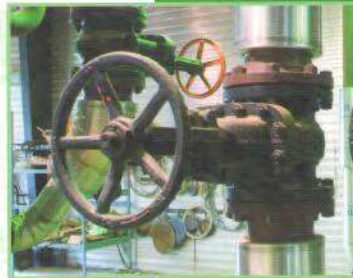


English for Oil & Gas

2

Vocational English
Course Book



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Series editor David Bonamy



CD-ROM

ALWAYS LEARNING

PEARSON

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1

People and jobs

- talk about roles and responsibilities
- explain an oil rig's organisation
- describe work routines
- discuss transportation

Roles and responsibilities

Reading 1 Read the information and match words 1–4 to photos A–D.

1 geophysicist 2 lab technician 3 production engineer 4 roughneck



I work in the downstream sector of the industry, in a refinery. We manufacture a wide range of products for domestic and industrial uses, such as lubricants, bitumen, liquefied petroleum gas (LPG) and petrochemicals.



I work on an offshore oil rig. I spend a lot of my time tripping drill pipe in and out of the hole, and operating the tongs to make or break connections. I also do other jobs around the rig, such as looking after equipment.




I look at seismic data and help the company make decisions about where to drill. At the moment we are looking at a shale gas reservoir in the USA. Shale gas is natural gas found in shale formations.



I work for an E&P independent. I'm part of the team of people responsible for the operation, production and maintenance of different facilities in this area. My main job is to find the best way to bring the oil to the surface.

Vocabulary 2 Match words 1–6 to definitions a–f.

- | | |
|---------------------|--|
| 1 downstream sector | a) put a pipe in/pull a pipe out of a drill hole |
| 2 LPG | b) activities to do with refining, transportation, sales and marketing |
| 3 trip in/out | c) connected with earth vibration |
| 4 E&P independent | d) independent exploration and production company |
| 5 seismic | e) liquefied petroleum gas |
| 6 shale gas | f) natural gas found in a type of sedimentary rock |

Listening 3  02 Listen to four conversations. Are these statements *true* (T) or *false* (F)?

lube oil =
lubricating oil

Conversation 1

- 1 Lab technicians mix oils and additives. (T / F)
- 2 Customers come to the refinery and pump oil from the storage tanks. (T / F)

Conversation 2

- 3 Roustabouts don't work in the rain. (T / F)
- 4 Roustabouts work alone. (T / F)

Conversation 3

- 5 Production engineers work in offices all day. (T / F)
- 6 Production engineers have to follow health and safety procedures. (T / F)

Conversation 4

- 7 The layers of rock reflect shock waves. (T / F)
- 8 Geophysicists analyse seismic data. (T / F)

4 Answer these questions. Then listen again and check your answers.

- 1 What does the lab technician optimise?
- 2 Does a roustabout clean and paint?
- 3 Is production engineering a technical job?
- 4 What do vibrator trucks do?

Language

Present simple

We use the present simple to talk about facts, repeated actions and habits.	<i>Geophysicists analyse seismic data.</i> <i>We manufacture a wide range of products.</i> <i>Roustabouts don't work alone.</i>
Yes/No questions	<i>Do you work in a crew?</i> <i>Is it an easy job?</i>
Wh- questions	<i>What do you do?</i> <i>Where do you work?</i> <i>Who does she work for?</i>



5 Put this conversation in the correct order.

- B: Yes, I do. I stand on the monkey board at the top of the derrick. I guide the drill pipe when we trip out or in. I'm also responsible for the fluid pumps and the circulation system.
- B: Yes, it is. But I know what I'm doing and I'm careful.
- A: A derrickhand? So do you work high up?
- A: What do you do, Adel?
- B: I'm a derrickhand on an oil rig.
- A: Isn't that dangerous?

6 Read the conversation in 5 again. Write a paragraph about Adel.

Adel is a derrickhand on an oil rig. He ...

Speaking 7 Work in pairs. Choose an oil industry job you are familiar with. Explain the job to your partner.

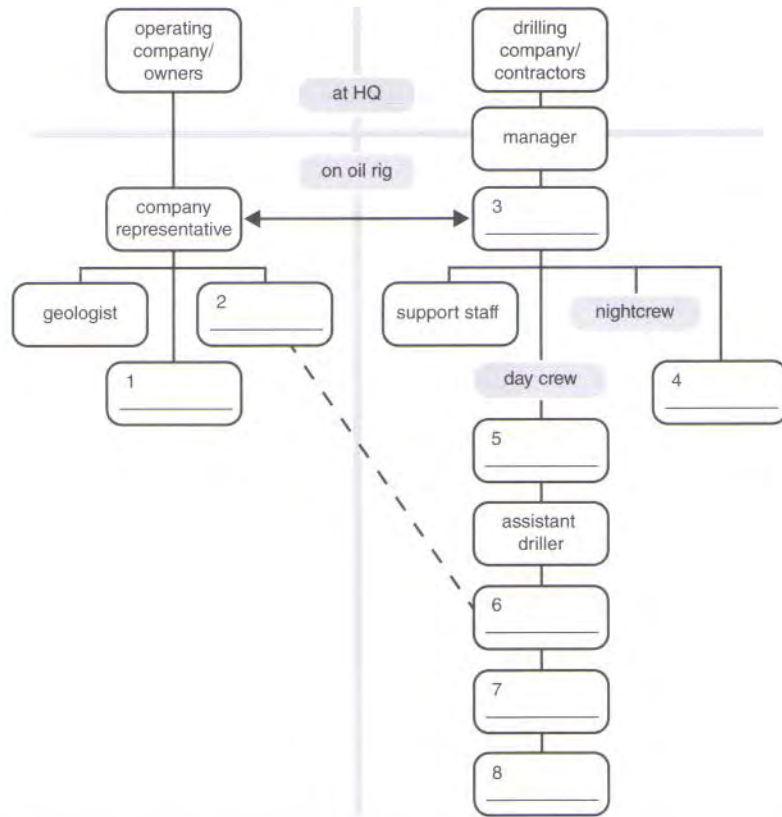
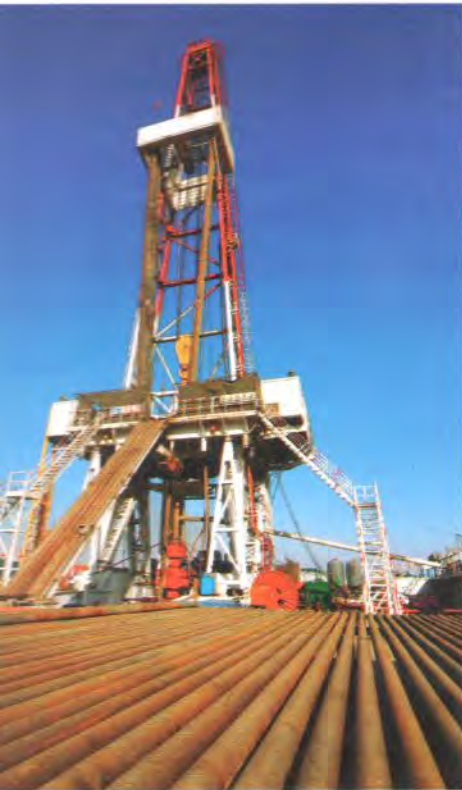
Roustabouts work on oil rigs. They do jobs like cleaning ...

The organisation

Reading 1 Read the text and complete this organisation chart with the job titles in the box.

hand = a crew member who does physical work

derrickhand driller drilling engineer motorhand
mud engineer roughnecks roustabouts toolpusher



A guide to jobs on an oil rig

Employees of the exploration or operating company

- **Company representative:** Works for the operating or exploration company. Can give instructions to the toolpusher but does not directly supervise the toolpusher or the drilling crews.
- **Drilling engineer:** Specialises in the technical aspects of drilling. Reports to the company representative.
- **Mud/Drilling fluids engineer:** Responsible for the drilling fluid. Reports to the company representative.

Employees of the drilling company contractors

- **Toolpusher:** Manages the drilling crews on the rig and the support staff. Can receive instructions from the company representative but reports to the manager of the drilling contractor company.
- **Driller:** Supervises a drilling crew. Controls the rig's machinery during the drilling operation. Has an assistant driller.
- **Derrickhand:** Handles the top of the drill string when the crew are tripping it in or out of the well hole. Also responsible for the flow of drilling fluid into and out of the well hole. Reports to the assistant driller and works closely with the mud engineer.
- **Roughnecks:** Skilled workers on the floor of the rig. Operate the tongs to make up and break out drill strings. Also trip pipe in and out of the well hole. Report to the derrickhand.
- **Roustabouts:** Semi-skilled workers. Do most of the painting and cleaning jobs on the rig. Report to the roughnecks.
- **Motorhand:** Responsible for the maintenance and operation of drilling engines and motors. Acts as a mechanic and an electrician. Reports to the toolpusher.

2 Look at the organisation chart and text in 1 again. Answer these questions.


- 1 Who is responsible for the drilling fluid?
- 2 Who looks after the engines?
- 3 Who represents the operating or exploration company?
- 4 Who does the painting and cleaning jobs?
- 5 Who reports to the manager of the drilling contractor company?
- 6 Who supervises the drilling crew?
- 7 Who operates the tongs?

Vocabulary 3 Complete this table with words from the text in 1. Which nouns refer to people?

Noun	Verb
1 _____	maintain
supervisor	2 _____
3 _____	instruct
operation	4 _____
5 _____	drill
6 _____	assist
manager	7 _____
8 _____	represent
9 _____	explore

4 Complete these sentences with the correct form of words from 3.

- 1 The company _____ works for the _____ company.
- 2 As a motorhand, I'm responsible for the _____ and _____ of all the engines.
- 3 My job is to support the driller. I'm his _____.
- 4 Each driller _____ one of the crews.
- 5 In some places the toolpusher is called the rig _____.

Listening 5  **03** Listen to Abdul as he introduces Harish to the rig crew. What is Harish's job and where will he work?

6 Listen again. Match the names to the job titles.

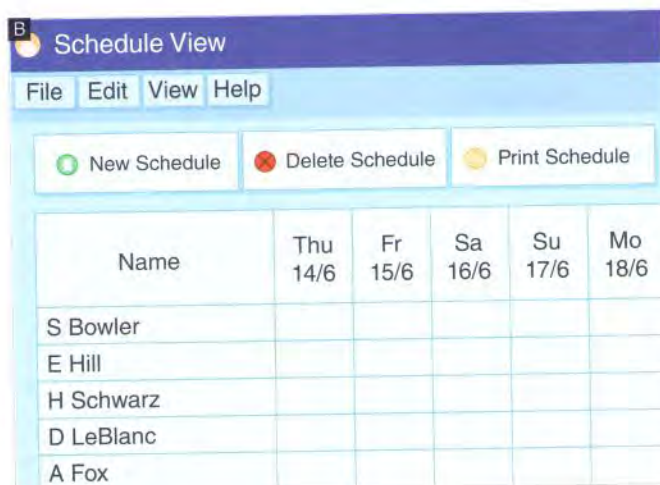
- | | |
|------------|---------------------------------|
| 1 Mr J | a) motorhand |
| 2 John | b) driller |
| 3 Mohammed | c) toolpusher |
| 4 Ali | d) drilling engineer |
| 5 Samir | e) company representative |
| 6 Abdul | f) mud/drilling fluids engineer |

Speaking 7 Work in pairs. Choose and complete one of the following tasks.

- 1 Draw an organisation chart for your own school or organisation. Explain it to your partner.
- 2 Make a list of different job titles in your school or organisation. Explain the jobs to your partner.

Work routines

Speaking 1 Work in pairs. What is the app in photo A for? What about the software in photo B? Discuss with a partner.



Listening 2 04 Listen to three conversations and answer these questions.

- Where do the speakers in conversation 1 work?
- Where does the woman in conversation 2 work?
- Where does the man in conversation 3 work?

3 Complete these sentences with the words in the box. Then listen again and check your answers.

call clock downtime reschedule routine set shifts straight

- On this rig, workers are on the job for 12 hours a day for seven _____ days.
- The night _____ were the worst.
- For _____ tests, we take samples at specific times from specific locations, according to a _____ schedule.
- Last week we had a problem with some of the crude inflow, so we had to _____ all our tests.
- I'm on _____ 24 hours a day.
- Everything had to be planned properly to minimise _____.
- We had to work around the _____ to complete the job.

Vocabulary 4 Match phrases 1-7 to definitions a-g.

- | | |
|-----------------------|-----------------------------------|
| 1 out of the ordinary | a) available for work |
| 2 week-long break | b) unexpected or non-routine |
| 3 around the clock | c) seven days off work |
| 4 reschedule | d) day and night without stopping |
| 5 on call | e) make a new timetable/schedule |
| 6 seven days on | f) working from sunset to sunrise |
| 7 the night shift | g) working for a week |

Past simple

	Regular verbs	Irregular verbs
We use the past simple to talk about a completed action in the past.	He called me an hour ago. He didn't call me. Did he call you? When did he call you?	They had a problem yesterday. They didn't have a problem yesterday. Did they have a problem yesterday? What kind of problem did they have yesterday?

5 Complete this conversation with the past simple form of the verbs in the box.

finish use want you/have you/see

Ahmed: Ahmed Bin Mohammed.
 Kevin: Hi, Ahmed. It's Kevin.
 Ahmed: Hi, Kevin. What's up?
 Kevin: I just wanted to say that we (1) _____ the repairs an hour ago.
 Ahmed: That's excellent news. (2) _____ any problems?
 Kevin: No, not really. We (3) _____ some of the off-shift crew for a couple of hours.
 Ahmed: OK. (4) _____ Joe yesterday? He (5) _____ to give you some documents.
 Kevin: No, I didn't. I'll catch him tomorrow in the office.
 Ahmed: Sounds good. OK. Thanks for calling.
 Kevin: You're welcome. Bye, Ahmed.
 Ahmed: Bye.

Reading 6 Read this text about a refinery shutdown and answer the questions.



Normally, the refinery runs 24 hours a day, seven days a week but last week was different. The refinery was on a scheduled shutdown in order to inspect, upgrade and clean our equipment. We also replaced one of the coke coolers. Over a thousand extra contractors came in to do this maintenance work, so we had a lot of extra traffic, especially during shift changes. This sort of turnaround maintenance takes place every four to five years.

- 1 Why was the refinery shut down last week?
- 2 Was the shutdown planned?
- 3 What type of equipment was changed?
- 4 Why was there extra traffic?
- 5 How often does the refinery shut down for turnaround maintenance?

Speaking 7 Work in pairs. Explain what you typically do each week over a period of one month.

A couple of weeks ago was very typical. I was on night shift the whole week, so I started work at ...

Transport to site

Vocabulary 1 Label these photos with the words in the box.

helicopter low loader tracked vehicle transfer basket



Reading 2 Read these comments by oil workers and underline the words for forms of transport. Which comments refer to the types of transport in 1?

- 1 'The rig camp is in the middle of the Omani desert. It takes several hours to get to the location. First, a taxi to the airport. Then, an early flight to the oil industry base at Fahud, normally in a propeller aircraft. And then two hours by crew bus.'
- 2 'I'm a driller on an exploration platform in the Campos basin, which is a large oil field off Rio de Janeiro. Every day approximately 2,000 workers fly by helicopter from the mainland to the platforms in the area, so it's very busy. Sometimes there are delays due to bad weather but normally the total travel time from hotel to rig is about four hours.'
- 3 'I'm a roustabout on a production rig which is quite close to the shore, so we travel by crew boat. The total distance is only about 600 m. When we get to the rig, the operator lowers the transfer basket and hoists us up.'
- 4 'I work on pipeline repairs. We use different vehicles to get to the work site, depending on the type of ground we have to cover. Our fleet has both wheeled and tracked vehicles, with payload capacities up to 40 tons. For long distances we use low loaders to transport the vehicles.'
- 5 'I'm a chemist in a refinery just outside the town where I live. It takes me 20 minutes by bicycle to get from my home to my office. On rainy days I take my car. The refinery is at the mouth of the river, on the south bank. You often see oil tankers there.'

Vocabulary 3 Match 1–5 to a–e to make forms of transport.

- | | |
|-------------|-------------|
| 1 low | a) vehicle |
| 2 crew | b) loader |
| 3 tracked | c) tanker |
| 4 propeller | d) bus |
| 5 oil | e) aircraft |

Describing location

We use a number of different phrases to describe short distances. The meaning is similar.

The refinery is **just outside/quite close to** the town.
My office is **quite close to** Main Street.
The oil field is **just off** the coast.

We can use different phrases to say where things are.


The airport is **in the middle of** the desert.
The jetty is **on the south bank of** the river.
The rig is **at the mouth of** the river.

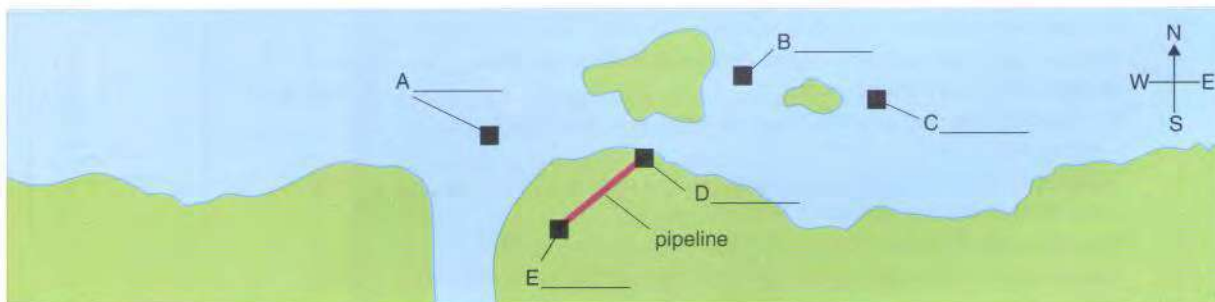
4 Read the sentences in the Language box and write the names of the places for A–F on this map.



5 Match 1–7 to a–g to make sentences.

- | | |
|--------------------------------|-----------------------------|
| 1 The oil field is | a) the mouth of the river. |
| 2 The oil field is | b) to the shore. |
| 3 The distance is | c) of the desert. |
| 4 The rig is close | d) off Rio de Janeiro. |
| 5 The refinery is just outside | e) the town. |
| 6 The refinery is at | f) south bank of the river. |
| 7 The refinery is on the | g) about 600 m. |

Listening 6  **05** Look at this map. Then listen to a conversation and label the rigs, the harbour and the refinery.



Speaking 7 Work in pairs. Discuss the different types of transport you use to get to your place of work/study.

2

Procedures

- read and understand safety rules and regulations
- explain decontamination procedures
- follow load handling instructions
- describe hazards at the place of work

Rules and regulations

Reading 1 Read this accident report. Then read the safety poster and tick ✓ the safety rules which were broken.

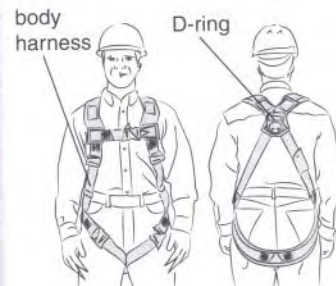
Accident report

Date: 13 October
Time: 1742Z
Location: drilling rig Alpha 341

Description of incident

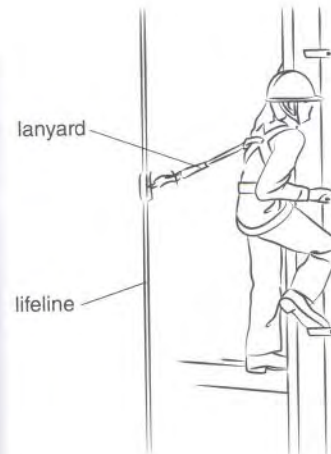
John Brown (motorhand) was injured when his fall protection lanyard was caught and wrapped around a rotating kelly bar. According to Brown, this is what happened: he completed some work in the derrick using a full body harness. His lanyard was attached to the D-ring on the back of the harness. He climbed down and detached the lanyard from the lifeline but did not remove the harness or the lanyard from his body. Then he walked across the rig floor, near to the rotating kelly. The lanyard was caught by the kelly and Brown was pulled towards the moving parts. Fortunately, another man (Kevin Watts) quickly pressed the emergency stop button.

Description of injuries



Safety rules on an offshore rig

- The rig must have a temporary safe refuge (TSR), or safe room, a safe escape route to the sea and a safe route to the lifeboats.
- A safety boat must always be on standby near the platform, to rescue people who fall into the sea.
- Workers must not enter the danger zone when the rotary table is in motion.
- Workers must remove fall protection equipment, such as lanyards, immediately when it is not needed.
- Workers must remove or confine loose clothing, long hair, jewellery, watches, etc.
- Workers must not bring dangerous items, such as matches, lighters or other flammable items aboard offshore oil rigs.
- Before coming aboard an offshore oil rig, all luggage must be checked.
- Every piece of equipment on the offshore oil rig must be tested regularly.
- When equipment is tested, it must be identified with a colour code.
- Workers must not use equipment with an out-of-date colour code.




Vocabulary 2 Match 1–7 to a–g to make collocations.

- | | |
|----------|---------------|
| 1 loose | a) route |
| 2 fall | b) protection |
| 3 safety | c) zone |
| 4 escape | d) clothing |
| 5 danger | e) code |
| 6 rotary | f) boat |
| 7 colour | g) table |

3 Complete these sentences with the collocations in 2.

- The visitor's _____ was caught in the _____.
- The _____ was waiting near the platform.
- The new roustabout forgot his _____ equipment.
- Do not use equipment with an out-of-date _____.
- The _____ went from the _____ to the sea.

Listening 4  06 Listen, write the words you hear and underline the word stress. Then find the words in the safety poster in 1.

- jewellery
- _____
- _____
- _____
- _____

Language

The passive

We often use the passive in written English. To transform an active sentence into a passive sentence, we use this pattern: subject of the passive sentence (object of the active sentence) + <i>to be</i> + past participle + <i>by</i> + agent (the doer of the action, the subject of the active sentence).	Active: <i>The rotating kelly injured the motorhand.</i> Passive: <i>The motorhand was injured by the rotating kelly.</i>
It is not always necessary to include <i>by</i> + agent.	<i>The motorhand was injured.</i>
We use the passive:	
• to focus on what happened, not on who or what performed an action.	<i>The equipment is tested regularly.</i> <i>The lanyard was caught.</i>
• when the doer of the action is self-evident or not important.	<i>This equipment is made in Germany.</i> <i>The well was drilled last week.</i>
• to talk about processes.	<i>The kelly is fixed to the drill pipe. Then the drill string is tripped into the well hole.</i>

5 Rewrite these sentences in the passive.

- The rotary table caught the derrickhand's lanyard.
- The visitor wore loose clothing.
- The toolpusher reported the accident.
- The engineer pressed the emergency stop button.
- The driller supervised the workers.
- A company in Germany makes these tools.
- The security guard checks the luggage.

Speaking 6 Work in pairs. Discuss accidents you have seen or heard about. Was anyone injured? Were any safety rules broken?

Decontamination procedures

Vocabulary 1 Label photos A-E with the words in the box.

cloth hose contaminated water porous material
soiled gloves steam cleaning




2 Complete this extract from a company's standard operating procedures (SOPs) with the words in the box.

bits cleaned minimise porous soiled water

PROCEDURES

Drilling equipment cleaning and decontamination

- 1 Prior to departure, the drill rig and all drilling equipment should be thoroughly _____ to remove all oil, grease, mud, etc.
- 2 Before each drilling operation, all downhole drill equipment, the rig and other equipment should be steam cleaned or cleaned using high pressure hot _____ and rinsed with pressurised potable water to _____ cross-contamination.
- 3 Equipment with _____ surfaces, such as rope, cloth hoses and wooden blocks or tool handles, cannot be thoroughly decontaminated. These should be disposed of properly.
- 4 Cleaned equipment should not be handled with _____ gloves. Surgical gloves, new clean cotton work gloves or other appropriate gloves should be used and disposed of, even when only slightly soiled.
- 5 The use of newly painted drill _____ and tools should be avoided, since paint chips will likely be introduced into the monitoring system.

- Listening 3**  Listen to a supervisor explaining decontamination procedures to a new employee. Match these procedures (a–e) to the supervisor's instructions.
- Clean the drill rig and all drilling equipment prior to departure. ___
 - Steam clean the equipment, then rinse with potable water. ___
 - Dispose of equipment with porous surfaces. ___
 - Dispose of soiled gloves. ___
 - Do not use newly painted tools or equipment. ___

- 4** Listen to conversations 1–3 again. Write words that match these definitions.
- prior to _____
 - rinse _____
 - potable _____
 - dispose of _____
 - soiled _____

- Vocabulary 5** Complete these sentences with the words in the box. There is one extra word.

away cleaned cleaner cleaning mud water

- This equipment should be thoroughly _____.
- First, use the steam _____.
- Remove all the grease and _____.
- Then wash the equipment with potable _____.
- Don't forget to throw the old ropes _____.

Language

Should and must

We use should to make recommendations or suggestions.	You should clean the drill bits first. You shouldn't wear jewellery.
We use must for rules. <i>Must</i> is stronger than <i>should</i> .	You must use the steam cleaner. You mustn't wear soiled gloves.
<i>Should</i> and <i>must</i> can also be used in the passive (<i>must/should</i> + <i>be</i> + past participle).	Active: You should/must clean the drill bits. Passive: The drill bits should/must be cleaned .

- 6** Complete these sentences with the correct active or passive form of *should*.
- You _____ (remove) the contamination.
 - _____ (we/steam clean) the drill pipes next?
 - Contaminated cloth hoses _____ (dispose) of.
 - You _____ (avoid) newly painted drill bits.
 - All this equipment _____ (clean) using high pressure hot water.

- Speaking 7** Work in pairs. Discuss procedures for cleaning equipment you are familiar with.

A: *I use a steam cleaner quite often.*

B: *Really? What do you use it for?*

A: *To clean the workshop floor.*

B: *What's the procedure?*

A: *Well, first we normally sweep the floor. And we put any tools away.*

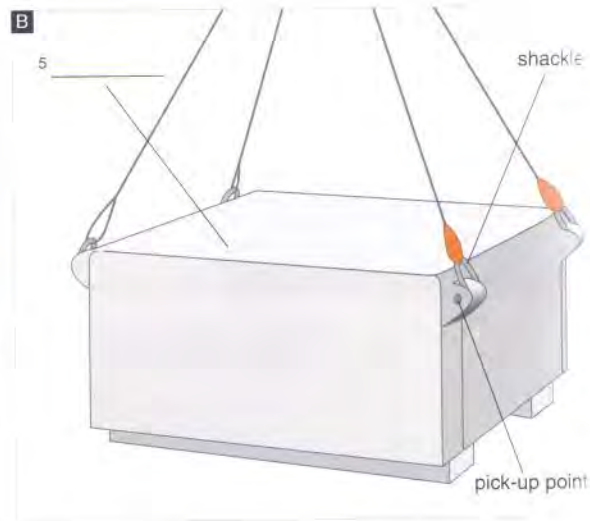
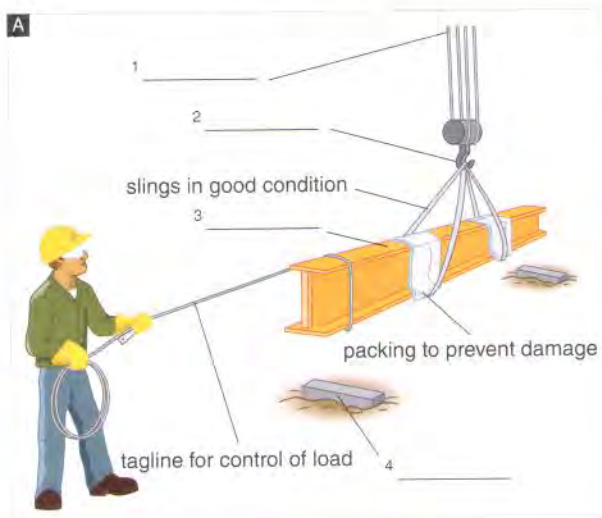
B: *OK.*

A: *Then we ...*

Load handling instructions

Speaking 1 Label illustrations A and B with the words in the box.

block container hook load wire rope



Listening 2 08 Listen to a supervisor (S) giving instructions to a roustabout (R) and complete their conversation.

S: Right, now let me give you some general rules about working with (1) _____. Listen carefully. First of all, make sure the work area is clear. If there's an obstruction, (2) _____ it. And by obstruction I mean anything which shouldn't be there: tools, equipment, boxes – you name it. OK?

R: OK.

S: Good. Next, always (3) _____ the condition of the equipment. If you see any damage, just (4) _____ me. For example, corroded or broken (5) _____ ropes or worn slings. That kind of thing is very dangerous. Understand?

R: Yes, OK.

S: Always use taglines to control a load. If a load swings to the left or right, you just (6) _____ it back. And another thing: attach (7) _____ or shackles to pick-up points. If there are no pick-up points, use slings and packing to prevent damage.

R: Got it.

S: Now, do you know the emergency stop signal?

R: Yes. Like this?

S: Yes, exactly. Well, if you see a problem, (8) _____ the signal.

R: OK.

S: Oh, yeah. If you aren't a qualified rigger, you mustn't rig loads.

R: Aha, OK.

S: And finally, if you don't understand your task, (9) _____ the person in charge.

3 Listen again and tick ✓ the topics that are mentioned.

- | | | |
|---|--------------------------------------|---|
| 1 <input type="checkbox"/> transport | 4 <input type="checkbox"/> equipment | 6 <input type="checkbox"/> stop signals |
| 2 <input type="checkbox"/> taglines | 5 <input type="checkbox"/> clothing | 7 <input type="checkbox"/> cleanliness |
| 3 <input type="checkbox"/> obstructions | | |

Vocabulary 4 Label photos A–E with words and phrases from the conversation in 2.



Language

If + present simple + imperative

We can use the conditional structure **if + present simple + imperative** to give instructions. When the sentence starts with *if*, we put a comma after the *if* clause.

If you see some damage, tell your supervisor. Tell your supervisor if you see some damage.

If you don't understand your task, ask the person in charge. Ask the person in charge if you don't understand your task.

5 Match 1–5 to a–e to make sentences.

- | | |
|-----------------------------------|------------------------------------|
| 1 If you don't know, | a) pull it to the right. |
| 2 If the load swings to the left, | b) throw them away. |
| 3 If there is a problem, | c) ask. |
| 4 If your gloves are soiled, | d) clean it. |
| 5 If the equipment is dirty, | e) give the emergency stop signal. |

6 Complete these sentences.

- If you see a fire, _____.
- If you are hungry or thirsty, _____.
- If you want to speak better English, _____.

Speaking 7 Work in pairs. Student A, look at the information on this page. Student B, look at the information on page 76. Follow the instructions.

Student A

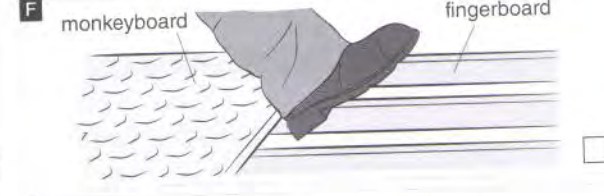
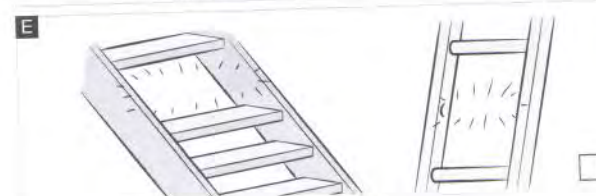
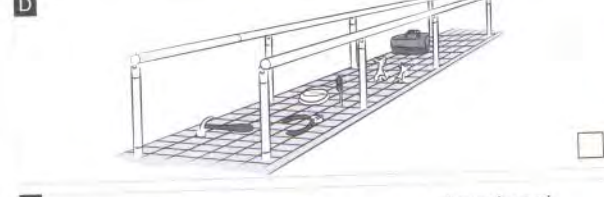
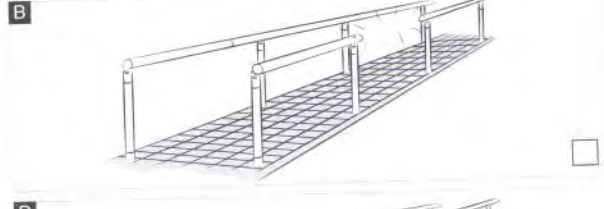
You are a supervisor. Practise the conversation in 2 with Student B. Then swap roles and repeat the activity. Remember to discuss the following:

- obstructions
- stop signals
- taglines
- condition of equipment

Hazards

Vocabulary 1 Match words 1–10 to illustrations A–J.

- | | |
|---------------------|----------------------|
| 1 falling hammer | 6 missing guard rail |
| 2 mouse hole | 7 moving pipes |
| 3 obstructions | 8 rotating kelly |
| 4 short monkeyboard | 9 steps and rungs |
| 5 swinging kelly | 10 tong handle |



Reading 2 Match hazards 1–10 to illustrations A–J in 1.

Safety hazards on an oil rig

- | | |
|---|---|
| 1 If there are obstructions in the walkway, you might trip or fall over them. — | 6 If a guard rail is missing from a walkway, you could fall off. — |
| 2 If you carry tools when you are climbing, you might drop them on someone. — | 7 If you step off a monkeyboard onto a fingerboard, you might fall off. — |
| 3 If rungs are missing from a stairway or ladder, you could fall from a height. — | 8 Moving pipes could trap your hand and crush it. — |
| 4 The rotating kelly might catch your loose clothing. — | 9 When the handle of the tong swings, it might strike you. — |
| 5 A kelly or pipe could swing and strike your head. — | 10 You could fall into an uncovered mouse hole. — |

Listening 3  09 Listen to three conversations. Choose the hazard you hear.

- | | | |
|-----------------------------|---------------------------|---------------------------|
| 1 a) wet rung | b) broken rung | c) missing rung |
| 2 a) missing
monkeyboard | b) broken
monkeyboard | c) twisted
monkeyboard |
| 3 a) loose clothing | b) helicopter landing pad | c) helicopter rotor |

4 Listen again. What exactly happened in each situation?

Language

Might and could

We use **might** and **could** to say there is a possibility of something happening.

You **might** fall over an obstruction.
The pipes **could** trap your hand.

We can also use **might** and **could** in conditional sentences.
We use *if* + present simple + **might/could** + infinitive.

If we get bad weather, we might stop work.

5 Match 1–5 to a–e to make short exchanges.

- | | |
|--|---|
| 1 If it rains, you might get wet. | a) No, sorry. But John might know. |
| 2 If the pipes arrive late, we might have to delay the drilling. | b) Yes, the sea is quite high already. |
| 3 If the weather gets worse, we could be in for a rough night. | c) The company rep won't like that. |
| 4 Could you make the tea? | d) Yes, but only if I forget my raincoat. |
| 5 Do you know where the incident file is? | e) No, sorry. I made it yesterday. Your turn today. |

Writing 6 Use these notes to write a report.

guard rail on stairway missing – no guards on winch – 3 drillers with no hard hats – nuts and bolts missing from swivel – no cables for tools – walkway blocked with hoses

Safety report

I inspected the oil rig on 24 August and I observed these safety hazards:

1 A guard rail on a stairway was missing.

2 There were no _____.

3 Three drillers did not _____.

4 _____.

5 _____.

6 _____.

Speaking 7 Work in pairs. Make a list of hazards in your place of work/study. Discuss what could happen.

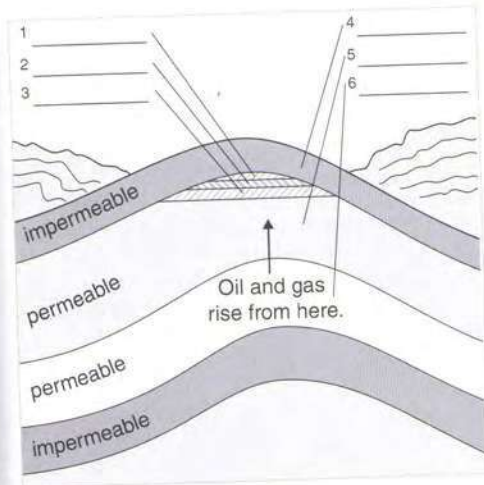
- describe how oil is formed
- explain typical oil industry processes
- give a short presentation about refining processes
- clarify pipeline laying techniques

Exploration

Reading 1 Read this text and label the diagram with the words in the box.

cap rock gas oil reservoir rock source rock water

Petroleum geologists look at two important properties of rocks: permeability and impermeability. Some rock types, such as limestone and sandstone, are highly permeable (or porous) – that is, they contain small pores (or holes) which allow fluids, such as oil, gas and water, to flow through them. Other rock types, such as granite and marble, are impermeable (or non-porous) – that is, they do not contain pores and fluids cannot pass through them. This diagram shows how permeable and impermeable rock layers are arranged in a typical oil and gas field. The oil and gas deposits are found in a layer of reservoir rock, which is permeable. In the reservoir rock, gas is at the top, oil is in the middle and water is at the bottom. The reservoir rock is trapped between two layers of impermeable rock. A long time ago, the petroleum was in a layer of source rock, such as shale, below the reservoir rock. Over a long period of time, the oil and gas flowed upwards out of the source rock into the reservoir rock, where it was trapped by the top layer of impermeable cap rock.

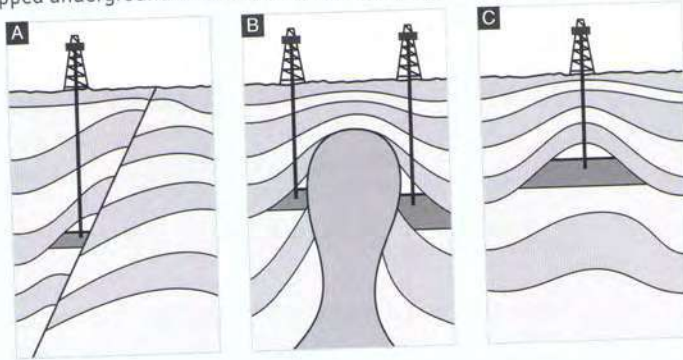


2 Read this follow-up text and label diagrams A–C Fig 1, Fig 2 or Fig 3.


How were oil fields formed? It began millions of years ago, when the remains of microscopic plants and animals (organic matter) settled on the sea bed. Sediments, such as clay and sand, covered the organic matter. More sedimentary layers were added and the sediments became heavier. Pressure and temperature increased. The heat and pressure converted much of the organic matter into the hydrocarbons that make up oil and gas. The oil and gas then flowed upwards. Some of it reached the surface and escaped. However, some of it was trapped underground in reservoir rock below a layer of cap rock. The oil remains in this geological 'trap' until it is drilled for and brought to the surface.

Here are three types of geological trap. They were all caused by movements in the Earth's crust:

- 1 A fold (or anticline). The layers of rock were bent into a dome shape (see Fig 1).
- 2 A fault. The layers of rock cracked and one side moved upwards or downwards (see Fig 2).
- 3 A pinch-out. A mass of impermeable rock pushed upwards into the reservoir rock (see Fig 3).



- 3 Are these statements about the texts in 1 and 2 *true* (T) or *false* (F)?
- 1 Granite and marble are examples of reservoir rock. (T / F)
 - 2 If there is no layer of cap rock, oil and gas can flow to the surface and escape. (T / F)
 - 3 Oil, gas and water can flow through small holes in rocks. (T / F)
 - 4 Oil is composed of hydrocarbons, formed underneath the sea. (T / F)

Listening 4  10 Complete this conversation between an engineer and a visitor to a drill site with words from 1 and 2. Then listen and check your answers.

- A: Can you tell me how oil fields are formed?
 B: Yes, of course. It's really very simple. First, you have organic matter which falls to the sea (1) _____ .
 A: Organic matter is things like plants and animals?
 B: Yes, exactly. Next, this organic matter gets covered by sediments, such as clay or sand. Over time more and more sediments fall, so we end up with different sedimentary (2) _____ .
 A: And the pressure increases?
 B: Yes, and the (3) _____ increases too. And this process converts the organic matter into (4) _____; in other words, oil and gas.
 A: I see.
 B: Now this oil and gas is in what we call the source rock. After a while, it flows upwards to what we call the (5) _____ rock. And finally, it stops in a so-called (6) _____ trap.
 A: Why do you call it a trap?
 B: Because it can't flow upwards any more. The cap rock, which is above the reservoir and is impermeable, stops the oil and gas escaping to the surface. It traps the oil and gas.
 A: I see.
 B: There are different types of traps, of course. Look at these diagrams. The first one is an anticline. You can see it's shaped like a(n) (7) _____ .

Pronunciation 5  11 Listen and repeat.

- 1 sedimentary layers
- 2 hydrocarbons
- 3 reservoir rock
- 4 geological trap
- 5 impermeable

Language

Sequencers

We usually use **sequencers** when we describe the different steps in a process.

first, second, third, next, then, after that, finally

We can also use certain phrases to talk about processes.

after a while, over time, over a long period of time

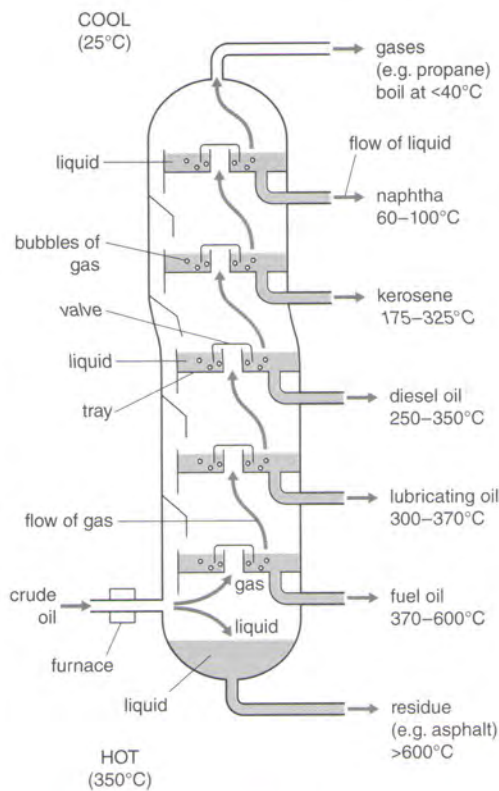
- 6 Put these sentences in the correct order. Then complete them with the words in the box.

after finally first over then

- _____, the hydrocarbons are trapped by impermeable rock or escape to the surface.
- _____, organic matter falls to the sea bed.
- _____ time the hydrocarbons flow upwards.
- _____ that, the weight of the sedimentary layers converts the organic matter into hydrocarbons.
- _____, sediments fall and cover the organic matter.

Distillation

Reading 1 Look at this diagram of the oil distillation process. Are statements 1–6 *true* (T) or *false* (F)?



- 1 Crude oil is heated and pumped into the column. (T / F)
- 2 When this happens, all the crude oil evaporates and the vapour (or gas) rises through the column. (T / F)
- 3 As the vapour goes up the column, the temperature decreases. (T / F)
- 4 All the vapour from the crude oil flows to the top of the column and leaves it through a pipe. (T / F)
- 5 When the temperature falls to between 175°C and 325°C, some of the vapour condenses into liquid kerosene. (T / F)
- 6 This substance condenses at a higher temperature than naphtha. (T / F)

2 Work in pairs. Read this description of the distillation process and answer the questions.

The oil refining process: fractional distillation

Crude oil (or petroleum) is a mixture of different hydrocarbons. Many useful products can be made from them but first they must be extracted and separated from one another.

The different hydrocarbon components of crude oil are called fractions and they are separated using fractional distillation. This process is based on the principle that different substances boil at different temperatures. For example, crude oil contains kerosene (which is made into jet fuel) and naphtha (which is made into petrol for cars). When the mixture of kerosene and naphtha is heated so that it evaporates and then is cooled, the kerosene condenses at a higher temperature than the naphtha. As the mixture cools, the kerosene condenses first and the naphtha condenses later.

This is how fractional distillation works: the main equipment is

a tall cylinder called a fractionator (or fractional distillation column). Inside there are many trays, or horizontal plates, located at different heights. Each tray collects a different fraction when it cools and condenses.

The crude oil is heated to at least 350°C, which makes most of the oil evaporate. The vapour then enters the column and moves up through the fractionator. As each fraction condenses, the liquid is collected in the trays. Substances with higher boiling points condense on the lower trays in the column. Substances with lower boiling points condense on the higher trays.

The trays have valves, which allow the vapour to bubble through the liquid in the tray. This helps the vapour to cool and condense more quickly. The liquid from each tray then flows out of the column.

- 1 Why do different substances need to be extracted from crude oil?
- 2 What scientific fact does fractional distillation use?
- 3 Which components in the column collect the condensed liquid from each fraction?
- 4 What do the valves do?

3 Match 1–7 to a–g to make collocations.

- | | |
|--------------|-----------------|
| 1 boiling | a) oil |
| 2 fractional | b) cylinder |
| 3 crude | c) plates |
| 4 tall | d) fuel |
| 5 liquid | e) kerosene |
| 6 horizontal | f) distillation |
| 7 jet | g) point |

4 Put these stages of the distillation process in the correct order.


- As the vapour rises through the trays in the column, the temperature falls.
- The condensed liquid of the fraction is collected in a tray.
- When a fraction in the vapour cools to its own boiling point, it condenses.
- 1 This is how the distillation process in the fractionator works.
- Most of the fractions in the crude oil evaporate.
- The condensed liquid flows out of the fractionator through a pipe from the tray.
- A furnace is used to heat the crude oil to a high temperature.
- The crude oil vapour enters the fractionator and rises up the column.

Language

Talking about temperature

We often use verb + preposition to describe temperature changes.

The temperature **falls to** 325°C.
The temperature **rises to** between 60°C and 100°C.
The temperature **ranges from** 370°C to 600°C.

Listening 5  **12** Complete these sentences with information from the diagram in 1. Then listen and check your answers.

- 1 Jet fuel is made from kerosene, which condenses between _____ and _____°C.
- 2 When naphtha vapour is cooled to between _____ and _____°C, it condenses.
- 3 Diesel oil is produced by cooling crude oil vapour to between _____ and _____°C.
- 4 The boiling point of industrial fuel oil ranges from _____ to _____°C.

Speaking 6 Work in small groups. Answer these questions.

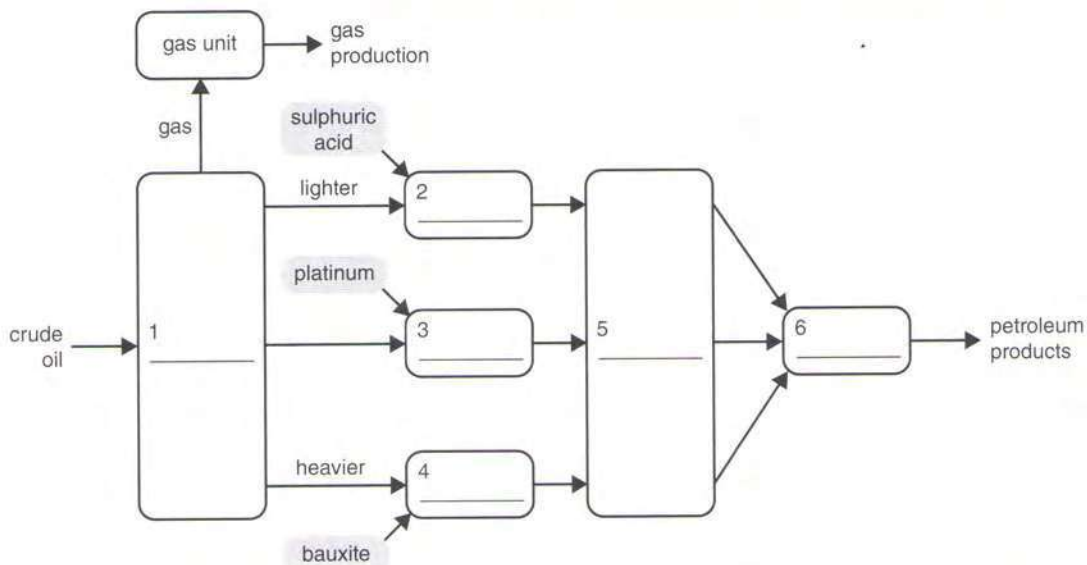
- 1 What is a fraction?
- 2 What is fractional distillation?
- 3 What are the main components in a fractionator?



Refining

Reading 1 Read the text and complete this flow chart with the words in the box.

alkylation blending cracking fractional distillation reforming treating



The oil refining process: cracking, reforming, alteration, treating and blending

The molecules in petroleum are hydrocarbons and consist mainly of carbon (C) and hydrogen (H).

Hydrocarbons may be gaseous, liquid or solid at room temperature and atmospheric pressure. Solids have a higher number of carbon atoms and a higher boiling point. Gases have a lower number of carbon atoms and a lower boiling point.

After fractional distillation, petroleum fractions can be changed in three main ways: by cracking, reforming or alteration.

Cracking breaks down larger, heavier hydrocarbons into smaller, lighter hydrocarbons. For example, heavy gas oil can be broken down into lighter products, such as petrol and diesel. The process takes place in a cracking unit. The hydrocarbons are heated under pressure to high temperatures until they break apart (thermal cracking). Sometimes a catalyst, such as bauxite or hydrogen, is used to speed up the process.

Reforming combines smaller, lighter hydrocarbons to make larger, heavier

hydrocarbons. The process takes place in a reformer. It uses heat, pressure and a catalyst (usually containing platinum) to convert naphtha into high octane petrol and petrochemicals.

Alteration rearranges or changes the hydrocarbons in one fraction to produce a different fraction. The most common method is called alkylation, which takes place in an alkylation unit. In this process, lighter hydrocarbons are converted into high-octane petrol using a catalyst, such as sulphuric acid.


After the above processes, the fractions are treated in the treatment unit where they are passed through chemical filters to remove impurities, such as sulphur, water or salts. Finally, different fractions can be blended or mixed together in the blender to create products for making plastics and other polymers, such as petrol, lubricating oils, kerosene, jet fuel, diesel oil, heating oil and petrochemicals.

Vocabulary 2 Tick ✓ which of the following are used as catalysts in the refining process.

- 1 kerosene 3 diesel oil 5 sulphuric acid
 2 bauxite 4 water 6 platinum

3 Match the items in this table.

Process	Location	Purpose	Method
1 fractional distillation	a) reformer	i) remove sulphur	A) heat under high pressure
2 cracking	b) blender	ii) break down heavy hydrocarbons	B) cool fractions at different temperatures
3 reforming	c) alkylation unit	iii) separate fractions from crude oil	C) heat under pressure; use platinum as catalyst
4 alkylation	d) treatment unit	iv) create products, such as petrol	D) use sulphuric acid as catalyst
5 treating	e) distillation column	v) change hydrocarbons	E) mix fractions together
6 blending	f) cracking unit	vi) combine hydrocarbons	F) pass through chemical filters

Listening 4  Complete these sentences from a presentation about the refining process with the words and phrases in the box. Then put the sentences in the correct order. Then listen and check your answers.

brings me to by saying for coming let's look at
 like to move shown shows to explain turn to

- (1) _____ cracking first.
 That (2) _____ the three main processes: cracking, reforming and alteration.
 My objective in this talk is (3) _____ some of the processes in oil refining.
 As (4) _____ in the flow chart, after treatment we have blending.
 I'd like to start (5) _____ a few things about hydrocarbons.
 Now let's (6) _____ on to reforming.
 And thirdly, let's (7) _____ alteration.
 And finally, I'd (8) _____ mention some of the products of refining.
 As the flow chart (9) _____, the next process is treatment.
 Good morning everyone, and thanks (10) _____ to this presentation.

Language

The passive with can

We use *can + be + past participle* to form the passive with *can*.

Active	Passive
We can change fractions in three main ways. We can break large hydrocarbons down into smaller ones.	Fractions can be changed in three main ways. Large hydrocarbons can be broken down into smaller ones.

5 Read the text in 1 again. Underline the passives with *can*.

Speaking 6 Work in small groups. Prepare a short presentation on the refining process. Use the expressions in 4 to help you. Then give a presentation to your group.

Laying a pipeline

Reading 1 Read the text and match headings 1–7 to gaps a–g.

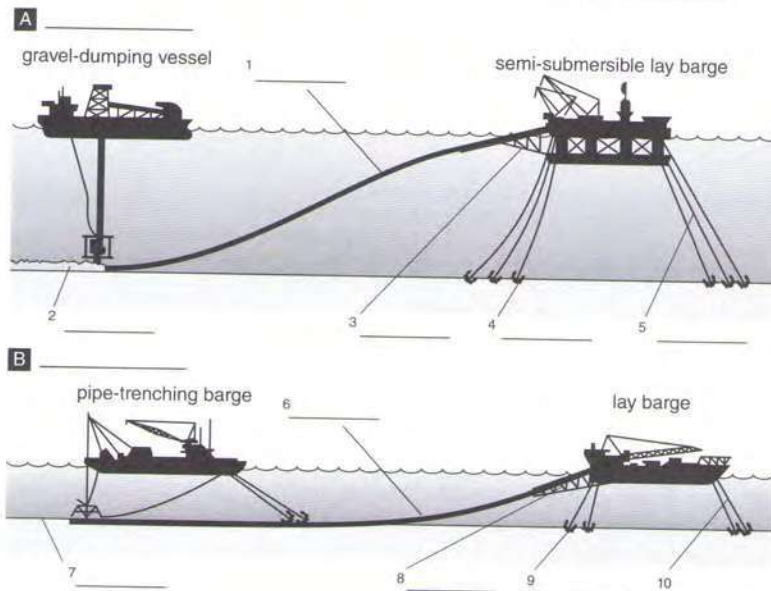
- 1 Burying the pipeline under the sea bed
- 2 Connecting the pipes into a pipeline
- 3 Laying the pipeline on the sea bed
- 4 Surveying and mapping the sea bed
- 5 Cleaning out the pipeline before use
- 6 Constructing the pipes
- 7 Planning the route of the pipeline

Most offshore oil and gas is brought to shore by pipelines, which can operate in all weathers. Here are the main stages of laying a sub-sea pipeline:

- a) ___ The sea bed is mapped to identify unstable areas and obstacles and to see if it will be possible to bury the pipe.
- b) ___ Pipeline routes are planned to be as short as possible. Slopes that could put stress on unsupported pipe are avoided.
- c) ___ Pipeline construction is begun onshore. Lengths of pipe are waterproofed with bitumen and coated with polymers or steel-reinforced concrete. This coating protects the submarine pipeline and also weighs it down on the sea bed.
- d) ___ The prepared lengths of pipe are welded together offshore on a lay barge.
- e) ___ The barge is winched forward on its anchor lines. At the same time, the pipeline drops gently to the sea bed. The pipeline is guided by a 'stinger'.
- f) ___ Two methods are often used to cover and protect the pipeline on the sea bed:
- 1 (see Fig 1 in 2) In shallower water, a pipe-trenching barge is used. This vessel follows the lay barge. When the new pipeline is laid on the sea bed, the trenching barge digs a shallow trench under the pipeline and covers it with debris.
 - 2 (see Fig 2 in 2) In deeper water, a gravel-dumping vessel is used. This vessel follows the semi-submersible lay barge and drops gravel onto the pipeline. The pipeline has more weight in deeper seas.
- g) ___ The insides of pipelines are cleaned regularly to remove wax deposits and water. A pipeline inspection gauge is forced through the pipe. This device collects deposits and cleans the pipe.


2 Look at methods 1 and 2 in the text in 1. Label these diagrams Fig 1 or Fig 2. Then label the diagrams with the words in the box. Use four of the words twice.

anchor anchor line gravel pipeline stinger trench



Vocabulary 3 Match 1–8 to a–h to make sentences.

- | | |
|---------------|------------------------|
| 1 Routes | a) are dug. |
| 2 The sea bed | b) are planned. |
| 3 Slopes | c) are avoided. |
| 4 Pipes | d) is dropped. |
| 5 The barge | e) are cleaned. |
| 6 Trenches | f) is mapped. |
| 7 Gravel | g) are welded. |
| 8 The insides | h) is winched forward. |

Listening 4  14 Listen to three conversations about laying pipelines. What mistakes do the speakers make?

- 1 She says _____ instead of _____.
- 2 He says _____ instead of _____.
- 3 She says _____ instead of _____.

5 Listen again and answer these questions.

- 1 What words and phrases do the speakers use to correct themselves?
- 2 What do the speakers say to point out the mistakes?

Language

Correcting

We use certain expressions to **correct** ourselves when we make mistakes.

*Oh sorry, my mistake. Onshore, not offshore.
I mean/I meant shallow water, not deep water.
I got that wrong. I meant the pipeline.*

We can correct other people by repeating the word we think is wrong or by asking for clarification.

*Did I understand you correctly? You use trenches in deep water?
Do you mean 'offshore'?
So in other words, the stinger places the gravel in the right place?*

6 Read these conversations about laying pipelines and complete them with suitable expressions. Use language from the Language box.

1

A: Yes, so we try to make the pipeline routes as long as possible.

B: As long as possible?

A: _____

2

A: We have a team of engineers on the lay barge. Their job is to weld the pipes together.

B: Do you mean 'welders'?

A: _____

3

A: We use a pipeline inspection gauge to clean the outside of the pipe.

B: Sorry, did you say the outside?

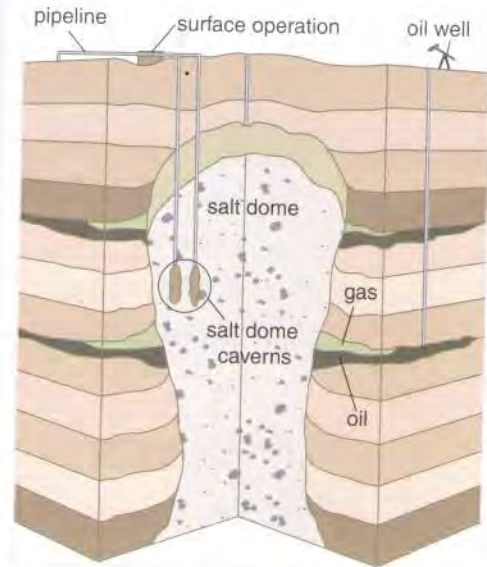
A: _____

Speaking 7 Work in pairs. Student A, explain how pipes are laid underwater but make some mistakes. Student B, correct Student A or ask for clarification where necessary.

Storage

- Reading 1** Read this article. Which three factors are important when choosing an underground storage site?

Natural gas, a colourless, odourless, gaseous hydrocarbon, may be stored in a number of different ways. It is most commonly held underground under pressure in three types of facilities. These are: (1) depleted reservoirs in oil and/or gas fields, (2) aquifers and (3) salt cavern formations. Natural gas is also stored in liquid form in above-ground tanks. Each storage type has its own physical characteristics and economics, which influence how it is used. Two of the most important characteristics of an underground storage reservoir are its capacity to hold natural gas for future use and the rate at which gas inventory can be withdrawn – its deliverability rate.



- Vocabulary 2** Find words in the article in 1 that match these definitions.

- 1 having no smell _____
- 2 emptied out _____
- 3 water-bearing rock _____
- 4 large cave _____
- 5 all the material in storage _____
- 6 taken out _____

- 3** Gas and gas storage facilities can be measured in different ways. Match 1–6 to a–f to complete the definitions.

Storage measures

- 1 Total gas storage capacity is the maximum volume of gas that
- 2 Total gas in storage is the volume of storage in the underground facility
- 3 Base gas (or cushion gas) is the volume of gas in a storage reservoir which is needed to maintain adequate
- 4 Working gas capacity refers to total gas storage capacity
- 5 Working gas is the volume of gas in the reservoir above the level of base gas. Working gas is available
- 6 Deliverability is a measure of the amount of gas that can be delivered (withdrawn) from
 - a) at a particular time.
 - b) minus base gas.
 - c) can be stored in an underground storage facility.
 - d) to the marketplace.
 - e) a storage facility on a daily basis.
 - f) pressure and deliverability rates throughout the withdrawal season.

mcf = million cubic feet
 mmcf = bcf = billion cubic feet
 mcm = million cubic metres
 bcm = billion cubic metres

4 Complete this table using the information in 3.

Total capacity (bcf)	Base gas (bcf)	Working gas (bcf)	Working gas capacity (bcf)	Total gas in storage (bcf)
7,563	3,728	2,473	1 _____	2 _____


Language

Compound nouns

A compound noun is made up of two or more nouns. Some are written as two words and some as one word.	<i>storage reservoir</i> <i>marketplace</i>
The first noun normally indicates what type of thing the second noun is.	<i>working gas, base gas, cushion gas</i> (types of gas) <i>gas inventory</i> (a type of inventory) <i>gas storage capacity</i> (a type of storage capacity) Note: <i>total gas storage</i> = the total storage <i>total gas in storage</i> = the total gas

Speaking 5 Work in pairs. Discuss the difference(s) between the following.

- 1 cushion gas/gas cushion
- 2 wall paper/paper wall
- 3 workbook/book work
- 4 safety helicopter/helicopter safety
- 5 test apparatus/apparatus test

Listening 6  25 Listen to a conversation about storage measures in a facility in North America. Which types of storage are mentioned?

7 Listen again. What do these numbers refer to?

- 1 123 _____
- 2 2,657 bcf _____
- 3 24,464 mmcf _____
- 4 30 million _____


Speaking 8 Work in pairs. Student A, look at the information on this page. Student B, look at the information on page 77. Follow the instructions.

Student A

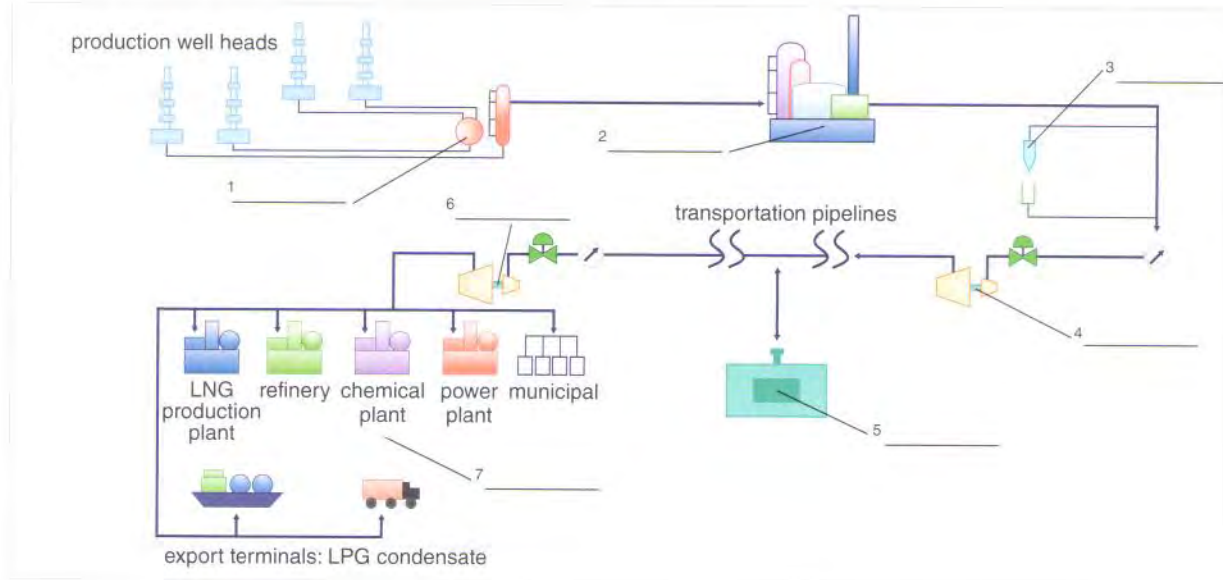
You own the following gas storage facility and you want to sell it. Answer the telephone.

Type: salt caverns
Number of caverns: 7
Capacity: 135 mcm
Base gas: 45 mcm
Deliverability: 18 mcm/day

Contamination control

Listening 1  **26** Label this illustration with the phrases in the box. Then listen to part of a presentation about contamination control and check your answers.

compressor/metering/regulation stations (x2) end users processing plants
 pipeline inspection gauge receivers production plants underground storage



2 Listen again and write one or more examples of each of the following. Then read audio script 26 on page 73 and check your answers.

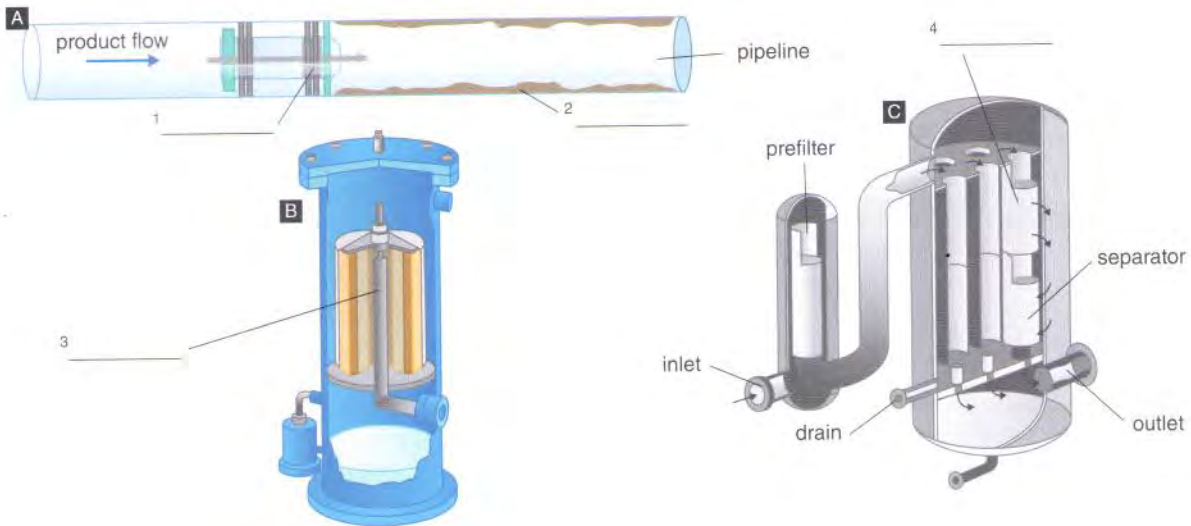


- 1 solid contaminant: _____
- 2 liquid contaminant: _____
- 3 typical problem(s) that contaminants can cause:

Reading 3 Read this information sheet and label diagrams A–C on page 49.

Three common ways of removing contamination from pipelines are pipeline inspection gauges, filters and coalescers.

- 1 A pipeline inspection gauge is a device that scrapes the walls of the pipe. It cleans the deposits from the pipe as it moves along it.
- 2 A filter allows liquid to flow through but stops solid particles.
- 3 There are two main types of coalescers. Liquid–gas coalescers are used to separate water and hydrocarbon liquids from gas. Liquid–liquid coalescers separate liquid contaminants such as water from liquid products.



Vocabulary 4 Complete this text with the words in the box.

contamination filters filtration liquid pipelines

Most pipeline systems use a combination of techniques to prevent or reduce (1) _____. For example, (2) _____ are often used to collect the solids removed after a pipeline inspection gauge has been through a pipe.

Pipeline inspection gauges are very common but cannot be used on all (3) _____. In such cases, (4) _____ systems can be used to remove contaminants from the (5) _____ before it enters the pipeline.

Language

Vague language

Sometimes we use **vague language** when we want to give people an impression of something without going into all the facts and details.

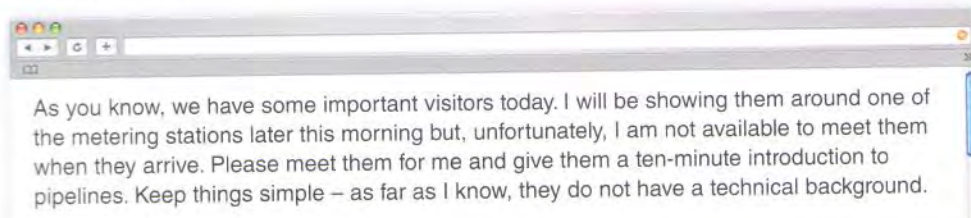
We're talking about **things like** rust and pipe scale. These contaminants can cause **all sorts of** problems. They can lower the quality of the product **quite a bit**.

5 Read audio script 26 on page 73 and underline examples of vague language.

Speaking 6 Work in pairs. Student A, look at the information on this page. Student B, look at the information on page 77. Follow the instructions.

Student A

You work for a company called JK Pipelines. Student B, who works for a bank, is visiting your company today. Read this email from your boss and follow his/her instructions.



Transport of dangerous goods

Speaking

driving licence (BrE)
driver's license (AmE)

1 Work in small groups. Can you drive? Do you have a driving licence? What extra skills do you need in order to drive a tanker? Discuss.



Listening

2 27 Listen to a driving instructor talking about a training course. What type of course is it? What sorts of things will it cover?

3 Listen again and choose *yes* (Y) or *no* (N) for each of these questions. Then read audio script 27 on page 73 to check your answers.

- 1 Are the rules the same in every country? (Y / N)
- 2 Is there a written test? (Y / N)
- 3 Will emergencies be covered on the course? (Y / N)
- 4 Is a placard necessary *only* at the front and rear of the vehicle? (Y / N)
- 5 Is there an emergency telephone number in the shipping documents? (Y / N)

Reading

4 Read this extract about shipping documents and label the diagram with the words in the box.

diamond hazard shipping sides telephone

SHIPPING DOCUMENTS (PAPERS)

The shipping document contains the four-digit ID number preceded by the letters *UN* or *NA*, the proper shipping name, the hazard class or division of the material(s) and, where appropriate, the Packing Group. The shipping document will also display a 24-hour emergency response telephone number.

EMERGENCY CONTACT 1-000-000-000				Example of emergency contact (1) _____ number	
		(2) _____ class or division number			
NO. AND TYPE OF PACKAGES			QUANTITY		
1 TANKTRUCK	UN1219	ISOPROPANOL	3	II	12,000 LITRES
		ID number	(3) _____ name	PACKING GROUP	

Example of placard and panel with ID number

The four-digit ID number may be shown on the (4) _____-shaped placard or on an adjacent orange panel displayed on the ends and (5) _____ of a cargo tank, vehicle or rail car.



a numbered placard

or

a placard and an orange panel



1219

Vocabulary 5 Match 1–7 to a–g to make collocations.

- | | |
|-------------|--------------|
| 1 shipping | a) materials |
| 2 hazardous | b) group |
| 3 hazard | c) users |
| 4 diamond- | d) licence |
| 5 driving | e) class |
| 6 packing | f) shaped |
| 7 road | g) document |

Language

Abbreviations

We often use **abbreviations** (the short forms of words) when we speak or write.

hazardous materials → *hazmat*
shipping documents → *shipping docs*
identification number → *ID number*
commercial driver's license → *CDL*

6 These abbreviations have been used in this book. What do they stand for?

- 1 LPG _____
- 2 E&P _____
- 3 SOP _____
- 4 MFP _____
- 5 DWT _____

Speaking 7 Work in pairs. Student A, look at the information on this page. Student B, look at the information on page 78. Follow the instructions.

Student A

Read these details about a training course and answer Student B's questions.

Then swap roles. Ask Student B about his/her course.

How long is it?

What will I learn on the course?

Who is the course for?

Dangerous goods regulations – Initial

Learn about shipping dangerous goods and the procedures, regulations, responsibilities and best practices involved.

Course details

Available as: classroom and in-company course

Duration: 5 days (40 hours)

Recommended level: entry-level and professional

Prerequisites: none

What you will learn

Upon completing this course, you will have the skills to:

- prepare and process dangerous goods shipments.
- understand legal requirements, operational restrictions and governing entities.

- champion dangerous goods compliance standards in your organisation.
- identify weak links in your handling procedures.
- examine safety issues and apply them appropriately in the workplace.

Who should attend

- airline acceptance staff, shippers and freight forwarders
- cargo training and development specialists
- ground handling and load control staff involved in the cargo chain
- regulatory compliance specialists
- personnel from the Departments of Transportation and Civil Aviation Authorities
- operations and station managers

7

Impact

- describe incidents
- understand causes of accidents
- complete incident report forms
- handle oil spills

Incidents

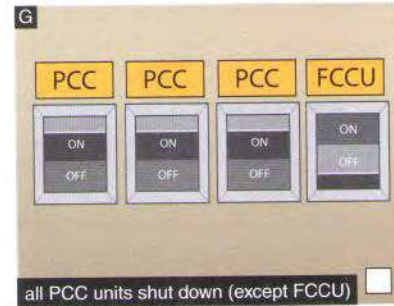
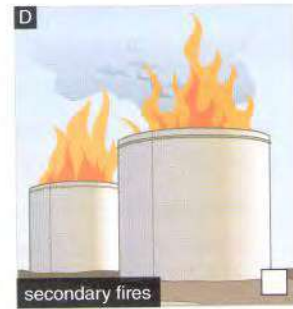
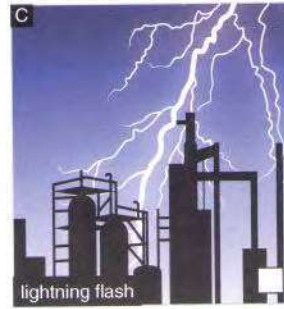
Speaking 1 Look at this photo. What type of installation is on fire?




Listening 2 28 Listen to a report about an incident that took place at the Texaco Refinery, Milford Haven, Wales, on 24 July 1994. Answer these questions.

- 1 Was anyone injured?
- 2 What exploded?
- 3 What on-site damage occurred?
- 4 What off-site damage occurred?

3 Listen again and put the events in the correct order.



4  29 Listen to a conversation. What are the people talking about?

5 Listen again. What four errors are mentioned?

Vocabulary 6 Match 1–5 to a–e to make collocations.

- | | |
|-----------|-------------|
| 1 sustain | a) a cloud |
| 2 cause | b) injuries |
| 3 provide | c) a fire |
| 4 form | d) damage |
| 5 suffer | e) feed |

7 Complete these sentences with the correct form of the collocations in 6.

- There were no deaths in the incident but 26 people _____.
- The smoke from the fire _____ over the refinery.
- The lightning strike _____.
- Several units _____ in the fire.
- The crude distillation unit _____ to the PCC units.

Language

Collocations with fire

Verb + fire	<i>start a fire, cause a fire, control a fire, contain a fire, put out/extinguish a fire</i> Note: If something catches fire , it starts to burn. (e.g. <i>The building caught fire.</i>)
Fire + verb	<i>A fire broke out at the refinery. A fire started when lightning struck.</i> <i>The fire spread quickly. A fire occurred last night in a factory.</i> <i>The fire went out after a few hours.</i>
Compound nouns with fire	<i>fire brigade, fire risk, fire equipment, fire alarm, fire fighter, fire extinguisher, fire incident</i>
Adjective + fire	<i>secondary fire, serious fire, small fire, large fire, hydrocarbon fire</i>
Compound adjectives with fire	<i>fireproof material, fire-retardant jacket, fire-resistant clothing</i>

8 Complete this article with the words in the box.

burn extinguished fire spread started

The (1) _____ incident occurred at approximately 4.40 hours, according to reports from on-site personnel. As they were tripping out the drill string from the ground, the bit cleared from the hole, went up through the annular BOP and passed through the deck of the drilling rig, at which time the incident occurred. Fire (2) _____ in the immediate

area around the drilling hole and (3) _____ upwards throughout the rig. The fire continued to (4) _____ freely until well control personnel were able to regain down-hole pressure and kill the well with water weighted with mud. The fire response team then (5) _____ the remaining fires.

Speaking 9 Work in pairs. Student A, look at the information on page 68. Student B, look at the information on page 78. Follow the instructions.

Equipment problems

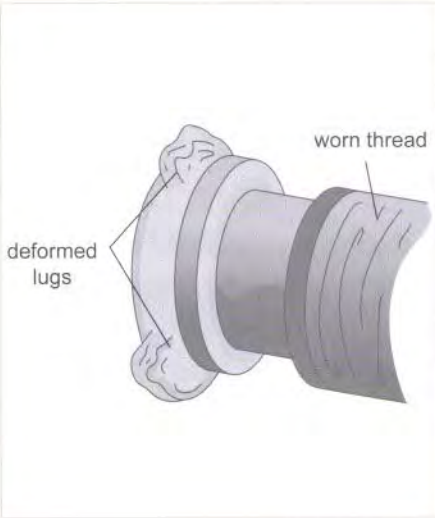
Vocabulary 1 Label photos A–C with the words in the box.

LPG loading arms LPG storage tanks LPG road tanker



Reading 2 Read this extract from a report about an incident at an LPG road tanker loading facility in a refinery. Tick ✓ the most likely cause of the accident.

- The driver did not tighten the connector.
- The connection thread was worn.
- The driver over-tightened the connector.



The incident took place at 9.45, when the driver had already loaded 12 tons of LPG. The coupling connecting the loading arm to the vehicle failed, which led to a spontaneous release of LPG. The escaping gas ignited and caused a fireball, which covered the driver. As a result, the driver sustained severe injuries and died two days later.

The investigation found that the thread in the coupling was badly worn. In addition, the lugs of the coupling were deformed. It is likely that the driver had used a hammer to tighten the coupling.

Vocabulary 3 Find words in the text in 2 that match these definitions.

- 1 not planned _____
- 2 started burning _____
- 3 surrounded _____
- 4 inquiry _____
- 5 a piece of equipment which connects two things _____
- 6 misshapen _____

Vocabulary 4 Complete this table with words from the text in 2.

Verb	Noun
investigate	1 _____
2 _____	ignition
couple	3 _____
4 _____	failure
release	5 _____
6 _____	deformation
connect	7 _____

Language

Explaining why something happened

<i>This led to ...</i>	<i>This led to a release of LPG.</i>
<i>This caused ...</i>	<i>The released hydrocarbons formed a vapour cloud, which ignited. This caused a major hydrocarbon fire.</i>
<i>The cause of ... was ...</i>	<i>The cause of the LPG release was the failure of the threaded coupling.</i>
<i>... was caused by ...</i>	<i>The deformation was caused by hammering the lugs.</i>
<i>... resulted in ...</i>	<i>A combination of errors resulted in the release of hydrocarbons.</i>
<i>... as a result of ...</i>	<i>The unit was shut down as a result of the fire.</i>

5 Complete this conversation with the words in the box. There is one extra word.

cause caused corrosion hole ignited led released was

A: So let me get this straight: there (1) _____ a fire, and the fire (2) _____ to an explosion.

B: No, no ... the other way round.

A: Pardon?

B: The explosion caused the fire. The fire didn't (3) _____ the explosion. The explosion came first.


A: OK. And what (4) _____ the explosion?

B: Leaking gas. There was a(n) (5) _____ in the pipe. Gas leaked out, formed a cloud and then (6) _____.

A: I see. And what caused the hole in the pipe?

B: That's what we don't know. We think maybe it was (7) _____. But we'll have to wait for the investigation to be sure.

A: Fair enough.

Listening 6  30 Listen and check your answers in 5.

Vocabulary 7 Rewrite these sentences, inserting the missing words.

- 1 There was a fire. This led to explosion.
- 2 The fire caused explosion.
- 3 The fire led an explosion.
- 4 The report stated that the cause death was a heart attack.
- 5 As a result the accident, all drivers received additional safety training.
- 6 The fire caused by an electrical storm.
- 7 The fire resulted a number of injuries.

Speaking 8 Work in pairs. How would you prevent an accident like the one in 2 re-occurring? Make a list of recommendations.

Check the thread couplings currently in use.

Doing the paperwork

Reading 1 Read this extract from accident/incident reporting regulations. Find words and phrases that are related to injury.

The regulation applies to liquid hazardous materials pipelines. An accident report is required for any of the following:

- 1 an explosion or fire not intentionally set by the operator
- 2 the loss of 50 or more barrels (eight or more cubic metres) of hazardous liquid
- 3 the escape to the atmosphere of more than five barrels (0.8 cubic metres) a day of highly volatile liquids
- 4 the death of any person
- 5 bodily harm resulting in one or more of the following:

- a) loss of consciousness
- b) the necessity of carrying the person from the scene
- c) the necessity for medical treatment
- d) disability which prevents the discharge of normal duties or the pursuit of normal activities beyond the day of the accident
- 6 estimated property damage, including the cost of clean-up and recovery, the value of lost product and damage to the property of the operator or others, or both, exceeding \$50,000.

2 Do these incidents on a pipeline system need to be reported according to the regulations in 1? Choose *yes* (Y) or *no* (N).

- 1 a fire at a compressor station, resulting in two operators being treated for burns (Y / N)
- 2 a leaking valve, resulting in a small pool of oil underneath the valve (Y / N)
- 3 an explosion at a metering station, resulting in the death of two operators (Y / N)
- 4 the fracture of a pipe, resulting in the loss of 400 barrels of oil (Y / N)


3 Read the extract from an incident report form below and find words or phrases that match these definitions.

- 1 deaths _____
- 2 people who have nothing to do with the pipeline _____
- 3 the time at a particular location _____
- 4 taken to another place _____
- 5 extra _____

<p>11 Were there fatalities? <input type="radio"/> Yes <input type="radio"/> No If Yes, specify the number in each category:</p> <p>11a operator employees /_/_/_/_/_/</p> <p>11b contractor employees working for the operator /_/_/_/_/_/</p> <p>11c non-operator emergency responders /_/_/_/_/_/</p> <p>11d workers working on the right-of-way but NOT associated with this operator /_/_/_/_/_/</p> <p>11e general public /_/_/_/_/_/</p> <p>11f total fatalities (sum of the above) /_/_/_/_/_/</p>	<p>12 Were there injuries requiring inpatient hospitalisation? <input type="radio"/> Yes <input type="radio"/> No If Yes, specify the number in each category:</p> <p>12a operator employees /_/_/_/_/_/</p> <p>12b contractor employees working for the operator /_/_/_/_/_/</p> <p>12c non-operator emergency responders /_/_/_/_/_/</p> <p>12d workers working on the right-of-way but NOT associated with this operator /_/_/_/_/_/</p> <p>12e general public /_/_/_/_/_/</p> <p>12f total injuries (sum of the above) /_/_/_/_/_/</p>
<p>13 Was the pipeline/facility shut down due to the incident? <input type="radio"/> Yes <input type="radio"/> No ⇒ Explain: _____</p> <p>If Yes, complete Questions 13a and 13b. (Use local time, 24-hour clock.)</p> <p>13a local time and date of shutdown /_/_/_/_/_/ /_/_/_/_/_/ /_/_/_/_/_/ /_/_/_/_/_/</p> <p style="text-align: center; margin-left: 100px;">hour month day year</p> <p>13b local time pipeline/facility restarted /_/_/_/_/_/ /_/_/_/_/_/ /_/_/_/_/_/ /_/_/_/_/_/ <input type="radio"/> still shut down</p> <p style="text-align: center; margin-left: 100px;">hour month day year (*supplemental report required)</p>	
<p>14 Did the gas ignite? <input type="radio"/> Yes <input type="radio"/> No</p> <p>15 Did the gas explode? <input type="radio"/> Yes <input type="radio"/> No</p> <p>16 number of general public evacuated /_/_/_/_/_/</p> <p>17 time sequence (Use local time, 24-hour clock.)</p> <p>17a local time operator identified incident /_/_/_/_/_/ /_/_/_/_/_/ /_/_/_/_/_/ /_/_/_/_/_/</p> <p style="text-align: center; margin-left: 100px;">hour month day year</p> <p>17b local time operator resources arrived on site /_/_/_/_/_/ /_/_/_/_/_/ /_/_/_/_/_/ /_/_/_/_/_/</p> <p style="text-align: center; margin-left: 100px;">hour month day year</p>	

Telling the time: the 24-hour clock

07.00	oh seven hundred
16.00	sixteen hundred/sixteen hundred hours (not sixteen o'clock)
16.15	sixteen fifteen (not sixteen fifteen o'clock)

Listening 4  **31** Listen to a conversation between two workers about an incident. What happened?

5 Listen again and complete the form in 3.

Examples:


00.00 = midnight = /0/0/0/0/

08.00 = 8:00 a.m. = /0/8/0/0/

12.00 = noon = /1/2/0/0/

17.15 = 5:15 p.m. = /1/7/1/5/

22.00 = 10:00 p.m. = /2/2/0/0/

6  **32** Listen and complete this report with the correct times.

From what I understand, this is what happened: at (1) _____ the safety officer issued a hot work permit to two employees – two welders. The permit was valid from (2) _____ to (3) _____ in the afternoon. The task was to weld a handrail to the stairs on storage tanks 387 and 388. All the preparation work had been done the day before. The welders took a break at around (4) _____ and returned to work at around (5) _____. They were unable to restart the engine on their

welding machine, so they called maintenance. At around (6) _____ a maintenance truck gave their welding machine a jump start. At around (7) _____ an explosion occurred in tank 387, followed a minute later by an explosion in tank 388. Both welders were killed. Another tank in the area, 392, was damaged but did not catch fire. The firefighters were called at (8) _____, arrived at (9) _____ and had extinguished the flames by (10) _____.

Writing 7 Read the report in 6 again and complete this hot work permit.



Hot work permit

Date: 6 Jan

Valid from: (1) _____ to: (2) _____

Location: (3) _____


Name(s): H Jahar, ID Vijay

Job description: (4) _____

Signed: K. Zammit

Job title: (5) _____

Cleaning up

- Speaking** 1 Work in pairs. What are the main causes of oil spills?
- Listening** 2  33 Listen to a person talking about oil spills. Compare what he says with your answer in 1.
- 3 Listen again and complete these phrases.
- 1 routine operations such as _____, loading or unloading
 - 2 mishaps and collisions between vessels or tankers and other transportation _____
 - 3 ships running _____
 - 4 ruptured _____
 - 5 oil _____ activities
 - 6 mechanical failure of oil collection and _____ equipment
- Reading** 4 Look at this photo of an oil spill kit. Can you identify any of the items? How do you think these items are used? What else might an oil spill kit contain?



1 pound = 0.454 kg
curb (AmE) = kerb
(BrE)

- 5 Read this extract from procedures for spill prevention control and countermeasures (SPCC) and check your answers in 4. What type of spill is the extract about?

Planning and preparation

Spill kits have been established at oil storage locations subject to SPCC regulations. The amount of spill materials kept at each location depends on the volume of oils stored there. Spill kit materials can be used for two main purposes: to absorb spilled oils and to block their flow.

The absorbents are of two types: diatomaceous earth (Oil Sorb) and polypropylene. Oil Sorb is supplied in 25-pound paper bags. Polypropylene is supplied as socks, pillows and pads. The use and limitations of each are described below:

Absorbent type	Use	Limitations
Oil Sorb	Spread on the leading edge of an oil spill and work back to the source.	Can absorb its weight in oil. Will absorb both water and oil. Does not float on water.
Polypropylene	Spread on the leading edge of an oil spill and work back to the source.	Can absorb 25 times its weight in oil. Will only absorb oil. Will float on water even if saturated with oil.

Blocking materials are also of two types: sandbags and elastomer mats and berms. The use and limitations of each are described below:

Blocking material	Use	Limitations
Sandbags	Place in path of flow and butt the ends of the bags tightly to each other to form a barrier.	Getting a good seal between adjacent bags and the ground can be difficult. Use absorbent to catch leakage. Each bag weighs about 70 pounds and thus is difficult for some to move.
Elastomer mats	Place over storm or sanitary drains to seal them.	May not completely cover some larger drains. May not form a perfect seal on rough surfaces or along curbs.
Elastomer berms	Place in the path of flow to form a barrier or lay around drain openings to form a barrier.	May not completely encircle some larger drains. May not form a perfect seal on rough surfaces or along curbs.

Vocabulary 6 Match 1–6 to a–f to make collocations.

- | | |
|-----------|------------|
| 1 rough | a) seal |
| 2 drain | b) edge |
| 3 paper | c) surface |
| 4 perfect | d) opening |
| 5 leading | e) bag |
| 6 spill | f) kit |

7 Match words 1–7 to definitions a–g.

- | | |
|----------------|---|
| 1 butt | a) nearby, neighbouring |
| 2 leading edge | b) soaked |
| 3 curb | c) front part |
| 4 adjacent | d) weaknesses |
| 5 limitations | e) push |
| 6 saturated | f) stones/concrete along the edge of a street |
| 7 absorb | g) take in |

Language

Be supplied

The phrase *be supplied* collocates with different prepositions.

<i>Oil Sorb is supplied in 25-pound paper bags.</i>	<i>Polypropylene is supplied as socks, pillows and pads.</i>
<i>The tool is supplied with/without a plug.</i>	<i>The kit is supplied by a company in Chicago.</i>
<i>Oxygen is supplied to the flame.</i>	<i>The software is supplied on a separate DVD.</i>

8 Complete these sentences with the correct prepositions.

- This area is supplied _____ gasoline from the Oston refinery.
- Water is supplied _____ the blowdown drum to cool hot process steams.
- Gas is supplied _____ most homes in this town.
- The chemicals were supplied _____ powder.
- Propane is also supplied _____ canisters.
- Power is supplied _____ a 12-volt battery.
- The mats are supplied _____ part of the spill kit.

Speaking 9 Work in pairs. Student A, look at the information on page 68. Student B, look at the information on page 78. Follow the instructions.