenses because fewer wells may be required, and
10. Access to off-site contamination to be treated by on-site operations.

Horizontal environmental wells can be used for ground-water or soil-vapor removal for surface treatment; in situ treatment of ground water and soil; hydraulic control of ground water; and monitoring of soil vapor or ground water (e.g., beneath contaminant sources). Horizontal wells can be installed by directional drilling or by trenching and backfilling (if specific site conditions allow it). Trenching and backfilling requires shallow depths and continuous surface access. Directional drilling can be used to install impermeable or permeable barriers and can be combined with fracturing technology in low permeability sediments. Horizontal drilling concerns include reduced permeability of the geologic formation during well installation caused by compaction drilling tools or due to introduced drilling fluids (same as for vertical drilling); and potential for drilling fluids to foul uncontaminated areas, damage equipment, and interrupt utility services, or compromise soil stability beneath pavement and structures. Costs for disposal of contaminated backfill and drilling fluids/cuttings must be assessed during technology selection. For oper-
ators, experience in directional drilling is a must, and experience in drilling water well and hazardous waste sites is preferred (Kara, D.T., et al, 2001).

**Disadvantages of horizontal wells**

1. High cost as compared to a vertical well. In the U.S., a new horizontal well drilled from the surface, costs 1.5 to 2.5 times more than a vertical well. A re-entry horizontal well costs about 0.4 to 1.3 times a vertical well cost.

2. Generally only one zone at a time can be produced using a horizontal well. If the reservoir has multiple pay-zones, especially with large differences in vertical depth, or large differences in permeability, it is not easy to drain all the layers using a single horizontal well.

3. The overall current commercial success rate of horizontal wells in the U.S. appears to be 65%. (This success ratio improves as more horizontal wells are drilled in the given formation in a particular area.) This means, initially it is probable that only 2 out of 3 drilled wells will be commercially successful. This creates extra initial risk for the project (Tribe, I.R., et al, 2003).

4. Hole cleaning. As the drillstring lies on the low side of the hole, beds of cuttings build up around the bottom of edge of the drillstring. These can be very hard to shift (fig.2).

5. Frictional forces. The power needed to turn the drillstring or to pull it out of the hole are higher on horizontal well than on a normally deviated or vertical well (fig.3).

6. Accurate navigation in the reservoir. Navigation within the reservoir is relative the reservoir characteristics and not computed according to inclination and azimuth only (fig.4).

**REFERENCES**


Министр, колдасың аялары үзгілмайдын кемшіліктері және арқылыңызғына картықылған.
Колдасың үзгілмалар алатып келісіп, тек суық әбі, газ үшінде колдасыңыз болған, бірақ сондықтан колдасың үзгілмалар көршігінін органына жакарып, әбі және калпна қалдыға мұндау.

Summary
Опшылықтың предикативына және недостаттықтықтиң арнайы сисөтерінің ретінде, горизонталдық скважина, горизонталдық скважиналық басқару жұмыстары жақсартылған, қолданылған. Скважиналық басқару жұмыстарының пайдаланылуына қатыстың, құрулысқа арнайы сисөтерінің ретінде, ал эң мағынаның ортакқа адаптифейлесуші жүктеме және мониторинг орын аударылған.

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СИСТЕМА ОЦЕНКИ КАЧЕСТВА РАБОТЫ ПЕРСОНАЛА В ВЫСШИХ УЧЕБНЫХ ЗАВЕДЕНИЯХ

Результаты работы ППС (профессорско-преподавательский состав), т.е. их вклад в достижение общей цели образования, неоднокаковы. В любой образовательной организации есть лидеры, аутсайдеры и середняки. Для выявления укрупненной дифференциации и принятия соответствующих управленческих решений в образовательной организации должна функционировать единая система оценки работы персонала.

При разработке системы оценки работы персонала необходимо учитывать следующее:
– система оценки должна быть универсальной, то есть единый для всей организации;
– оценку следует проводить на основании установленных стандартов и норм;
– для адекватности оценки работы персонала необходимо выбрать метод оценки.

Один из методов оценки персонала в организации является аттестация. Аттестация представляет собой процесс оценки эффективности выполнения сотрудником своих должностных обязанностей.

Аттестация персонала — важная составная часть управления персоналом, наиболее эффективная форма оценки кадров, представляющая собой периодическое освидетельствование профессиональной пригодности не соответствующей занимаемой должности каждого работника определенной категории.

Оценка персонала — система периодической проверки работы сотрудника за отчетный период (месяц, вторник, учебный год), оценка соответствия его квалификации, навыков, отношения к своим обязанностям. На практике же понятия оценки персонала и аттестации часто перепутаны. Поэтому под аттестацией обычно понимается то, что относится к оценке персонала и наоборот.

Регулярная процедура оценки деловых и личностных качеств работников, их трудовых показателей подразумевает использование этих результатов в целях улучшения подбора и расстановки персонала, постоянного стимулирования работников к повышению квалификации, улучшению качества и эффективности работы. Эффективность работы организации складывается в целом из эффективности использования всех организационных ресурсов, в том числе потенциала каждого сотрудника.

Цель аттестации — получение информации для принятия управленческих решений в области управления персоналом. Оценка определяет, насколько потенциал сотрудника позволяет реализовать цели вуза (необходимы сформированные цели и задачи вуза, его образ на рынке, проблемы развития), что важно для перспективных, активно развивающихся вузов с гибкой структурой и системой управления. Аттестация необходима для получения информации о текущей работе с персоналом, то есть аттестация дает информацию для корректировки деятельности и поведения сотрудников, а также для выявления областей, нуждающихся в повышенном контроле, позволяет разработать