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# *Oil*

(A Bilingual Edition)

by

Norman Wymer

Translated and Annotated

by

Gu Yinning 顾荫宁

Gao Guopei 高国培

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## 内 容 提 要

本书是有关石油的形成、分布、勘探、开采、运输、炼制和应用的科普性读物。本书文字浅显,内容生动,文笔流畅,篇幅不长。它适用于具有中等英语水平的人阅读。书中还附有参考性译文和注释,以便读者使用本书时参考。

简易英语注释读物

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石 油

〔英〕诺曼·威麦尔 著

顾荫宁 高国沛 译注

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## Chapter 1

### WHAT IS OIL<sup>1</sup>?

The oilfields began to form 400 million years ago. Parts of many countries were then under the sea. Very small animals — ‘plankton’<sup>2</sup> — lived in the shallow seas. Every year millions of these animals died and dropped to the bottom of the water. The rivers then brought tons of dead plants and mud down to the sea. The plankst mixed with the plankton. The mud and salts then covered them and formed a sediment<sup>3</sup> on the bottom. When the plants and plankton rotted, oil and gas began to form in the sediment. This was happening all the time; so<sup>4</sup> the sediment of mud got deeper and deeper every year.

Water is very heavy. The pressure of the sea-water on the mud was very great. The pressure was so great that<sup>5</sup> it made the mud hard. After a very long time the mud turned into rock — ‘sedimentary’ rock.<sup>6</sup>

Sedimentary rock is soft and porous. It contains millions of little holes and passages — ‘pores’<sup>7</sup>; it can hold oil or water in these pores. All rocks are either porous<sup>8</sup> or impervious. Impervious rock is very hard. It has no<sup>9</sup> pores and so it cannot hold oil or water.

The sedimentary rocks held the oil and its gases<sup>10</sup> for mil-

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1. Oil: 可泛指动物油、植物油或矿物油,也可专指石油。此处指石油,与 petroleum 同义。但在某些情况下,两字不能互换使用。如只能说 oilfield (油田) petroleum chemicals (石油化工产品)等。 2. plankton: 浮游生物。是不可数名词,无复数形式。 3. sediment: 沉积物; 沉积层。 4. So: 或作 and so (较口语化),作“于是”、“所以”解,是表示因果关系的并列连词。 5. so... that...: 这和 ... such ... that... 一样,都可引导结果状语从句,作

## 第 一 章

### 石油是什么？

油田是四亿年以前开始形成起来的。许多国家的部分地区当时是在海底。很多微小的动物——浮游生物——生活在浅海里。每年都有好几百万个这种动物死去后沉落到水底。同时，河流将成吨成吨的枯死植物和泥沙冲刷到海里。这些枯死的植物和浮游生物的尸体掺和在一起。然后，泥沙和盐类将它们覆盖起来，在海底形成一个沉积层。在这些植物和浮游生物腐烂的同时，石油和石油气就开始在沉积层中形成。这个过程每时每刻都在进行着。因而，泥沙的沉积就逐年加深。

水是很重的。海水对泥沙的压力很大。这种压力大到能使泥沙变得坚硬。经过一段很长的时间之后，泥沙变成了岩石——沉积岩。

沉积岩是柔软和多孔的，它有许许多多微小的孔隙和通道——‘细孔’，可以把石油或水容蓄在这些孔隙里。所有的岩石要末是可渗透的，要末是不可渗透的。不可渗透的岩石非常坚硬，它没有孔隙，所以不能容纳石油或水。

沉积岩收容着石油和石油气长达几百万年，但是，在这段时间里，

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“如此...以致...”解。such 后跟名词连用；so 后跟形容词或副词。此处作连词用。所连接的主句和从句之间的关系是因果关系，即 The pressure was so great 是因，that it made the mud hard 是果。 6. Water is very heavy. ... ‘sedimentary’ rock.: 上段用过去时，本段用一般现在时。上段叙述石油形成的历史过程，故用过去时，本段说明石油形成的一般原理，故用一般现在时。本书其它章节中这类时态转换的例子很多，阅读时应注意。 7. pore: 动植物等的毛细孔。此处指沉积层的孔隙。 8. porous adj. 多孔的，能渗透的。 9. no: 在这里是形容词，作“没有”、“很少”解。又如：There are no men in the room. (这间房里没有人。) 10. gas: 此处指天然气，与 natural gas 同义。

lions of years. But during that time very thick impervious rocks slowly formed above the sedimentary rocks. They made a roof over them and walls around them. The pressure of these hard rocks on the soft rocks below was very great. The lowest sedimentary rocks could not keep the oil in their pores because the pressures above were too great. The oil flowed slowly through the holes and passages, and rose into higher rocks. It rose higher and higher until<sup>11</sup> it reached the impervious rocks. The oil could not escape through these hard rocks; so it was caught in a trap — an 'oil-trap'.

Oil is always found in a trap under impervious rock. The oil-traps have different shapes. In some traps all the rocks may<sup>12</sup> be flat and straight. In other traps the rocks may curve. There are four chief kinds of oil-trap: the 'anticline', the 'salt dome', the 'fault', and the 'stratigraphic' trap.

When the oil was in the sedimentary rock, it contained gas and water. The oil, gas and water were all together. But in the oil-trap they are all in separate parts of the rock. The water stays at the bottom because it is the heaviest. The oil rises higher and lies on the water. The gas is the lightest; so it rises to the top and lies on the oil.

Many oilfields are between 1,000 and 1,500 metres deep.<sup>13</sup> But some are 3,000 or 6,000 metres deep. An American oilfield in Louisiana is the deepest in the world; it is almost six and a half kilometres<sup>14</sup> below the ground.

How do we get oil out of the ground? Men drill a deep well. They cut a hole through the hard, thick impervious rock. They drill deeper and deeper until they reach the sedimentary rocks. With great care they cut through the impervious rock. They open

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11. **until**: 在这里是从属连接词, 作“到...为止”解。它表示主句中的有关动作一直延续至 **until** 后所表示的时间为止。 12. **may**: 是情态动词。它在本书中出现次数很多。具有“可以”, “可能”, “或许会”等含义。除 **may**

在沉积岩的上面也慢慢地形成了很厚的不可渗透的岩石。它们构成沉积岩上方的顶和四周的壁。这些坚硬岩石对它下面的松软岩石的压力很大。位于最低层的沉积岩无法将石油保持在它们的孔隙中，因为上面的压力太大了。这些石油缓慢地从孔隙和通道中流出来，上升到较高一些的岩石里。它逐渐向上流动，直至不可渗透的岩石为止。石油是不可能从这些坚硬的岩石里边流失出去的，于是它就被关在陷阱——“油闭”内。

石油往往是在不可渗透的岩石下面的油闭中。油闭有各种各样的形式。在某些油闭中，所有的岩石都可能是平直的，而在另外一些油闭中，岩石可能是弯曲的。油闭有四种主要类型：背斜型、盐穹型、断层型和地层型。

石油在沉积岩中的时候，它含有气体和水份。石油、石油气和水全都在一起。可是在油闭中，它们都存在于岩石的不同部位。水最重，所以它留在底层；石油上升得较高，浮在水上面。石油气最轻，因此它上升到顶部，聚在石油的上面。

很多油田的深度在 1,000 米~1,500 米之间，有些深达 3,000 米或 6,000 米。美国在路易斯安那州的一个油田是世界上最深的油田。它几乎在地面以下 6,500 米的深处。

我们如何把石油从地下开采出来呢？人们钻一口深井。他们在又硬又厚不可渗透的岩石上钻一个孔。他们越钻越深，一直钻到沉积岩。他们小心翼翼地钻穿那不可渗透的岩石，打开蕴藏着石油的油闭，油跟

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外，主要情态动词还有 can, could; must; need; might; ought 等。它们的特点是有一定的词义；除 ought 后跟不定式外，其他都跟动词原形（有时跟这一动词的完成式或进行式）构成谓语，在各种人称后都用同样的形式。 13. **Many oilfields are between 1,000 and 1,500 metres deep.** 很多油田的深度在 1000 至 1500 公尺之间。between ... and ... 在用来指数量、距离时，与 from... to ... 意思相同，如 between 5 and 6 miles; between 40 and 50 tons, 等。 14. **six and a half kilometres:** 作“六点五公里”解。又如：one and a half years (一年半); two and a half hours (两个半小时)。



the oil-trap which<sup>15</sup> contains the oil. The oil then begins to rise up the well. Usually the water in the trap makes the oil rise; the great pressure pushes the oil up the well.

Some oilfields are very small and unimportant; they have very little value. Other fields are very large and have great value. The Ghawar oilfield, in Saudi Arabia,<sup>16</sup> is one of the largest in the world; it is 200 kilometres long.

The condition of oil is not the same in all places. In some fields the oil may be thick and dark; in others it may be quite thin and clear.

All the oilfields in the world began under the sea. There are still many large and important oilfields under seas and lakes. But most oilfields are now under dry land, because the earth's shape changed while the oil was forming in the rocks. Many things happened during those millions of years. In some parts of the earth dry land went under the sea, in other parts great pressures below pushed up the land. The land rose above the water and the shallow seas flowed away or dried up. So the oilfields in these parts are now under dry land.

The deserts around the Arabian Gulf,<sup>17</sup> in the Middle East, are good examples. The Sahara Desert, in North Africa, is another example. Millions of years ago these deserts were under the sea. Oil formed in the mud below the water. The shape of the earth then slowly changed. The sea went away and left great deserts of sand. Today the oilfields under these dry and dusty deserts are some of the richest in the world.

Perhaps new oilfields are forming under some of the seas today.

着就开始沿油井上升。通常是油闭里的水驱使石油上升。巨大的压力推动石油沿着油井喷上来。

有些油田很小,没有什么开采价值。有些油田很大,具有很大的开采价值。沙特阿拉伯的加沃尔油田是世界上最大的油田之一,它长达两百公里。

各个地方的石油状况不尽相同。有些油田的石油可能是质稠色深的,而在另外一些油田里,石油则可能很稀很清。

世界上所有的油田都是在海底下开始形成的。至今还有很多大的有价值的油田在海洋和湖泊的下面。不过,大多数的油田现在是在陆地下面。因为,当石油正在沉积岩中形成时,地球的外形发生了变化。就在这几百万年里,发生过许许多多情况。地球上有些地方的陆地变成了海底,而在另一些地方,下面的巨大压力把地层推到上面来。地层升到水的上面,浅海的水流走或干涸。因此,这些地区的油田现在是在陆地下面。

中东阿拉伯湾周围的一些沙漠就是很好的例证。北非的撒哈拉沙漠是另一个例证。几百万年以前,这些沙漠地区都在海的下面。石油就是在海水下面的泥沙中形成的。后来,地球的外形慢慢地发生了变化,海水流走了,留下大片的沙漠。今天,在这些干燥多尘的沙漠下面的油田是世界上蕴藏油量最大的一些油田。

也许有一些新油田今天正在一些海洋下面逐渐形成。

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15. which: 后面是定语从句,修饰主句中有关的名词 the oil-trap. 16. Saudi Arabia: 沙特阿拉伯,国名,位于中东阿拉伯半岛上。 17. the Arabian Gulf: 阿拉伯湾,又名波斯湾,位于伊朗与沙特阿拉伯之间。

## Chapter 2

### THE OIL REGIONS OF THE WORLD

There are five chief oil regions in the world. They are the Middle East; the United States of America and Canada; Latin America and the Caribbean; North Africa; and Russia. There are also many smaller oil regions in different countries.

The Middle East countries have the largest amount of oil. They have more oil than all the other regions together.

Oil was first discovered in the Middle East in 1908. The first oilfield was opened in Iran — the famous Masjid-i-Sulaiman<sup>18</sup> field. A few years later men found oil in other Middle East countries. But they did not produce much oil at that time because nobody knew the size and value of the oilfields. Then in 1932 oil was discovered on Bahrain Island.<sup>19</sup> The men who discovered this oil said: 'If Bahrain has oil, there may be a lot of oilfields in and around the Arabian Gulf.'

Immediately men began to search for oil in the countries around the Gulf. During the next few years oil was found in many places. The Middle East oil industry then grew fast.

Today this region produces one third of the world's oil supplies. The world uses 2,000 million tons of oil a year — and the Middle East supplies a third of this amount.

Most of the oilfields are in four countries — Saudi Arabia, Kuwait, Iran and Iraq — and under the Arabian Gulf itself.<sup>20</sup>

Saudi Arabia's chief oilfield is the great Ghawar field, between Ain Dar and Haradh.<sup>21</sup> Many of this country's rich oil deposits were discovered after the Second World War. In 1946 Saudi Ara-

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18. Masjid-i-Sulaiman: 马斯杰德苏莱曼, 是伊朗东部临阿拉伯湾的胡泽坦省内最早的产油区。 19. Bahrain Island: 巴林岛, 位于阿拉伯湾西

## 第二章

### 世界产油区

世界上有五个主要产油区，它们就是中东、美利坚合众国和加拿大、拉丁美洲和加勒比海、北非以及俄罗斯。此外，还有许多较小的产油区分布在一些不同的国家里。

中东一些国家拥有的石油量最多。他们拥有的石油量比所有其他地区的石油总和还要多。

石油是 1908 年首先在中东发现的。第一个油田是在伊朗开发的，那就是著名的马斯杰德苏莱曼油田。几年之后，人们又在中东其他一些国家里找到了石油。不过，当时他们没有大量生产石油，因为没有一个人知道这些油田的规模和价值。接着，1932 年在巴林岛上发现了石油。发现这里石油的人们说：“如果巴林有石油，那末在阿拉伯湾里和周围就可能有很多的油田。”

人们立即就开始在海湾周围的国家里寻找石油。在其后的几年中，人们在很多地方都找到了石油。于是，中东的石油工业迅速地发展起来。

今天，这个地区生产的石油占世界石油产量的三分之一。全世界每年消耗的石油为 20 亿吨，而中东供应的石油就占了总量的三分之一。

大多数的油田分布在沙特阿拉伯、科威特、伊朗及伊拉克四个国家里和阿拉伯湾的海底。

沙特阿拉伯的主要油田是位于艾因达尔和哈腊德之间的加沃尔大油田。这个国家的许多蕴藏丰富的石油矿藏是在第二次世界大战以后

部。或拼写成 Bahrein Island. 20. itself: 是自身代词, 为 the Arabian Gulf 的同位语, 作“本身”解。 21. Ain Dar and Haradh: 艾因达尔和哈腊德, 是沙特阿拉伯东部靠近阿拉伯湾的产油区。

bia produced only eight million tons of oil. During the next twenty years many large and important oil deposits were discovered. Production rose quickly and today Saudi Arabia is producing more than 100 million tons a year.

Kuwait is a very small country, but her oil production is almost as high as Saudi Arabia's.<sup>22</sup> Most of her oil comes from the oilfield at Burgan. This may be the richest oilfield in the world.

Oil production in Iran and Iraq is also very high. One quarter of Iran's oil comes from the Agha Jari<sup>23</sup> field. Iraq's chief oilfield is at Kirkuk.<sup>24</sup> This field, in the middle of deserts, is one of the most famous oilfields in the world.

Other countries around the Arabian Gulf also produce some oil. During the last few years men have discovered important oilfields along the Trucial coast.<sup>25</sup> One Trucial State, Abu Dhabi,<sup>26</sup> is already beginning to produce a lot of oil.

The Arabian Gulf is the chief oil centre. But there are oilfields in many other parts too. Twelve Middle East countries are now producing oil.

The Middle East oil industry has grown very fast since the war. In 1946 the Middle East produced only one-tenth of the world's oil supplies. Then suddenly production began to rise. After the war, most countries began to use more oil; they needed more and more every year. So oil production rose in every region. But it rose faster in the Middle East than in the other regions. What is the result? Today the world is using five times as much oil as in 1946<sup>27</sup> — and the Middle East now produces a third

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22. ...her (Kuwait's) oil production is almost as high as Saudi Arabia's.: Saudi Arabia's 即 Saudi Arabia's oil production 之略。在使用比较级时,被比较的两者应为相同的事物,故 Saudi Arabia's 不可写成 Sandi Arabia. 23. Agha Jari: 阿加贾里,伊朗地名,位于伊朗西北部的胡泽斯坦省境内,靠近阿拉伯湾。 24. Kirkuk: 基尔库克,伊拉克东北部一地名。 25. Trucial coast: 波斯海岸的一部分。在这个地区有七个半独立的阿拉伯酋长国,称为 Trucial States. 26. Abu Dhabi: 读 ['æbu: 'ðæbi:] 阿布扎比酋长国。

发现的。1946年,沙特阿拉伯只生产八百万吨石油。在随后的二十年里,发现了很多大的重要的油矿,产量迅速上升。今天,沙特阿拉伯每年生产的石油在一亿吨以上。

科威特是一个很小的国家,但是它的石油产量几乎与沙特阿拉伯一样高。它的大部分石油都是贝尔干油田生产的。这个油田可能是世界上最富的油田。

伊朗和伊拉克的石油产量也很高。伊朗的四分之一的石油是从阿加贾里油田开采出来的。伊拉克的主要油田在基尔库克。这个油田位于沙漠的中央,是世界上最著名的油田之一。

阿拉伯湾周围的其他一些国家也生产一些石油。近几年,人们在特鲁夏海岸发现了一些大油田。一个特鲁夏海岸国阿布扎比已开始生产大量的石油。

阿拉伯湾是主要的石油中心。但在其他许多地区也有油田。现在,中东有十二个国家在生产石油。

战后,中东石油工业发展非常迅速。1946年,中东生产的石油只占世界总产量的十分之一。后来,产量开始急剧上升。大多数国家在战后开始耗用更多的石油,它们的需要逐年增多。因而每个产油区的石油产量也提高了,不过中东的石油产量比其他地区提高得要快些。结果如何呢?现在,全世界的耗油量是1945年的五倍,而中东现在生

27. Today the world is using five times as much oil as in 1946. times 表示倍数。由于汉、英文表现方法不同,翻译时应注意。本句可译为今日世界用油量五倍于1946年,或今日世界用油量比1946年提高了四倍。A is three times larger than B, 中译应为A为B的三倍或A比B大两倍,不可译作A比B大三倍或A为B的四倍。“as ... as ...”作“和...一样”解。这种结构用法繁多,本书中常见的还有: as + 形容词 + as + 名词,如: They are as hard as stone. 它们硬得和石头一样。as + 形容词 + as + 数量词组,如: ... it may be as tall as sixty-five metres. 它可能高达六十五公尺。as + <sup>many</sup> much + as + 数量词组,如: In a large region as many as 200 men may make the survey. 在一个大的地区里,可能要多达200人来进行这种勘查。This work may cost millions of pounds — perhaps as much as £ 10 million or more. 这种工作可能要耗费好几百万英镑——也许多达一千万英镑或者更多。

of the supplies.

The Middle East countries now export more oil than any other region. They do not need all their oil. So they are able to export most of their oil to other countries. Europe is one of their chief markets. They supply<sup>28</sup> all the countries of Western Europe and also some of the countries in Eastern Europe. These European countries have very little oil themselves. So they have to import millions of tons from other countries. They import some of their oil from North Africa and Latin America but they buy most of it from the Middle East.

The United States oil industry is the oldest in the world. Drilling for oil began in America. The world's first oil well was drilled in a small Pennsylvanian<sup>29</sup> town, Titusville, in 1859. Before that date<sup>30</sup> no country had an oil industry. When people wanted oil, they looked for pools on the ground. Where did the pools of oil come from? How did the oil rise above the ground? It climbed through 'faults' in the impervious rocks. Rocks over an oil-trap are sometimes broken in a few places. Oil then usually flows out of the trap and escapes through the faults. It rises to the top and forms a pool on the ground. People used to<sup>31</sup> draw the oil from a pool. They waited until the pool filled up again. Then they drew some more oil.

The name of the man who drilled the first well was Edwin Drake. Drawing oil from pools was too slow for Drake; so he decided to try to get oil straight from an oilfield. People said that this was not possible. 'You'll never drill a well through the impervious rock,' they said. 'The rock is too hard and the oil is too deep.' Drake did not listen.<sup>32</sup> He used a heavy metal tool to cut through the rock. This 'cable tool' moved up and down<sup>3</sup> and slowly made a hole in the ground. Drake drilled for many months. Then,

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28. supply: 及物动词, 其宾语可以是供应的对象(人), 也可以是所供应的物资。注意下面两种用法: to supply the child with food; to supply food

产的石油竟占总供给量的三分之一。

中东各国现在出口的石油比任何地区出口的都多。它们并不需要用自己开采的全部石油，因此它们可以将它们生产的石油的大部分出口给其他国家。欧洲是它们的一个主要市场。它们供应所有西欧的国家，也供应东欧的某些国家。这些欧洲国家本身只有很少一点油，所以它们必须从其他国家进口数百万吨。它们从北非和拉丁美洲进口他们所需的一部分石油，而其所需的大部分石油都是从中东买进的。

美国石油工业在世界上发展得最早。钻探石油的活动是在美国首先开始的。1859年在宾夕法尼亚州的一个小市镇提吐斯维尔钻出了世界上第一口油井。在这以前，没有一个国家拥有石油工业。人们在需要石油的时候就去地面上寻找油池。这些油池是从哪儿来的呢？石油是怎样上升到地面上的呢？它是穿过不可渗透岩的断裂层流出来的。有时油闭上面的岩石在一些地方破裂了，石油就从油闭中流出，并从断层处漏逸出来。石油上升到顶部，就在地面上形成油池。过去人们从油池里汲取石油，然后等待油池满起来，再汲取一些石油。

钻第一口井的人名叫埃德温·德雷克。他认为从油池里汲取石油太慢，于是他决心设法直接从油田里开采石油。当时人们认为这是不可能的。他们说：“你永远不可能穿透坚硬的岩石钻成一口井。岩石太硬了，石油又太深。”德雷克没有听他们的。他使用一个很重的金属工具去凿穿岩石。这种缆索形的工具一上一下地移动，在地上缓慢地凿出一个孔洞。德雷克钻了好几个月，最后他终于凿穿了岩石，找到了石

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for the child. 29. **Pennsylvanian**: 是 Pennsylvania 的形容词形式。Pennsylvania [ˌpensɪlˈveɪnjə], 宾夕法尼亚，美国州名。 30. **date**: 日期。date 可绕指年月日，如 date of birth: January 15th, 1930; 但亦可分指年或月或日，如本句 Before that date no country had an oil industry. 此处 date 便是指 1859 年。 31. **used to**: 指过去经常发生或习惯性的动作，而现在已不那样做了。这里 People used to draw oil from a pool, 意思是人们过去从地面的小油池中汲油使用，现在已不这样做了。 32. **listen**. 此处作“听从”、“听信”解。



at last, he broke through the rocks and reached the oil. As soon as<sup>33</sup> he opened the oil-trap, the oil began to flow up the well. Drake was soon producing a lot of oil — and everybody wanted to buy it.

People were very excited. Hundreds of Americans immediately rushed to drill oil wells. They all wanted to make money too. "If we find oil, we'll soon be rich," they thought. They found oil in many places.

So America's oil industry — the first in the world — began.

The Gulf of Mexico<sup>34</sup> and the States of Texas and Louisiana<sup>35</sup> form the chief centre of the United States oil industry today. There are rich oilfields along the coast and also under the sea. Texas, the largest American oil state, has as many as 600 oilfields.

America has fifty states, and forty of them produce oil. Now men have found oil in Alaska.<sup>36</sup> This state is very cold and wild. The oilfields are in a desert, and snow and ice often cover the ground. The men who are drilling the wells are living and working in terrible conditions. They have to wear special clothes in order to keep<sup>37</sup> themselves warm. Producing oil in Alaska will be very difficult; there are many problems. But the oil companies say that the Alaskan fields may be very rich. They may produce a lot of oil. If this is so,<sup>38</sup> Alaska will be another very important oil state — perhaps as important as Texas.

The United States used to export a lot of her oil but she does not do so today. Her own needs are now too great. Indeed, America now has to import some oil from other countries.

Canada's chief oilfields are in Alberta.

The two chief oil countries of the Latin American region are Venezuela<sup>39</sup> and Mexico. Venezuela's oilfields are some of the richest in the world. Fifty years ago Mexico's oil production was

33. as soon as: 后面是时间状语从句, 作“一...就...”解。 34. The Gulf of Mexico: 墨西哥湾, 是墨西哥东岸一海湾。 35. Texas and Louisiana: 得