Review Unit C

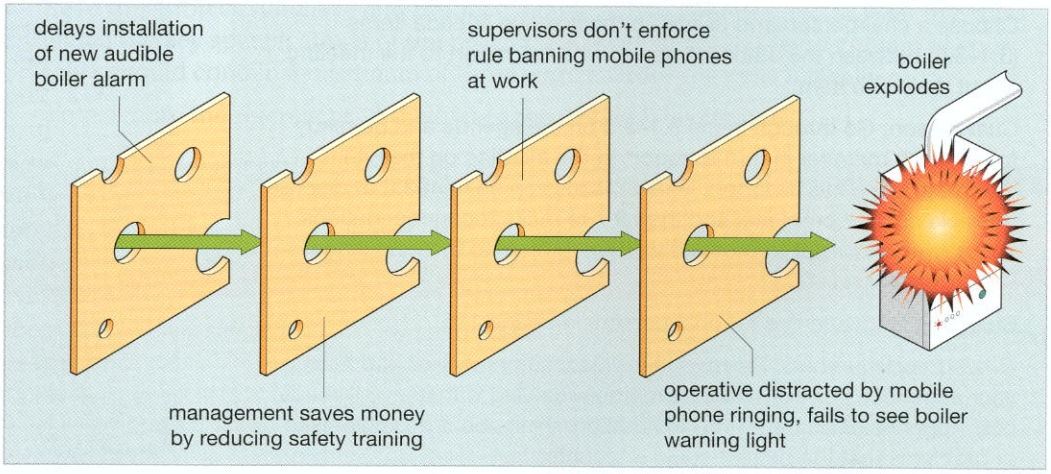
1 Complete these sentences choosing words and phrases from the box. Two of the words/phrases are not needed.

results from	as a result of using	is caused	and as a result	causing it to
as a direct result of	because	cause of	caused by	results in

1 Oxygen in a steel-making furnace changes the temperature, _____ rise.
2 The rapid melting of scrap steel is _____ the extremely high temperatures.
3 A layer of slag is formed _____ the impurities combine with lime flux.
4 The high temperature in an aluminium smelting pot _____ the electric current.
5 Electrolysis _____ the production of oxygen as a by-product.
6 Carbon gases are emitted _____ carbon anodes and cathodes.
7 Molten aluminium sinks to the bottom of the pot _____ its increased weight.
8 Oxygen is released from alumina in the electrolyte _____ the oxygen becomes heavier.

2 Study this accident scenario. Then produce a similar diagram (if possible as a PowerPoint slide) illustrating the causes of a common type of accident in your own industry or technology. Present your diagram and explain it to your class or group.

An operative working in a boiler room fails to see a warning light when he is distracted by a call on his mobile phone. The boiler explodes soon afterwards.



3 Identify all the words and phrases that can fill each gap in these sentences. The number in brackets indicates the number of possible words / phrases.

A cause	B caused by	C because	D cause of	E was caused by	F the result of
G result in	H as a result of	I resulted from	J resulted in	K as a result	L due to
M was due to	N lead to	O gave rise to			

1 The oil spill in the sea was _____ oil leaking from a broken underwater pipe. (4)
2 The break-up of the riser _____ an explosion in the blowout preventer. (3)
3 The explosion took place _____ the safety valve failed to close properly. (1)
4 Without doubt, poor maintenance in the past _____ the failure of the valve. (2)
5 The oil spill will certainly _____ widespread pollution of the area. (3)
6 The main _____ damage to wildlife will be the oil that reaches the shore. (1)
7 The disaster will certainly _____ the authorities investigating the accident. (2)
8 The report will be published and _____ the guilty parties will be identified. (1)

4 Combine each pair of sentences into a single sentence with a similar meaning. Use the words in brackets and change the verbs in italics into related nouns. Do not use personal pronouns.

Example: *1 The development of a new technology has resulted in the production of a stronger type of aluminium.*

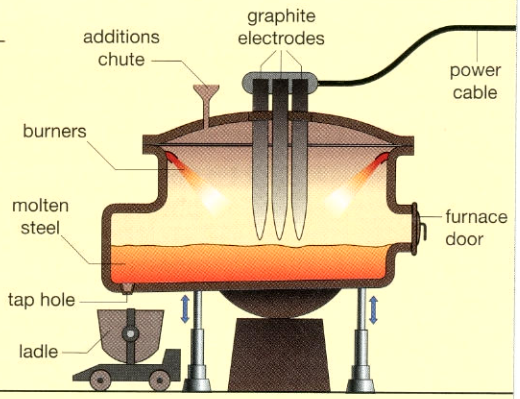
1 A new technology *has been developed*. As a result, a stronger type of aluminium *has been produced*. (result in)
2 Pressure *built up* in the tank. The result was that the mixture *exploded*. (lead to)
3 More wind farms *will be introduced*. This will cause carbon emissions to *be reduced*. (bring about) [Note: the noun from 'reduce' is followed by 'in']
4 The number of accidents *has increased*. This is why a special investigation team *has been formed*. (give rise to)
5 An electrical current *flows* through the electrolyte. As a result, oxygen *is separated* from the mixture. (result in)
6 The maintenance staff were poorly *supervised*. As a result, the project *failed*. (be a major factor in)

5 Rewrite this process description. Change the verbs in italics to the passive or keep them in the active, as appropriate. When you use the passive, decide whether or not to use *by* + the agent.

This is how they *roll* aluminium into a new shape. First, they *heat* the aluminium slab (a thick, rectangular shape) to make it more malleable and then they *pass* it backwards and forwards between large heavy rollers, which *compress* and *squeeze* the metal until it *becomes* thinner and longer. Usually, they *hot-roll* the metal first to a thickness of 2–4 mm, and then they *cold-roll* it into a sheet less than 1 mm thick. Finally, they *anneal* the sheet, that is, they *heat* it and then *slow-cool* it, a thermal process which *toughens* it and *reduces* its brittleness.

6 Complete this description of the process in the illustration, using phrases a–k below.

1 The furnace has a movable roof, through which three graphite electrodes ... g
2 First, the electrodes are pulled out and the roof is swung sideways, to ...
3 Steel scrap is then charged into the furnace from a steel basket that is ...
4 When this operation is complete, the roof is ...
5 A powerful electric current is then ...
6 This causes an arc to be created, ...
7 Fluxes are added and carbon and oxygen are ...
8 This action results in impurities in the metal ...
9 Samples of the steel are taken and analysed, to ...
10 When they are correct, the molten steel is ...
11 Final adjustments can be made by ...



a) lowered from an overhead crane.
b) check that the composition and temperature are correct.
c) blown into the melt.
d) tapped into a ladle through the tap hole.
e) generating the heat to melt the scrap.
f) passed through the molten metal.
g) can be raised or lowered.
h) adding alloys during tapping.
i) allow charging to take place.
j) swung back into position and the electrodes are lowered into the furnace.
k) combining to form a liquid slag, which is tapped via the furnace door.

7 What do the following words refer to in the text in 6?

1 which (#1) 2 this operation (#4) 3 This (#6) 4 This action (#8) 5 they (#10)

8 The raw material is given seven different names in the text as it goes through the process above (the first is *steel scrap*). List them all.

9 Rewrite these statements to give the same or similar meaning, using the words in brackets.

Example: *1 It is likely that the trapped miners will be rescued within the next month.*

1 The trapped miners will probably be rescued within the next month. (likely)
2 There's only a remote possibility that the relief well will be completed ahead c schedule. (The likelihood)
3 It's highly likely that deepwater drilling will be banned because of the oil spill. (There's / probability)
4 It's extremely unlikely that new oil will be found in this old oilfield. (remote chance)
5 It's virtually certain that the new tunnel project will be very innovative. (definitely)
6 This new bridge will certainly reduce travelling time between the islands. (dou

10 Make statements comparing the risks on this risk assessment chart, without using of the words in the chart headings (such as *catastrophic*, *medium* or *likelihood*). Us variety of forms for expressing degrees of certainty.

Example: *1 In both normal and deepwater drilling, it is highly unlikely that there wou be an explosion in the well. However, if it happened in normal drilling, the impact wo be only moderate, whereas in deepwater drilling, ...*

RISK ASSESSMENT comparing normal offshore drilling (< 300 m deep) with deepwater drilling (> 700 m deep)

KEY: BLUE = DRILLING AT NORMAL DEPTHS RED = DEEPWATER DRILLING

Likelihood → / Severity ↓	Extremely low	Low	Medium	High	Extremely high
Catastrophic	1 explosion in well	3 failure of blowout preventer (BOP)		2 oil spill	
Critical					4 fractured pipe
Medium	1 explosion in well	3 failure of BOP			
Minimal			4 fractured pipe		
Negligible	2 oil spill				

11 Complete the text below about a bridge–tunnel construction schedule, using the phrases in the box. Some phrases are used more than once.

going to be | about to be | will finally be | is going to | will be | about to | will already have | is on the point of | will already have been | is ready to

Work is (1) _____ begin (in the next few days, in fact) on reclaiming land from the s The idea is to make two artificial islands, which are (2) _____ connected by means of a tunnel. Drilling on the tunnel (3) _____ carried out during the second phase of the project. The intention is that by the time the drilling team (4) _____ start work the beginning of the second phase, the land (5) _____ reclaimed and the two artific islands (6) _____ appeared out of the sea.

In addition, work (7) _____ being started (also in the next few days) on digging the foundations for the bridge piers and constructing them. This work (8) _____ continue throughout the second phase and it is expected that by the beginning of th third phase, when the bridge sections are (9) _____ placed on the piers and linked together, the contractors (10) _____ laid all the foundations and constructed all the piers.

By the end of the third phase, all the components – the tunnel, the bridge sections and the approach roads – (11) _____ completed. At that point the bridge (12) _____ linked up to the tunnel and the approach roads.

12 Write a description of this project, using the headings and notes below. Replace percentages with words or phrases expressing degrees of certainty.

GOTTHARD BASE TUNNEL

PURPOSE OF TUNNEL

- replace old St Gotthard tunnel through Swiss Alps
- provide straight, flat route through mountain
- for high-speed rail / heavy freight trains

PLANNED SPECIFICATIONS

- two tunnels, low altitude, close to mountain base
- length: 56.978 km (W), 57.091 km (E)
- diameter of each tunnel: 8.8–9.5 m
- connected by cross-passage tunnels at 325-m intervals
- maximum rock above tunnel: 2,500 m

EXPECTED OUTCOMES

- completion date changed several times, will possibly change again
- 2017–18 (certainty: 80%)
- cost estimate: €4bn (certainty: 20%) → €8bn (certainty: 90%)
- longest road/rail tunnel in world (ahead of Seikan, Japan)? (certainty: 95%)
- 200–250 trains per day; up to 250 kph; reduce Zurich–Milan journey from 3.5 to 2.5 hours (certainty: 85%)

PROBLEM, CAUSE AND SOLUTION

- drilling conditions difficult in centre of base of mountain
- cause: pressure of 2,500 m of rock on tunnel wall
- result: walls collapse like butter (spraying concrete doesn't help)
- solution: anchor pairs of interlocking steel rings deep into tunnel walls → mountain settles in controlled way → add concrete
- solution successful? (certainty: 95%) but will increase cost and time

RISKS

- accident-free project? (certainty: 15%); cause: 24-hour 365-day work schedule
- limited space, fresh air, light → health hazards
- high construction noise → mistakes → accidents
- explosives → injury, death
- contractors aware of risks, manage them → successful outcome, minimal danger

Project **13** Choose a process in your industry or technical field. Make notes about what you already know and then carry out research to fill any gaps in your knowledge. Write down the main stages in the process and prepare one or two large visuals (or no more than ten PowerPoint slides) to accompany your talk. Prepare your talk, which should be no more than about 500 words long. Give your talk to your class or group. Answer any questions. While you are listening to a colleague's talk, make notes and prepare some questions to ask at the end.