



石油科技英语丛书
Petroleum Technical English Series

江淑娟 吴松林 编

石油钻井英语

Petroleum Drilling English

石油工业出版社
Petroleum Industry Press

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前 言

随着石油工程国际合作项目的日益增多,越来越多的石油工程科技人员需要提高英语交流水平,从而了解国际石油经济的新进展,成功地从事国际合作业务,参与国际竞争。但目前市场尚缺乏适于自学,且石油专业涵盖面较广的英语阅读教材。为此,我们编写了一套《石油科技英语丛书》,分为石油勘探英语、石油钻井英语、油田开发英语、石油化工英语和石油经济与管理英语五个分册。这五个分册基本涵盖了石油工业各方面的词汇和术语,每一分册原文均选自英语国家原版刊物,语言地道、准确,疑难语法现象及语言点均配以注释,阅读理解练习的设计科学、合理,有利于阅读理解能力的快速提高。此外,所有原文均配有准确流畅的译文,读者可借此进一步提高阅读理解的准确性,也可以通过翻译练习提高翻译能力。

有了这套教程,石油工作者就可以随时随地进行英语自学,尽快掌握本专业常用术语、词汇及表达法等,更顺利地进行对外合作业务。本教程编写过程中,广泛参阅了国际最新石油科技杂志和专著,选材具有新颖性和实用性,语言技能训练根据学习者的专业需要而有所侧重,适用对象范围广,可供石油、石化科技工作者使用,也可供大专院校师生等做 ESP (English for Specific Purposes/专门用途英语) 教材或参考书使用,更值得作为资料情报馆藏。

本书由江淑娟、吴松林担任主编,武义民、杨国俊担任副主编。在编写过程中,石油经济研究中心的王雪梅女士,高泳生先生在资料的收集、整理等方面给予了大力协助。美籍专家 John Carey 夫妇及 Barry Wallace 先生为本书做了终稿审校。李江昊、孙慧萍、田野等做了大量的文字录入和校对工作,在此一并衷心致谢。

由于作者水平有限，书中难免存在缺点和不足之处，诚望广大读者批评指正。

江淑娟 吴松林

2002年12月

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1 Drilling Site Selection

1.1 Introduction to Drilling Site Selection

Despite man's ability to make a lunar landing, take pictures of Mars, and look billions of miles into space, we still can't see what is present even one inch below ground level.⁽¹⁾ Other than a very few unique types of petroleum deposits, there is no known scientific method of determining whether a commercial deposit of petroleum lies beneath a given spot without drilling a hole in the ground.⁽²⁾ The best that technology can provide is the means to make an educated guess where to drill.⁽³⁾ And sometimes even drilling a hole in the ground isn't a conclusive method of determining the existence of a commercial deposit.

The first step in exploration is to select an isolate area to study. The selection is usually based on a very general analysis of geologic data. When a study area has been reduced to a manageable size, it is called a prospective area, or prospect.⁽⁴⁾ Once a prospect is located, some means of evaluating its potential value is needed to determine if a well should be drilled.⁽⁵⁾ If a company decides to drill the well, it must determine exactly where the best drilling site would be.

The earliest site selection method was probably based on petroleum seeps.⁽⁶⁾ It was logical to assume that if one saw oil seeping at the surface, oil was probably located directly below.⁽⁷⁾ Undoubtedly, most of the earlier discovered deposits were located by this type of surface investigation. When all possible sites that could be picked in this manner were exhausted, new selection methods were necessary.⁽⁸⁾

Another site selection technique was surface geology. This method involved visually examining the general lay of the land, looking for unusual surface features such as large mounds or faults

that might reflect similar subsurface features.⁽⁹⁾ This is a completely valid technique for locating geologic anomalies, or unusual features, that are relatively close to the earth's surface.⁽¹⁰⁾ A surface anomaly implies that a shallow subsurface anomaly also exists. If a petroleum seep happened to be in the area, the site was considered extremely promising.⁽¹¹⁾

Because surface geology is an inexpensive and reliable method of drilling site selection, it was used extensively for many decades. When companies explore for very shallow deposits, they still use the technique. However, as we exhaust the supply of shallow deposits nationwide, we must look deeper. And to find deeper structures, we must use other selection techniques.

While no scientific method of locating petroleum without drilling exists, we do know that traps caused by rock deformities within the earth are necessary for commercial accumulations of petroleum to exist.⁽¹²⁾ So most exploratory techniques utilized since the 1920s have been geared toward locating geological deformities.⁽¹³⁾ Modern drilling site selection is really based on exploring for traps and hoping the traps will contain petroleum.

Before a drilling site is selected, the traps must be located. Techniques that obtain subsurface geological information by physical measurements taken at the earth's surface are called geophysical techniques.⁽¹⁴⁾ An individual who specializes in applying these techniques is a geophysicist.⁽¹⁵⁾ Since the 1920s, geophysicists have used several different surface methods to locate subsurface traps. The popularity of a particular technique depends on the region, the surface limitations, and the relative dependability of the method.

Notes

(1) despite 介词，意思是“尽管”，“虽然”。

Despite man's ability to make... 相当于 Although man is able to make...

“what is present even one inch below ground level”为 see 的宾语从句。

(2) other than... 除了...

“whether a commercial deposit of... ground”为动名词 “determining” 的宾语从句。

(3) that technology can provide: the best 的定语从句, that 指代 the best 相当于 the best thing, 作 provide 的宾语。

to make an educated guess where to drill: 不定式作 means 的定语。

where to drill: where 引导不定式作 educated guess (有根据的猜测) 的定语。

(4) be reduced to... 缩成...; prospect 探区

(5) Once a prospect is located: 一旦探区被确定, once 为连词, 引导状语从句。

to determine if a well should be drilled: 不定式作状语。

if a well should be drilled: if (是否) 是连词, 引导从句作 determine 的宾语。

(6) seep 渗漏

(7) It was logical to assume that if one saw oil seeping at the surface: it 是形式主语, 真实主语是 to assume. that 引导的复合句 if one...below 是 assume 的宾语从句。

(8) When all possible sites that could be picked in this manner were exhausted: 时间状语从句。主语是 sites, 谓语是 were exhausted. “that could be picked in this manner” 是 sites 的定语从句。

(9) examining ... 动名词短语作 involved 的宾语。

looking for ...features 现在分词短语作伴随状语表示目的。

(10) that are relatively close to the earth's surface: 定语从句修饰

饰 anomalies, or unusual features

(11) happen to... 恰巧...

(12) While no scientific method of locating petroleum without drilling exists: 让步状语从句, 连词 while 在这里的意思是“虽然”, “尽管”。

no scientific method ...exists: 主谓结构。

(13) be geared toward... 使适合...

that obtain subsurface geological information... taken at the earth's surface: techniques 的定语从句。

(14) that obtain subsurface geological information by physical measurements taken at the earth's surface: 定语从句修饰 Techniques

(15) specialize in... 专长于...

Exercise

Directions: Decide whether the following statements are true or false.

1. Without drilling a hole in the ground, very few unique types of petroleum deposits can be found.

2. A prospect is a manageable-sized area whose potential value must be evaluated for the determination of necessary drilling.

3. All of the earliest discovered oil deposits were found by surface investigation of seeping oil.

4. Surface geology by which subsurface features can be reflected from similar surface features is mainly used in the exploration of very shallow deposits.

5. Geological deformities may cause traps which usually contain considerable amount of petroleum.

1.2 The Drilling Site

The drilling site—the actual location on which the well is to

be drilled—is selected by the operating company. The company's decision on exactly where to drill is based on several factors. The most important factor is geological; that is, the company must believe strongly that hydrocarbons (oil and/or gas) exist in the subsurface under the spot where the well will be started. This belief is based on geological study. To determine whether or not hydrocarbons may exist is usually the job of the company's staff of geologists; or sometimes, the company will hire the services provided by a company of geologists whose specialty is finding likely sources of petroleum.⁽¹⁾

In addition to the geological factors, legal and economic factors must be considered. For example, the company must obtain the right to drill for and produce oil and gas on the land. Also, the company must have money to not only purchase or lease the right to drill and produce on the site, but to pay for the costs of drilling.⁽²⁾ All of these factors, plus many others, have to be considered in selecting a drilling site.

Oil and gas wells are being drilled in almost every country in the world, on land, in marshes, and offshore. These wells are generally classified as two kinds: exploration wells and development wells.

An exploration well, or “wildcat,” is one that is drilled primarily for the purpose of determining that oil or gas actually exists in a subsurface rock formation.⁽³⁾ Before a well is drilled, it is at best an educated guess that petroleum exists in a formation.⁽⁴⁾ It is only after a well is drilled into the formation that the presence of oil or gas can definitely be confirmed or denied to be present.⁽⁵⁾

A development well is a well that is drilled after an exploration well has confirmed the presence of petroleum in the formation. Usually, it takes several development wells to efficiently produce hydrocarbons from a formation.

Major oil and gas reserves have been discovered on nearly every continent, including the continental shelves (that area of a continent relatively near the shore but covered by ocean or sea); in gulfs, bays, and marsh lands; and in deserts, frozen wastelands, and tropics. Each discovery brings new drilling problems that have to be solved. For example in the jungle and in the Arctic, drilling rigs and supplies must be brought in where no roads or highways exist. In offshore areas, the threat of hurricanes and major storms is ever present. On the North Slope of Alaska, bitter cold and blizzards must be overcome. Sometimes rigs are located in environmentally sensitive areas.

As new regions change from exploration to exploitation, the emphasis changes from drilling to production. When development wells are drilled, full advantage is taken of the information gained when the exploration, or wildcat, wells were drilled.⁽⁶⁾ As a result, the costs of drilling are reduced as problems are solved.⁽⁷⁾

Notes

(1) services provided by ... 由...提供的服务

(2) to not only ..., but to pay for the costs of drilling: 两个 to 介词短语作后置定语修饰 money

(3) wildcat 探井

for the purpose of determining that oil or gas actually exists in a subsurface rock formation: 介词短语作目的状语。

determining that ...: 动名词短语作介词 of 的宾语, 后接 that 从句作宾语。

(4) at best 最多

educated guess 理论上的猜测

(5) It is only after a well is drilled into the formation that...: 强调句, only after a well is drilled into the formation 为被强调部分。

(6) take full advantage of ... 充分利用...

gained when the exploration, or wildcat, wells were drilled: 分
词短语作定语修饰 information

(7) as a result 结果

Exercise

Directions: For the passage there are some questions or unfinished statements. Each of them is provided with four choices marked (a), (b), (c) and (d). You should decide on the best choice and then mark your answer.

1. To determine whether or not hydrocarbons may exist is usually the job of _____.

- a. tool pushers
- b. geologists
- c. biologists
- d. drillers

2. All of the following factors must be considered in drilling except _____.

- a. legal factors
- b. geological factors
- c. environmental factors
- d. economic factors

3. The operation company must have money to _____.

- a. purchase the right to drill and produce on the site
- b. lease the right to drill and produce on the site
- c. pay for the costs of drilling
- d. All of the above.

4. According to this passage in almost every country in the world, oil and gas wells are being drilled in the following places except _____.

- a. offshore
- b. in marshes
- c. in mountains
- d. on land

5. Which of the following is not a problem that has to be solved before or during drilling?

- a. Not being able to subscribe newspapers to read.
- b. Hurricanes and major storms in offshore areas.
- c. Bringing in rigs to places where no roads are available.
- d. Bitter cold and blizzards.

1.3 Finding Oil and Gas

Hydrocarbons—crude oil and natural gas—are found in certain layers of rock that are usually buried deep beneath the surface of the earth. In order for a rock layer to qualify as a good source of hydrocarbons, it must meet several criteria.⁽¹⁾

For one thing, good reservoir rocks (a reservoir is a formation that contains hydrocarbons) have porosity.⁽²⁾ Porosity is a measure of the openings in a rock, openings in which petroleum can exist. Even though a reservoir rock looks solid to the naked eye, a microscopic examination reveals the existence of tiny openings in the rock. These openings are called pores.⁽³⁾ Thus a rock with pores is said to be porous and is said to have porosity.

Another characteristic of a reservoir rock is that it must be permeable.⁽⁴⁾ That is, the pores of the rock must be connected together so that hydrocarbons can move from one pore to another. Unless hydrocarbons can move and flow from pore to pore, the hydrocarbons remain locked in place and cannot flow into a well.

In addition to porosity and permeability, reservoir rocks must also exist in a very special way.⁽⁵⁾ To understand how, it is necessary to cross the time barrier and take an imaginary trip back into the very ancient past.⁽⁶⁾

Imagine standing on the shore of an ancient sea, millions of years ago. A small distance from the shore, perhaps a dinosaur crashes through a jungle of leafy tree ferns, while in the air, flying reptiles dive and soar after giant dragonflies. In contrast to the hustle