

Е. М. Федотова, С. М. Трусова, Е. А. Белоус

# TRENDS IN SAFETY ENGINEERING

Учебное пособие



Нижний Новгород  
2020

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## Trends in Safety Engineering

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## ПРЕДИСЛОВИЕ

Настоящее учебное пособие создано для обучения английскому языку студентов направления подготовки 20.03.01 Техносферная безопасность и представляет собой новое поколение учебных материалов, которые соответствуют требованиям государственного стандарта высшего профессионального образования и современным целям обучения. При разработке учебного пособия авторы ориентировались на такие требования как

- умение взаимодействовать в профессиональной сфере;
- умение анализировать полученную информацию на основе личного опыта;
- умение применять полученные знания на практике;
- навыки выполнения проектной работы;
- творческий подход к решению профессиональных проблем;
- владение информационно-коммуникационными технологиями.

Цель пособия – введение в язык специальности, а главная задача – формирование профессионально важных качеств, связанных с иноязычной речевой деятельностью.

Пособие состоит из семи блоков (Units), представленных темой, которая создаёт предметный и социальный контекст профессиональной деятельности. Темы базируются на тщательно отобранных аутентичных текстах Интернет-сайтов. К текстам подобраны упражнения как на развитие лингвистического компонента (введение специальной лексики, фонетика, повторение грамматики, типичной для данного текста и вида деятельности), так и упражнения на обучение всем видам речевой деятельности: чтению, говорению (презентации, сообщения, обсуждения, ролевая игра), письму (e-mail, мемо, инструкции). Для каждой темы имеются проблемно-творческие задания типа Case Study и Webquests.

Два предложенных вебквеста как вариант проектной групповой или индивидуальной самостоятельной работы, которые можно проводить параллельно с изучением UNIT V и UNIT VII, разнообразит учебный процесс. Вебквест – это проект, в котором все материалы, с которыми работают студенты, выполняя задание, находятся в Интернете, с указанием реальных адресов сайтов.

В приложении к пособию имеются образцы выполнения заданий по письму, дополнительные тексты для чтения по специальности, разработанные с целью развития навыков различного вида чтения, говорения, перевода (gendering), а также списки наиболее трудных слов по блокам.

Современный дизайн с достаточным количеством иллюстраций делает работу с пособием удобной и интересной.

## UNIT I SAFETY

“A life without adventure is likely to be unsatisfying, but a life in which adventure is allowed to take whatever form it will, is likely to be short”.

Bernard Russell (1872-1970), English philosopher

### Starting up

Your future profession will be connected with safety and do you know

- what safety is?
- what it is responsible for?
- how safety was developed?



**A.** Match the expressions from the text to their Russian equivalents.

- |                        |                                  |
|------------------------|----------------------------------|
| 1. to eliminate        | a. авария, несчастный случай     |
| 2. to cause injury     | b. опасность, риск               |
| 3. improper contact    | c. устранять                     |
| 4. hazard              | d. профессиональная безопасность |
| 5. occupational safety | e. явиться причиной повреждения  |
| 6. accident            | f. неправильное обращение        |

**B.** Read the text and compare your ideas.

Safety is an activity that minimizes or *eliminates* hazardous conditions that can *cause injury*. There are two types of safety: occupational and public.

*Occupational safety* liquidates risks in offices, plants and factories, farms, construction sites and commercial areas. Public safety eliminates *hazards* at home, in travel and recreation.

In ancient times people did not have safety. *Accidents* were considered to be a will of gods. Modern notions of safety developed only in the 19<sup>th</sup> century as an outgrowth of the industrial Revolution, when a terrible toll of factory accidents aroused humanitarian concern. Today safety is a worldwide activity of government and private agencies at the local, national and international levels.

Accidents vary from country to country and from industry to industry. Industrial accidents can happen because of *improper contact* with machinery, materials, electrical, chemical and radiation hazards.

## Speaking and Reading

- A. *In your country, what organisation deals with safety at workplaces? What is the mission of that organisation?*
- B. *Work in pairs. Student A reads the text about the European agency; Student B reads the text about the US agency for safety.*
- C. *Exchange information and complete all the sections of the chart.*



Every three and a half minutes, somebody in the EU dies from work-related causes. That's more than 150,000 deaths a year as a result of either work-related accidents (8,900) or occupational diseases (142,000).

Workers and employers need to be made aware of the risks that they face, and how to manage them. That is why the European Agency for Safety and Health at Work was set up, in 1996.

The mission is to make Europe's workplaces safer, healthier and more productive. They do this by bringing together and sharing knowledge and information, to promote a culture of risk prevention.

Located in Bilbao, Spain, the Agency has a dedicated staff of occupational safety and health (OSH), communication and administrative specialists. Dr Christa Sedlatschek is the current Director of EU-OSHA, following on from Dr Jukka Takala in September 2011.

The Agency is a tripartite organisation, this means that it works with governments, employers and workers representatives. They commission, collect and publish new scientific research and statistics on OSH risks.



The United States **Occupational Safety and Health Administration** (OSHA) is an agency of the United States Department of Labour. It was created by Congress under the Occupational Safety and Health Act, signed by President Richard M. Nixon, on December 29, 1970. Its mission is to prevent work-related injuries, illnesses, and deaths by issuing and enforcing rules (called standards) for

workplace safety and health. OSHA develops guidelines and issues regulations for safety and health standards, and conducts inspections of workplaces for compliance with these standards. OSHA is currently headed by Acting Assistant Secretary of Labor Loren Sweatt.

	<b>The European Agency</b>	<b>The US Agency</b>
Location		Washington
Date of foundation		
Pillar	European Communities	
Mission		
Director		

### **Reading**

**A.** *Here are some facts about OSH. Use the words below to replace them with the ones given in italics in the text.*

**finances, incapacitated, obligations, undertake, welfare, affect, limb, favour, result in**

Occupational safety and health (OSH) is the discipline concerned with protecting the safety, health and *financial assistance* of employees, organisations, and others affected by the work they *take part in* (such as customers, suppliers, and members of the public).

The primary reason for occupational safety and health (OSH) standards is moral. An employee should not expect that by coming to work they are risking life or *an arm or leg*, and nor should others *influenced* by their undertaking.

The next one is legal, occupational and health requirements may be reinforced in civil law or criminal law; it is accepted that without the extra “encouragement” of potential regulatory action many organizations would not act upon their implied moral *duties*.

The final factor that *supports/helps* OSH is economic. The government have long realised that poor occupational safety and health performances *end in* cost to the state: through social security payments to the *disabled*, medical cost for treatment, the loss of the “employability” of the worker and organisations un-

dergo a number of costs in the event of an incident at work such as legal fees, *financial penalties*, compensatory damages, investigation time, lost production, lost goodwill from the workforce.

**B.** *Read the statements and say if they are true or false.*

1. The less money government spend on safety the more they pay afterwards.
2. Occupational safety deals with the safety of employees only.
3. Each employee expects to risk at work.
4. Many organisations need some extra motivation to follow the implied obligations.
5. Civil and criminal law reinforce occupational and health requirements.
6. The text gives three main reasons for OSH standards.

**C.** *Fill these words into the gaps in the following sentences in a suitable form.*

1. Last year more than 100,000 upper ....disorders caused by using a keyboard were reported to the Health and Safety Commission.
2. He .... careful risk assessment.
3. It will be the duty of every employer to ensure the health, safety and ....at work of all his employees.
4. At Level Two students will plan and .... a programme of activities designed to improve their personal effectiveness.
5. These responsibilities are .... by major local government services such as housing, education and welfare.
6. Probably the worst example was a serious traffic accident on the A34 which didn't .... any deaths but involved serious injuries.
7. He was permanently .... after the accident.
8. The National Union of Mineworkers also had to pay heavy ....and suffer sequestration.
9. He claims Southern Water failed in its .... to prevent health problems caused by piping sewage into the sea.

## Pronunciation

A. See if you can pronounce the following words correctly.

safety	['seɪftɪ]	disease	[di'zi:z]
eliminate	[i'limineɪt]	employer	[ɪm'plɔɪə]
incapacitated	[,ɪnkə'pæsɪteɪtɪd]	employee	[em'plɔɪ'i:]
injury	['ɪndʒəri]	limb	[lɪm]
hazardous	['hæzədəs]		

## Grammar

### Gerunds and infinitives

Look at the following uses of the gerund

- ✓ after prepositions

They do this by *bringing* and *sharing* knowledge and information.

- ✓ as a noun

*Working* with governments, employers and workers themselves will be of great importance.

- ✓ after certain verbs (begin, consider, enjoy, finish, risk, start, suggest, involve, keep, avoid)

They've just finished *checking* these hose reels.

Look at the following uses of the infinitive (to+verb)

- ✓ as subjective complement (predicate noun)

Our mission is *to make* Europe's workplaces safer.

- ✓ after adjectives

It is equally important *to pay attention* to cumulative health risks.

- ✓ after certain verbs (aim, decide, intend, prepare, manage, need, plan, want, afford, demand, fail, hope)

Safety engineering and hygiene aim *to reduce* the number of work-related injuries.

- ✓ to show purpose

The men shouted *to warn* everyone of the danger.

Some verbs can be followed by either a gerund or an infinitive with no difference in meaning.

They prefer *wearing* proper protective clothing.

They prefer *to wear* proper protective clothing.

Some can be followed by either a gerund or an infinitive but **with a difference in meaning.**

We stopped *using* out-of-date equipment at this mine.

We stopped *to get* some extinguishers.

A. Complete the following text about Australian National OHS strategy with appropriate gerund or infinitive forms.



The National OHS Strategy 2012-2022 provides a basis for (develop) sustainable, safe and healthy work environments and for (reduce) the number of people hurt or killed at work.

The National Strategy focuses on particular OHS risks and industry sectors (minimize) the impact of its initiatives. The risks targeted are musculoskeletal disorders, falls from heights, and hitting or being hit. These three risks account for more than half of the workers' compensation claims across Australia.

The priorities identified by the National Strategy to achieve short-term and long-term OHS improvements are (reduce) the impact of risks at work, (prevent) occupational disease more effectively and (eliminate) hazards at the design stage.

The six priority industry sectors targeted are building and construction, transport and storage, manufacturing, health and community services, agriculture and forestry and fisheries.

### **Follow-up**

*Read the questions and find the right answers using all the information you have learnt from the texts and your common knowledge.*

### **Workplace Safety Is No Accident Quiz**

1. Workplace safety is only the responsibility of the person(s) wearing the risk management hat.

- True
- False



2. Safety is just common sense. The entity doesn't

need to waste time training people not to put their hands in a shredder.

- True
- False

3. OSHA is just a regulatory agency; safety training and information must be gotten elsewhere.

- True
- False

4. Dress codes can decrease accidents and injuries.

- True
- False

5. Safety glasses, gloves, helmets, and safety shoes, although not a fashion statement, must be worn on the job if policy requires them.

- True
- False



6. Any injury at work—no matter how small—must be reported immediately to the person's supervisor and receive first-aid attention.

- True
- False

*See Appendix I to find out if you're right or not.*

### **Case study**

A serious safety problem is threatening the future of Transal, a pipeline company. Hundreds of yearly accidents have led to high absenteeism, causing lost time, low morale, unsatisfactory efficiency levels and falling profits. If the company is to survive it must develop a "safety conscious culture". The question is how?



**Task I**

*Look at the three options open to Transal and discuss the potential benefits and disadvantages of each one.*

**1. THE INTERNATIONAL SCHOOL OF INDUSTRIAL ENGINEERING.**

Send all the technical staff members on an intensive “safety awareness” course run by a high-profile school of engineering. The course is very expensive but has an excellent reputation. On their return, the managers will train their teams. The forecast is to have improved safety conditions by this time next year.

**2. STANFORD, TRAYNOR & WELDOM ASSOCIATES.**

Bring outside consultants into every subsidiary to organise training schemes for all employees over a period of six months. This would be more expensive but would give low-level workers an opportunity to speak to experts and to point out (обозначить, указать) problems. The results should be almost immediate and the experts would be on hand to talk to the press.

**3. SAFETY CHARITY CHALLENGE.**

Offer to give a sum of money community charity of the workers’ choice every time they eliminate a safety hazard. An untested idea suggested by the communications department. If successful, it could lead to a lot of positive publicity and be very cost-effective. However, it relies on the employees’ willingness to take part in such a scheme. There is no knowing how long it might take to improve conditions.

**Task II**

*Choose the best option and present your arguments to the class.*

**Task III**

*Write a brief email to the Transal board recommending the best option and giving reasons for your decision. (see Appendix I)*

**DECISION**

*Turn to Appendix I and see what happened when a famous British company was faced with the same problem.*

## UNIT II HAZARDS



### Starting up

You deal with hazards in your life every day.

1. What are the most frequent situations that trouble you?
2. Do you know how to protect yourself from them?
3. Have you ever been informed how to deal with hazards in the workplace?



**Hazard** is a dangerous event or situation that may lead to an emergency or disaster or may cause injury or loss.

### Vocabulary

**A.** Match the verbs and nouns below to make word partnerships about hazards.

- |                     |                              |
|---------------------|------------------------------|
| 1. high exposure to | a. wiring                    |
| 2. skin             | b. conditions                |
| 3. to work from     | c. cords                     |
| 4. improper         | d. irritation                |
| 5. to expose smb    | e. rays                      |
| 6. unsafe           | f. sunlight                  |
| 7. insect           | g. serious long-term injures |
| 8. frayed           | h. bites                     |
| 9. ultraviolet      | i. to biological hazards     |
| 10. to result in    | g. heights                   |

**B.** There are four main types of hazards: physical, biological, ergonomic and chemical. Read the text and match the headings to the paragraphs.

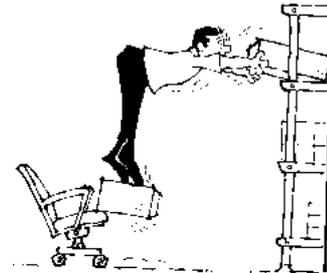
**a.** chemical hazards

**b.** ergonomic hazards

**c.** physical hazards

**d.** biological hazards

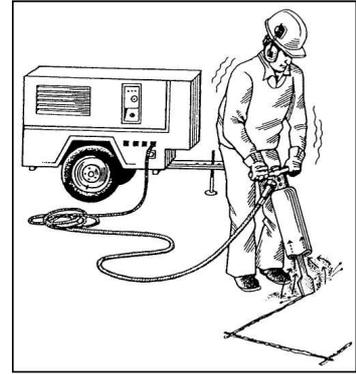
1. \_\_\_\_\_ They are the most common and will be present in workplaces at one time or another. They include unsafe conditions that can cause injury, illness and death. They are typically easiest to spot but too often overlooked because of familiarity, lack of knowledge, resistance to spending time or money to make necessary improvement.



2. \_\_\_\_\_ They come from working with animals, people, or infectious plant materials. Work in day care, hospitals, hotel

laundry and room cleaning, laboratories, veterinary offices may expose you to biological hazards.

3. \_\_\_\_\_ They occur when the type of work, body position and working conditions put strain on your body. They are the hardest to spot since you don't always immediately notice the strain on your body or the harm these hazards pose. Short-term exposure may result in "sore muscles" the next day, but the long-term exposure can result in serious long-term injuries.



4. \_\_\_\_\_ This type of hazards are present when a worker is exposed to any chemical preparation in the workplace in any form (solid, liquid or gas). Some are safer than others, but to some workers who are more sensitive to chemicals, even common solutions can cause illness, skin irritation or breathing problems.

**C.** Look at the list of different risks and define what type of hazard they belong to and complete the table.

- improper wiring      constant loud noise      bacteria and virus      poor lighting  
solvents      frequent lifting      vapours and fumes      carbon monoxide  
 high exposure to sunlight      explosive chemicals      fungi      spills on floors

Physical hazards	Biological hazards	Ergonomic hazards	Chemical hazards
	fungi		solvents

**Pronunciation**

**A.** Match the words in the left and right columns which contain the same sound.

- |                                                                                                                                                                                                                                             |               |                                                                                                                                                                                                                                                  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>1. physical</li> <li>2. lighting</li> <li>3. injury</li> <li>4. ray</li> <li>5. trouble</li> <li>6. cause</li> <li>7. improper</li> <li>8. increase</li> <li>9. work</li> <li>10. nuclear</li> </ul> | <p>←————→</p> | <ul style="list-style-type: none"> <li>a. virus</li> <li>b. unsafe</li> <li>c. fungi</li> <li>d. cord</li> <li>e. vapour</li> <li>f. solvent</li> <li>g. ergonomic</li> <li>h. liquid</li> <li>i. frequent</li> <li>j. pneumoconiosis</li> </ul> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Grammar                      **Comparatives and superlatives**

**A.** *Look at the following sentences from the text and find comparatives and superlatives*

1. Physical hazards are typically easiest to spot.
2. Some workers who are more sensitive to chemicals can have breathing problems.
3. Some chemicals are safer than others.
4. These hazards happen less frequently on the construction sites.

**B.** *How are the comparatives and superlatives of the following formed?*

- adjectives of one syllable
- adjectives ending in -y
- adjectives of more than one syllable
- adverbs

**C.** *Complete the table.*

adjective	comparative	superlative	adverb	comparative	superlative
1 improper					
2 busy					
3 frequent					
4 immediate					
5 hard					
6 bad					

**D.** *Fill in the gaps with the right form of the superlatives and comparatives.*

1. Poor lighting causes serious risks (frequently) than improper wiring.
2. People working with hazardous substances should be much (careful).
3. Bhopal Disaster in India was one of (bad) industrial accidents on record.
4. The danger of nuclear power was never (clearly) proved than in April 1986 when one of the four reactors at Chernobyl exploded.
5. Over half (serious) industrial accidents in that century occurred since 1977.
6. We, at least, are a (healthy) organisation because of the changes we were forced to bring about in the workshop.

## Reading

- A. *Dust is a common thing for you. Why do you think it is dangerous? Can dust be defined as a hazard? Why or why not? If yes, what type of hazards does it belong to?*
- B. *Read the text and find out the possible causes of dust in the workplace.*

### **Dangers of dust in the workplace**

Millions of workers are at risk because of dust for two reasons; the danger of combustion (возгорание), and dust-related illness. Dust can cause explosions (взрывы) if there is a concentration cloud of dust and a source of ignition (воспламенение), and it is only through careful management and risk-minimisation that there are relatively few injuries caused in this way in the UK.



Dust-related illness is a much bigger problem for workers, and has been found to be one of the largest occupational killers in the UK. In 2003, there were around 4,000 deaths from industrial illnesses caused by dust such as mesothelioma, asbestosis, asbestos-related lung cancer, and silicosis.

### Workplaces where dust may cause health problems

These are some of the places of work in which workers may be exposed to large amounts of dust:

- Mines (coal dust) шахты
- Quarries (silica dust and flint dust) каменоломни
- Textiles (leather dust)
- Mills and bakeries (flour dust)
- Building sites (cement dust and asbestos dust)
- Agriculture (grain dust)
- Wood-related work (wood dust)

### Dust-related illnesses

Most dust-related industrial illnesses take many years to develop, with people not realising they have them for up to 40 or 50 years in some cases. Pneumoco-

niosis is the name given to dust-related disease that affects the lungs, of which there are a number, including silicosis and asbestosis. Other illnesses that can be caused by dust include:

- Skin conditions
- Eye damage
- Nose damage
- Cancer
- Asthma

These are some ways in which employers can help make a cleaner, healthier environment for their employees:

- Installing an exhaust ventilation (вытяжная вентиляция) system.
- Installing a dilution ventilation (обще-обменная приточная вентиляция) system.
- Ensuring employees wear proper protective clothing.
- Ensuring employees undergo regular health checks to pick up any early signs of possible illness



*C. Read the text more carefully and mark the sentences as true or false.*

1. Danger of explosion is a much bigger problem than the problem of dust-related illnesses.
2. It is possible to know about some dust-related illness only when you're retired.
3. Dust causes mainly heart-related health problems.
4. Employers can't reduce injuries to workers.
5. There are just a few places of work where workers may be exposed to large amount of dust.
6. A ventilation system should be installed in a work-place where dust is concentrated.
7. Proper clothing can protect a worker from the dust.



## Speaking

Student A: You are a new employee at a coal mine.

Student B: You are a safety engineer at the same industry.

*Discuss what hazards might happen in your industry and what measures should be taken to prevent them.*

## Case study on occupational noise

Standards set by OSHA (Occupational Safety and Health Administration) indicate that continued exposure to noise over 85 dBa\* will eventually harm hearing. According to OSHA, the exposure time allowed is cut in half for every 5 decibel increase. For example, if a sound is 95 dBa, then 4 hours of exposure, over time, will cause hearing loss, and exposure to sounds at 115 dBa for just 15 minutes a day, over time, will cause hearing loss.

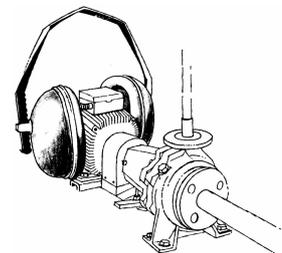
Noise need not be excessively loud to cause problems in the workplace. Noise can interact with other workplace hazards to increase risks to workers.

Exposure to noise may pose a variety of health and safety risks to workers:

- hearing loss
- physiological effects (exposure to noise has an effect on an increase in blood pressure)
- work-related stress, noise in the work can be a stressor, even at a quite low levels
- increased risk of accidents, high noise levels make it difficult for staff to hear and communicate.

### **How can noise be controlled?**

Workplace noise can be controlled: (1) at the source; (2) through the use of barriers; and (3) at the worker.



#### **A. At the source**

The best method of prevention is to eliminate the hazard.

Therefore controlling noise at its source is the best method of noise control. It

---

\* сокр. от decibels adjusted – децибелы, отсчитываемые относительно контрольного уровня шумов

can also often be cheaper than other methods of noise control. This method of control may require that some noisy machinery be replaced. Many machines are now required to conform to noise standards.

**Regular maintenance, lubrication and replacement** of worn or defective parts can also be effective ways to reduce noise levels.

### **B. Barriers**

If it is not possible to control the noise at the source, then it may be necessary to **enclose** the machine, place **sound-reducing barriers between the source and the worker**, or increase the **distance** between the worker and the source. (However, this can be difficult in many cases.)



### **C. At the worker**

Controlling noise at the worker, by using ear protection (sometimes called hearing protection) is, unfortunately, the most common yet least effective form of noise control. Forcing the worker to adapt to the workplace is always the least desirable form of protection from any hazard. Generally there are two types of ear protection: earplugs and earmuffs. Both are designed to prevent excessive noise from reaching the inner ear.



Earplugs are the least desirable type of hearing protection because they do not provide very effective protection against noise and they can cause ear infection if pieces of the plug are left in the ear or if a dirty plug is used.

### **Problem I**

Company XYZ is a manufacturer with five power presses producing noise levels of 102 - 104 dB. Even when only one or two presses are operating, the noise levels are still as high as 98 dB. This is painful for the workers and puts them in serious danger of losing their hearing. What solutions to this problem can you suggest?

### **Problem II**

Company ABC produces nails. The machines that cut the nails produce a noise level of 95 dB. These machines are all in a row in one section of the factory and need to be operated by a worker for eight hours a day. All workers have been given ear protectors but they do not wear them because it is too hot and uncomfortable. What solutions to this problem can you suggest?

### **Task**

*You are safety instructors. Meet to find solutions.*

1. *Work in pairs. Suggest actions of noise control in each case.*
2. *Meet as one group and present your ideas.*
3. *As one group, agree on a final solution.*

### **Useful phrases**

Why don't we...?  
 I think we should...  
 It might be better if we...  
 I suggest we...

### **Writing**

*As the safety instructor, write a memo to the Health and Safety Officer about the actions agreed on in the meeting.*

→(see Appendix I)

## UNIT III POOR LIGHTING



### Starting up

**A.** *What do you think makes lighting poor? What can poor lighting cause?*

**B.** *Read the article from the site*

*[http://www.mflohc.mb.ca/fact\\_sheets\\_folder/lighting.html](http://www.mflohc.mb.ca/fact_sheets_folder/lighting.html)  
and see if you were right.*

“Bad lighting” is lighting that is inappropriate for the tasks being performed. The level of **illumination** may be too low or too high, **excessive direct** or **reflected glare** may be present, the **color** rendering of **artificial light sources** may be inadequate, or **the distribution of light** may be inappropriate.

**Poor lighting** has been associated with a variety of problems including low productivity, **high human error rates**, **eye strain**, headache, a reduction in mental alertness, general malaise, and **low employee morale**. Each of these problems can have a significant negative economic impact on any organization. Poor lighting may also cause employees **to assume awkward body postures**, which may contribute to the development of cumulative trauma disorders (CTDs) such as carpal tunnel syndrome.

**C.** *Do you think poor classroom lighting affects students’ performance? Why? How do you find the existing lighting systems in the university classrooms? Do they need improving or modifying?*

### Vocabulary

**A.** *Match elements of lighting to their definitions.*

- |                |                                                                                                                  |
|----------------|------------------------------------------------------------------------------------------------------------------|
| 1. Luminance   | a. the relationship between the light coming from an object and the immediate background, such as words on paper |
| 2. Colour      | b. the level of quantity of light falling on a surface                                                           |
| 3. Glare       | c. the percentage of light falling on a surface that is reflected                                                |
| 4. Reflectance | d. occurs when there is too much direct or reflected light within the field of view                              |
| 5. Contrast    | e. can affect both the mood and the perception of size in a workplace                                            |
| 6. Illuminance | f. the amount of light reflected or coming from a light source or surface                                        |

**B. Read the text from the site**

[http://www.ccohs.ca/oshanswers/ergonomics/lighting\\_survey.html](http://www.ccohs.ca/oshanswers/ergonomics/lighting_survey.html) and fill in the gaps with the words from task A.

### **What Are the Elements of Lighting?**

General lighting provides light for an entire building or facility.

Task lighting, on the other hand, is the lighting available at the work area where a task is performed. Proper task lighting makes work safer and easier.

Workers receive about 85 percent of their information through their eyes. Appropriate lighting highlights moving machinery and other safety hazards. That helps prevent accidents from unseen hazards. Good lighting also reduces vision problems and injuries from momentary blindness.

#### **Quantity of Light:**

The level of quantity of light falling on a surface is called ..... More light is needed for fast paced fine detailed work with low contrast, such as rapid reading of small letters in pencil, than for rough assembly work.

#### **Quality of Light:**

There are several elements of light quality that must also be accounted for when determining the proper lighting for a work station or work environment. These include *colour, contrast, glare, luminance and reflectance*

.....is the amount of light reflected or coming from a light source or surface. It is important that there is not a great difference between the luminance levels for the task and that of the surrounding area.

..... is the percentage of light falling on a surface that is reflected. In an office the most reflective surface should be the ceiling; the least reflective should be the floor and in between are the reflectance of walls and furniture.

..... is the relationship between the light coming from an object and the immediate background, such as words on paper. High contrast is important for fine detail work.

..... occurs when there is too much direct or reflected light within the field of view. Glare causes a decrease in contrast which results in decreased visibility and physical discomfort.

..... can affect both the mood and the perception of size in a workplace.

**Blues** and **greens** are considered relaxing or soothing.

**Orange, yellow** and **brown** colours are thought to be stimulating.

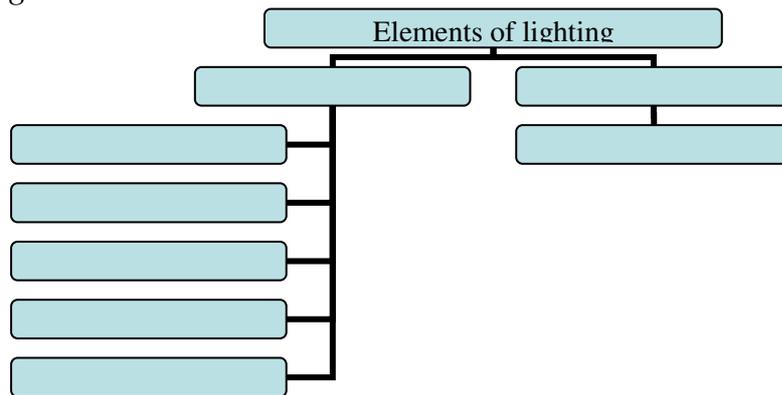
**Red** and **violet** are considered alarming or aggressive.

**Pastel colours** reduce the impact of colour.

**Cool** colours such as blues and greens can make a space seem larger.

**Reds** and **oranges** can make a space seem smaller. Different types of lights will influence how colours are perceived.

*C. Read the text again carefully and present its main ideas in the form of a diagram.*



**Pronunciation**

*A. Match the words in the left and right columns which contain the same sound.*

- |                       |                       |
|-----------------------|-----------------------|
| 1. <b>lux</b>         | a. <b>accident</b>    |
| 2. <b>appropriate</b> | b. <b>morale</b>      |
| 3. <b>inadequate</b>  | c. <b>illuminance</b> |
| 4. <b>fluorescent</b> | d. <b>comfortable</b> |
| 5. <b>contrast</b>    | e. <b>cause</b>       |
| 6. <b>soothing</b>    | f. <b>control</b>     |
| 7. <b>fatigue</b>     | g. <b>sufficient</b>  |
- 

**Reading**

*A. Before reading, match the verbs and nouns from the text to make word partnerships about poor lighting.*

- |                         |                                |
|-------------------------|--------------------------------|
| 1. to lead              | a. glare levels                |
| 2. to draw attention to | b. dreary environment          |
| 3. to prevent           | c. lighting systems            |
| 4. to maintain          | d. costly errors               |
| 5. to create            | e. hazardous operations        |
| 6. to improve           | f. to visual fatigue           |
| 7. to control           | g. productivity and efficiency |

**B.** Read the article from the site <http://www.iapa.ca/Main/documents/pdf/lightin.pdf> and match the sub-headings with the following paragraphs.

- \*area to be lit
- \*the benefits of proper lighting
- \*human factor

## Lighting at Work

### 1.-----

Proper workplace lighting is essential to any good business:

- \*it allows employees to comfortably see what they're doing, without straining their eyes or their bodies;
- \*it makes work easier and more productive;
- \*it draws attention to hazardous operations and equipment;
- \*it helps prevent costly errors and accidents.

Proper lighting is also required under s.21 of the Industrial Establishments Regulation. There must be sufficient light in the workplace to ensure the safety of every worker.

To realize the benefits of proper lighting, it is important to maintain your lighting systems and train your workers in how to use them.

### 2.-----

The lighting in your workplace should enable employees to comfortably see what they need to do their tasks. Poor lighting makes it hard for employees to see and can lead to visual fatigue and discomfort. It can also lead to neck and back pain, if the worker adopts a poor posture. Insufficient lighting also creates a dreary environment. Proper lighting, on the other hand, creates a pleasant atmosphere and gives workers a sense of well-being. This improves their productivity and efficiency.



Lighting levels should meet the needs of older workers and workers with visual limitations. To compensate for this loss, increase the lighting to a comfortable level. One way to do this is by providing lighting with adjustable intensity.

Older workers also take longer to adapt to changes in light intensity and are more sensitive to glare. To reduce these problems, control light and glare levels.

### 3.-----

The speed and accuracy of processing visual information are best when there is enough light for workers to do their tasks comfortably and efficiently.



Consider the size and shape of the work area and how it is used. Barriers such as furniture and partitions can block general lighting. Inappropriate lighting, such as using only overhead lights, can create shadows. Shadows can make work difficult and even dangerous by hiding sharp edges and other potential or actual hazards. To reduce shadows, provide light from various sources and directions.

*C. Complete the chart with the right words: receiving and packing, loading into trucks, difficult assembly.*

### Recommended lighting levels by task and area

Task / Area	Recommended Range of Illuminance (Lux*)
<b>Simple visual tasks</b> ●● lobby area ●● washrooms ●● -----	30-100
<b>Medium visual tasks</b> ●● bookkeeping ●● filing ●● -----	300-1,000
<b>More visually demanding tasks</b> ●● colour inspection ●● ----- ●● proofreading ●● fine bench or machine work	3,000-10,000

(Adapted from Industrial Lighting, ANSI/IESNA RP-7-2001)

Lux\* is the unit of measurement for illuminance.

*C. Read the text again and say if the following statements are true or false.*

1. Proper lighting allows employers to control employees' work.
2. Proper lighting stops from costly errors.
3. Older people are less sensitive to glare.
4. Glare and colour can block general lighting.

## **Speaking**

*The importance of an appropriate visual environment for learning tasks also deserves careful consideration. Do you think if there is anything wrong about lighting in our department of foreign languages? What can be done about it? Work in pairs and then report your suggestions to the rest of the class.*

## **Case study on poor lighting**

### ***The Client:***

Commercial Vehicle Bodyworks, Wokingham, Berkshire



### ***Background:***

Litenow were called to advise on the replacement of the existing lighting system. The vehicle workshop is used for the repair of accident-damaged commercial vehicles and several engineers work on a variety of large vehicles.

The existing 8ft fluorescent light fittings were old, many were defective and the light output in the workshop area was very poor. Engineers were finding it difficult to work in, or under the vehicles they were repairing.

### ***Existing Lighting:***

- 22 x 125 Watt twin fluorescent light fittings
- Lamp Life: 10,000 hours
- Total energy consumption: 6.82kW (allowing for control gear losses)

### ***The Problem:***

The light fittings were mounted on lighting trunking at approximately 5.5 metres from floor level.

Rotating electrical equipment used within the workshop area could give rise to stroboscopic effect with fluorescent lighting.

Phasing out of 8ft T12 lamps in near future.

Low lighting levels requiring engineers to work in imperfect conditions.

***Proposed Lighting:***

- 14 x 400 Watt Metal Halide low bay fittings
- Lamp Life: 15,000 Hours
- Total energy consumption: 5.6kW (allowing for control gear losses)

**Task**

*You are safety instructors. Meet to find solutions.*

1. *Work in pairs. Suggest actions of proper lighting.*
2. *Meet as one group and present your ideas.*
3. *As one group, agree on a final solution.*

**Useful phrases**

Why don't we...?  
 I think we should...  
 It might be better if we...  
 I suggest we...

***The Solution: (see Appendix I)***

**Writing**

*As the safety instructor, write a memo to the Health and Safety Officer about the actions agreed on in the meeting.*

## UNIT IV THERMAL COMFORT

### Starting up

*Temperature preferences vary greatly among individuals and there is no one temperature that can satisfy everyone. What temperature do you feel comfortable by? What factors does it depend on? In what way does it influence you, when you're hot or cold?*



An office, which is too warm, makes its occupants feel tired.



Workers begin worrying about how to get warm again.

### Vocabulary

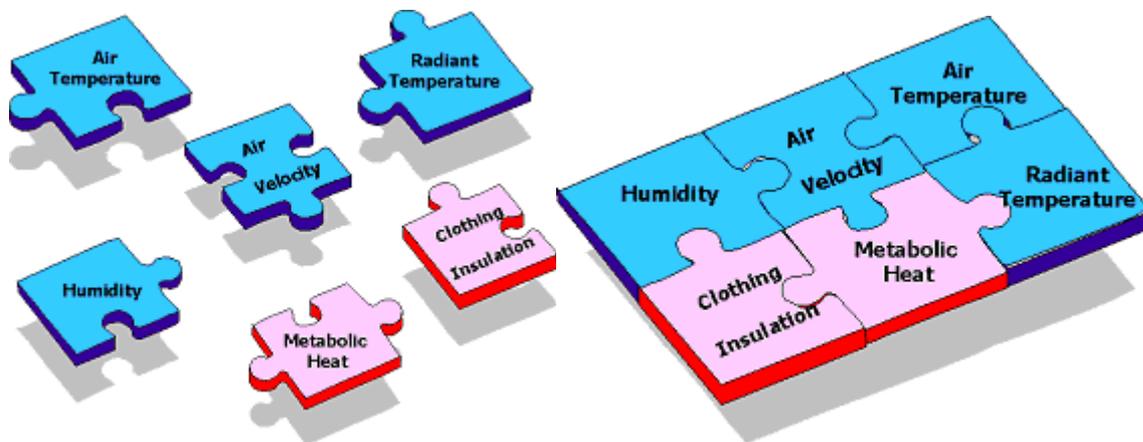
The six factors affecting thermal comfort are both environmental and personal. These factors may be independent of each other, but together contribute to a worker's thermal comfort.

#### **Environmental factors:**

- Air temperature
- Radiant temperature
- Air velocity
- Humidity

#### **Personal factors:**

- Clothing Insulation
- Metabolic heat



**A. Match the words with their definitions:**

1. air temperature	a. the speed of air moving across the worker
2. radiant temperature	b. reduction of the transmission of heat to or from the body by surrounding clothes or personal protective equipment (PPE)
3. air velocity	c. the temperature of the air surrounding the body
4. humidity	d. the heat that we produce inside our bodies as we carry out physical activity
5. clothing insulation	e. amount of water in the air
6. metabolic heat	f. the heat that radiates from a warm object

**B. Fill in the gaps with the words and word combinations from task A.**

A general recommendation is that the \_\_\_\_\_ should be held constant in the range of 21-23°C.

When relative \_\_\_\_\_ is kept at about 50%, office workers have fewer respiratory problems (specifically in the winter) and generally feel better. Higher \_\_\_\_\_ makes the office feel "stuffy". More important, it can contribute to the development of bacterial and fungal growth.

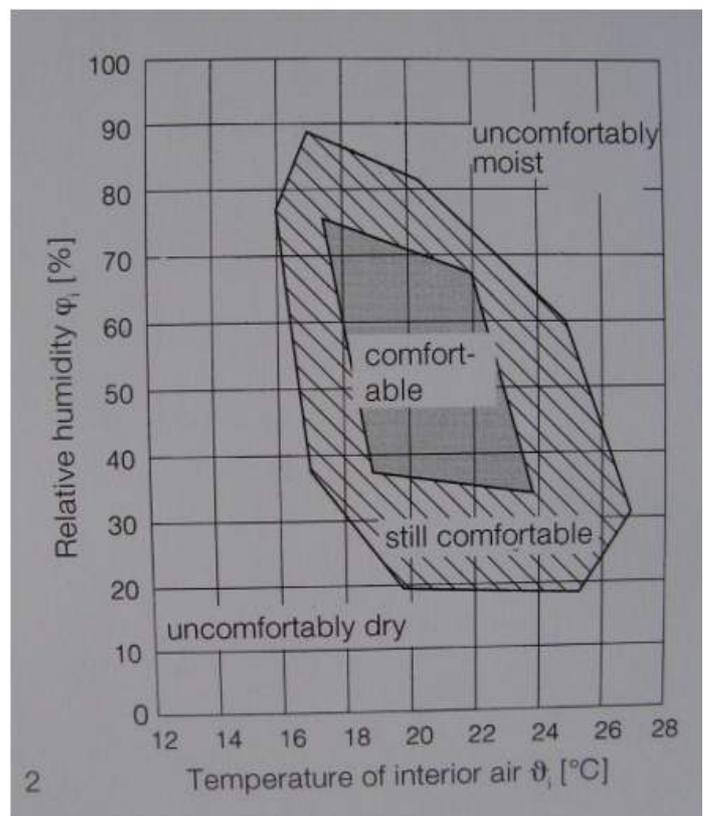
\_\_\_\_\_ lower than 50% can cause electrostatic charge on both office equipment and their users. Moreover, it can contribute to skin rashes.

\_\_\_\_\_ below 0.25 metres/second does not create any significant distraction even in tasks requiring sustained attention.

**Reading**

**A. Before you read the article, discuss the question with a partner:**

- What measures can you take to control thermal comfort?



**Thermal Comfort diagram**  
(from Energy Efficiency Upgrades, 2007, Richarz C., Schulz C., Zeilner F., Edition Detail.)

**B. Read the article and check if your suggestions were right.**

## **How to assess thermal comfort**

### **Calculating thermal comfort**

In legislation, there is no single value for the maximum temperature to which you can be exposed at work. Of course, some temperature and relative humidity combinations cause discomfort. However, in some situations, exposure to excessive heat can lead to heat stress that could lead to heat exhaustion, fainting, heat stroke, and other conditions which should be addressed.

You cannot simply ‘measure’ thermal comfort with a thermometer. For example, a normal or ‘dry-bulb’ thermometer in a workplace may read 21°C but if humidity is high, people are likely to feel uncomfortable unless some form of air-cooling or ventilation is provided. An acceptable zone of thermal comfort for most people in the UK lies roughly between 13°C and 30°C, with acceptable temperatures for more intensive work activities concentrated towards the bottom end of the range, and more sedentary activities towards the higher end. However, you may wish to measure the factors contributing to thermal comfort more accurately. The predicted mean vote (PMV)\* and percentage of people dissatisfied (PPD)\* index and use of BS EN ISO 7730 and BS EN ISO 10551 British standards are recommended.

#### **DO YOU KNOW?**

**British (BS), European (EN) and International (ISO) standards relevant to working in thermal environments**

BS EN 7730 Moderate thermal environments – Determination of the PMV and PPD indices and specification of the conditions for thermal comfort

ISO 10551 Ergonomics of the thermal environment – assessment of the influence of the thermal environment using subjective judgment scales

The PMV/PPD index predicts the thermal comfort of people working in a given environment. It uses the six basic factors, and has become the most widely used index in recent years. It has been adopted as a British and European and International standard.

## Controlling thermal comfort

There are a number of ways that you can manage thermal comfort in the workplace:

1. \_\_\_\_\_

This type of controls include planning and rescheduling work times and practices and rest schedules, for example, scheduling 'hot' work for cooler times of day or giving workers flexible hours to help avoid the worst effects of working in high temperatures.

These controls are generally of a short term, temporary nature and are also widely recognised as being more expensive and less cost-effective than engineering controls in the long-term.

2. \_\_\_\_\_

These should be the first choice to reduce or eliminate the hazard. Although the initial cost of such controls seems high, it has been found that the implementation cost is often offset by the resulting improvements to production and decrease in downtime, with reduced absenteeism and improved motivation.

- ✓ Heating
- ✓ Air movement
- ✓ Air conditioning
- ✓ Evaporative cooling
- ✓ Thermal insulation

It is important to stress that any practical solution to controlling thermal comfort is likely to require a combination of different options alongside consultation between employers, employees and their representatives.

*predicted mean vote (PMV)\* индекс комфортности по Фангеру (ожидаемая средняя оценка степени комфорта)*

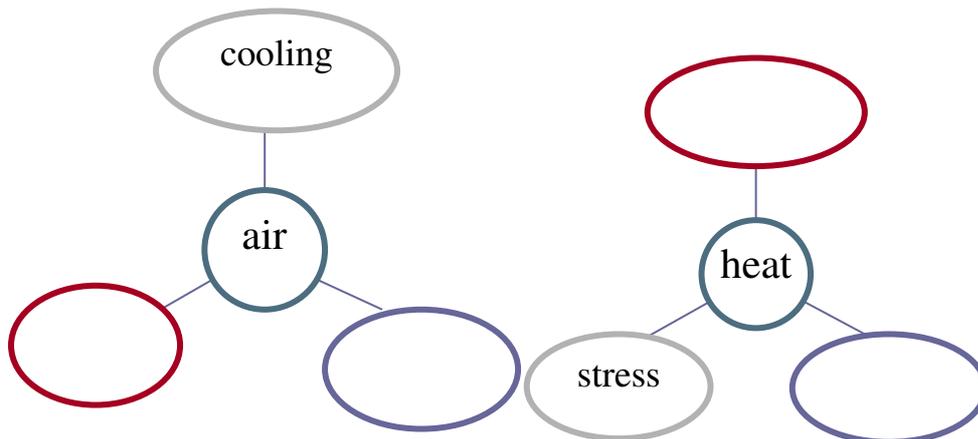
*percentage of people dissatisfied (PPD)\* ожидаемый процент неудовлетворенных степенью комфорта*

C. Read the text again and match the subheadings with paragraphs 1. and 2.

\* administrative controls \* engineering controls

### Vocabulary II

Look through the text and fill in the diagram of word combinations with **air** and **heat**.



### Pronunciation

A. Underline the stressed syllable.

temperature, respiratory, exhaustion, sedentary, absenteeism, evaporative, accurately

### Speaking

Many studies have revealed that the thermal environment in the classroom will affect the ability of students to grasp instruction. Herrington found that temperatures above 80 degrees **Fahrenheit** ( $^{\circ}F$ ) (26.6 degrees **Celsius** ( $^{\circ}C$ )) tend to produce harmful physiological effects that decrease work efficiency and output. Peccolo noted that ideal thermal classroom environments had an effect on the mental efficiency of students.

Compare the thermal comfort in different buildings and in different rooms of our campus? How does this environment affect you? What can be done about it? Work in pairs and then report your ideas to the rest of the class. You can use the following adjectives: humid, stuffy, dry, uncomfortable, comfortable, hot, warm, cool, cold, evaporative etc.

## UNIT V INDUSTRIAL ACCIDENTS

### Starting up

*Can you guess what is depicted in the pictures? What do you think caused these disasters? Have such accidents ever been in your place? What have they affected?*



**Industrial accidents** are mass disasters caused by industrial companies, either by accident, negligence or incompetence.

### Vocabulary

*A. Read the English words and match them to their Russian equivalents.*

- 1 gas emission
- 2 workspace lighting
- 3 negligence
- 4 chemical spills
- 5 failure
- 6 external cause
- 7 temperature exposure
- 8 slippery flooring
- 9 excessive noise



- a халатность
- b внешняя причина
- с авария, повреждение
- d освещенность рабочего места
- e температурное воздействие
- f утечка химикатов
- g чрезмерный шум
- h выделение газа
- i скользкий настил, покрытие

### Reading

*A. Read the text and the statements after it and say if they are true or false.*

Approximately 120 million industrial accidents occur in the work place worldwide each year.

Approximately 210,000 of these accidents result in fatality. The industries which have the highest rate of accidents are the mining, construction, transportation, and agricultural industries. Construction accidents account for fifteen percent of all accidents and thirty percent of all fatalities in industrial work environments.

Causes of industrial accidents can be broken down into two broad categories: **unsafe conditions** and **unsafe acts**. The causes of industrial accidents because of unsafe conditions can include insufficient workspace lighting, excessive noise, slippery flooring, extreme temperature exposure, inadequate protection when working with machinery or hazardous materials, unstable structures, electrical problems, and more.

The causes of industrial accidents that involve unsafe acts can include actions or failures to act which result in injury. This can be a result of employee negligence.

The causes of industrial accidents can occur in the environment around the workplace (external) or within the work environment (internal). **External causes** of industrial accidents may include fires, chemical spills, toxic gas emission or radiation. The causes of industrial accidents in these cases might include organizational errors, human factors, abnormal operational conditions, natural forces, software failures, and outside interference.

**Internal causes** of industrial accidents can involve equipment, harmful materials, toxic chemicals, and human error.

1. Industrial accidents happen rather seldom in the world.
2. Half all the industrial accidents result in fatality.
3. Construction is the leading area for industrial accidents.
4. There are three types of causes of industrial accidents.
5. Toxic gas emission is the example of external cause of industrial accident.

## Vocabulary II

### Word building

**A.** Use the correct form of these words from the text to complete the first two columns.

Noun	Adjective	Opposite
1 negligence	.....	.....
2 .....	conditional	unconditional
3 stability	.....	.....
4 safety	.....	.....
5 hazard	.....	.....
6 .....	fatal	vital
7 .....	.....	inadequate
8 sufficiency	sufficient	.....
9 norm	normal	.....

**B.** Opposite meanings of the adjectives above are formed in one of two ways:

a) using a prefix *un-*, *in-*, *ab-*; for example, *conditional*, *unconditional*.

b) using a different word; for example, *fatal*, *vital*.

Complete the right-hand column of the chart with opposites of the adjectives.

**C.** Use one of the adjectives or its opposites to complete the following sentences.

- Local environmentalists have criticized the fact that ...conditions still exist at the plant even after three years of clean-up work.
- Computer system users cannot control risk management decisions, but suffer big losses when ...protection fails to avert catastrophe.
- The workman had to prove that the employer had been ....
- He has been caught in a machine, or some part of a machine has suddenly broken, with ... results.
- The Labour party believes that there are a number of essential approaches to toxic and ...waste.
- The poison was ... to destroy the rat colony.

### Pronunciation

**A.** Put the words from the box in the correct column, according to the pronunciation of the letters in bold.

fatality forecast catastrophe heater <b>a</b> vert plant threaten <b>a</b> ttention <b>f</b> ailure decrease disadvantage charity dead installing disaster leak carbon <b>a</b> cid fall escape immature challenge <b>cl</b> aim <b>a</b> tttempt <b>a</b> sthma						
as in hand	as in part	as in take	as in tall	as in mean	as in health	as in about

## **Reading II**

**A.** *Before you read this article about an industrial accident, discuss these questions with a partner:*

- What are the worst kinds of pollution in your country?
- Should we manufacture chemicals which can kill people or pollute the environment?

### DISASTER ON THE RHINE

A fire at a chemical in Basel, Switzerland, led to one of the worst ecological disasters of the last ten years. Poisonous chemicals, including deadly mercury compounds, were



released into the River Rhine following a warehouse fire at the huge Sandos complex, just north of the city of Basel. The water near the factory turned pink, and scientists soon realized that a major ecological disaster had occurred. Within days, thousands of fish were found dead on the shores of the Rhine as the chemicals flowed slowly downstream through West Germany.

Analysis of the water showed that there was danger to human life as well as to fish and plants. Towns and villages near the Rhine had their drinking water delivered by tanker for over a week.

Further down the Rhine, the Dutch authorities could do nothing to stop the chemicals reaching their waters. They hoped that there would be no long-term damage to fish in the North Sea itself, but no one was sure what the effect would be.

Meanwhile, Sandos conducted a full inquiry into the accident. At a press conference, there were angry scenes when protesters threw poisoned Rhine water at representatives of the Swiss pharmaceutical company.

**B.** *Answer the questions about the article.*

- a. Why did the chemicals flow into the River Rhine?
- b. What were the effects on fish in the river?
- c. What happened to the drinking water of towns and villages near the river?
- d. What did the Dutch authorities do?
- e. What did Sandos do?
- f. What did the protesters do?

**C.** Look at the first paragraph of the article. Find words which mean:

- 1 very big .....
- 2 happened .....
- 3 catastrophe .....
- 4 river banks .....
- 5 towards the sea .....

**D.** Look at the last two paragraphs. Find words which mean:

- 6 investigation .....
- 7 people with power to make decisions .....
- 8 certain .....
- 9 permanent .....

### **Grammar**

#### **The Passive**

	Simple	Continuous	Perfect
Present	am } is } written are }	am } is } being written are }	have } has } been written
Past	was } were } written	was } were } being written	had been written
Future	will be written		will have been written

**A.** Look at the sentences and answer the questions:

- a. Car fumes pollute the air.
  - b. The air is polluted.
  - c. Ten people were injured.
  - d. Employee negligence causes accidents.
  - e. Accidents are caused by employee negligence.
- 1) In which sentences the subject is 'the doer' of the verb?
  - 2) In which sentences the action is more important than the 'doer'?
  - 3) What sentences are with active/passive verbs?

**B. Now complete the rules about the passive voice:**

We form the passive with \_\_\_\_\_ + \_\_\_\_\_ of the verb.

We use \_\_\_\_\_ (active/passive) when what happened to the person or thing is more important than the 'doer'.

We use \_\_\_\_\_ (active/passive) when the 'doer' of the verb is not known or not important.

We can show 'who did it', using \_\_\_\_\_.

**C. Find examples of the passive in the text.**

**D. Work in teams. Following the model, write your own general knowledge quiz or test each other on your speciality.**

was composed/painted in...by...	is/are made of...
was discovered/designed in...by...	is/are caused by...
was built/started/completed in...by...	is/are used...

**Model:**

*The European Agency for Safety and Health at Work was set up in*

*a) Italy b) Spain*

*What type of extinguisher is used in case of fire with electrical risks?*

*a) dry powder b) water*

**E. Work in pairs. In turn read instructions and make reports, using the passive and words of time in brackets.**

Example: *build a garage (last month) - It was built last month.*

*send a reporter (tomorrow) - He will be sent tomorrow.*

- check extinguishers (last week)
- take survivors to the hospital (already)
- drop water on the burning house (now)
- find people in the building (some time ago)
- build shelters (in two days)
- ask people not to waste water (yesterday)

### **Speaking**

*Below there are a number of industrial accidents happened in the world in different times. Read about them and hold an international conference on the problem of safety at work. Work in groups of four (one of the students is a journalist interviewing the representatives of different factories where some accidents occurred). Discuss the circumstances and the causes of the disasters and give your ideas to avoid them in the future.*

- Bhopal Disaster in India. This was one of the worst industrial disasters on record. In it toxic chemicals leaked from a Union Carbide plant and killed over 15,000 people, injured many more, and causes the region's human and animal populations severe health problems to the present.
- Seveso disaster. This was an industrial accident that occurred in Seveso, Italy on July 10, 1976 in a small chemical manufacturing plant of ICME-SA. Due to the release of dioxins into the atmosphere and throughout a large section of the Lombard Plain, 3,000 pets and farm animals died and, later, 70,000 animals were slaughtered to prevent dioxins from entering the food chain. In addition, 193 people in the affected areas suffered from chloracne and other symptoms. The disaster lead to the Seveso Directive, which was issued by the European Community and imposed much harsher industrial regulations.

- Minamata disaster. This was caused by the dumping of mercury compounds in Minamata Bay, Japan. The Chisso Corporation, a fertilizer and later petrochemical company, was found responsible for polluting the bay during the years 1932-1968. It is estimated that over 3,000 people suffered various deformities, severe mercury poisoning symptoms or death from what became known as Minamata disease.
- Auburn, Indiana gassing accident. On June 28, 1988, four workers at an electroplating plant in Auburn, Indiana were poisoned by hydrogen cyanide gas produced when hydrochloric acid was mixed with zinc cyanide in a cleaning operation. A fifth victim died two days later.
- Kader Toy factory fire. On May 10, 1993, a fire started in a poorly built factory in Thailand. Exit doors were locked and the stairwell soon collapsed. 188 workers were killed, mostly young women.
- BP refinery explosion. On March 23, 2005, an explosion occurred at a petroleum refinery in Texas City, Texas, that belonged to BP. It is the third largest refinery in the United States and one of the largest in the world, processing 433,000 barrels of crude oil per day and accounting for 3% of that nation's gasoline supply. Over 100 were injured, and 15 were confirmed dead, including employees of the Fluor Corporation as well as BP. BP has since accepted that its employees contributed to the accident. Level indicators failed, leading to overfilling of a heater, and light hydrocarbons concentrated at ground level throughout the area. An unidentified ignition source set off the explosion.

**You can base your discussion on the following questions.**

1. When did the accident occur?
2. Where did it happen?
3. How many victims were there?
4. What caused the disaster?
5. What safety precautions should people make to minimize industrial accidents?

6. Is it possible to decrease the number of industrial accidents?
7. Can you see the future without industrial accidents?

### Useful words and phrases.

People should....	to be careful with equipment
I think we can....	to avoid failures at work
We should try to....	to provide safety
It's extremely important to....	to cause catastrophe
If people....	not to pollute the air, water, land
Why not....	to minimize external causes of
gas emission	unsafe conditions
chemical spills	radiation
organizational errors	hazardous/harmful materials
abnormal operational conditions	unstable conditions
employee negligence	

### Case Study

According to European statistics, young workers have a higher accident rate than older workers for a number of reasons including:

- their lack of awareness of OSH risks ;
- inexperience and unfamiliarity with the job they are doing, and their surroundings;
- lack of skill/training in the job they are doing;
- physically or mentally immature
- being given jobs that are beyond their capabilities
- not paying attention to health and safety



*Do you think it is true about young workers in your country? Are these factors, affecting the health and safety aspects of their work the same or completely different?*

*Read about three accidents and fill in the table.*

	<b>Case I</b>	<b>Case II</b>	<b>Case III</b>
<b>who</b>		young male-aged 18years working for two years with his father	
<b>job</b>			
<b>injury</b>			
<b>how</b>	struck by heavy machinery falling from a height		
<b>reasons</b>			inadequate super- vision

**I** The young worker was employed on a construction site when a 750kg compressor was being moved by a mobile crane at a tunnel shaft on the site. At a height of five metres, the compressor fell from its chains and onto the young man. He didn't have much of a chance being struck by such a heavy weight falling from a height - and he died from his injuries.

Investigators found that young workers were not properly trained or even properly appointed to their jobs. This construction company had a poor attitude to health and safety and did not always follow correct safety procedures. This cost one young worker his life.

**II** This young labourer was nearly 18 years old and had been working on the construction site for almost two years when he had his accident. The site foreman was also his father. What happened?

The young man was working with plastic piping. He struck a plastic pipe with a hammer but the hammer had become brittle and as he struck the pipe, it fragmented - that is, it broke into pieces, and struck him in the eye. He suffered severe bruising.

The site foreman(πρораб), also the young man's father, was advised to do a risk assessment and identify hazards for his son prior to giving him tasks.

**III** The young man had worked every Saturday afternoon as a steel erector for the last eighteen months. He had been instructed never to walk along the top flange of steel - but on this one occasion, he did.

A colleague asked him to fetch an item from the Mobile Elevating Work Platform (MEWP) but he could not find the key. So, he made his own way across the top of the beam. He was knocked off balance by a projecting flange and he fell 5 metres, fracturing his foot as he landed.

Fellow workers blamed the young man himself for ignoring previous instructions and doing something that was potentially dangerous. The supervisor had also briefly left the building to fetch an extra piece of steel and so was not there when the young man had his fall.

Investigators felt that the young worker was not adequately supervised. He had managed to carry out his unsuitable actions without being seen by anyone.

### **Writing**

*Work in three groups. Choose one of the cases and write a memo to the chief safety manager about the causes of each accident.*

→(see Appendix I)

## **UNIT VI FIRES**

### **Starting up**

**A.** *Do you know what causes fire? Have you ever been injured by fires? What do you know about the main fire safety rules? Do you know any great fires in the history of the world?*

**B.** *Have a look at the list of sources of fires and rearrange them from the most frequent ones.  
Can you add any other causes of fires?*

Matches

Central and water heating appliances

Electrical appliances

Cooking appliances

Blow-lamps (паяльная лампа), welding (сварка)

Electrical wiring (электропроводка)

Space heating appliances

Smoking materials



### Vocabulary

*Fire safety is everyone's responsibility. In order to understand this fact you first need to know more about fire.*

**A.** *Match the words to their definitions.*

- |                 |                                                                                      |
|-----------------|--------------------------------------------------------------------------------------|
| 1. fuel         | a) the process of burning                                                            |
| 2. oxygen       | b) a substance such as coal, gas, or oil which you can burn to produce heat or power |
| 3. extinguisher | c) a gas in the air that all living things need                                      |
| 4. combustion   | d) a piece of equipment used for stopping small fire                                 |

**B.** *Read the text and try to fill in the gaps with the right words:*

<b>chemical reaction</b>	<b>wiring</b>	<b>combustion</b>	<b>to sustain</b>
<b>flammable</b>	<b>ignition</b>		

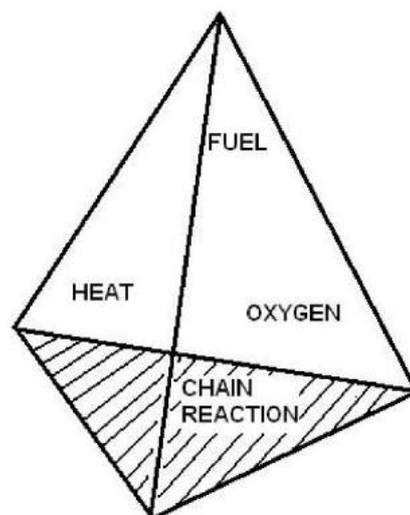
Four things must be present at the same time in order to produce fire:

Enough oxygen .....combustion,

Enough heat to raise the material to its .....temperature,

Enough sort of fuel or ..... material and

The chemical, exothermic reaction that is fire.



Oxygen, heat and fuel are frequently referred to as the “fire triangle”. Add the fourth element, the ..... and you have a fire “tetrahedron”. The important thing to remember is to take any of these four things away, and you will not have a fire or the fire will be extinguished.

There are many different classification systems used for uncontrolled fires. In the USA, fires are generally classified into five groups: A, B, C, D and K.

CLASS A	Flammable solids: wood, paper, cloth, and some types of plastics
CLASS B	..... liquids, gasoline, oil, grease, acetone, spirits, natural gas
CLASS C	Electrical appliances, ..... and other electrically energized objects
CLASS D	Combustible metals: sodium, magnesium and potassium
CLASS K	Cooking oils

*What fire classification is used in your country?*

**C.** *Study different types of extinguishing agents and guess what class of fires they are used against.*

Carbon dioxide (CO<sub>2</sub>), water, foam and dry powder. These agents not only smother fire very rapidly but are also non-toxic and harmless to the most delicate mechanism and material.



computers.

- I. Foam is an agent suitable for dealing with easy setting on fire non solid material.
- II. Water is the most widely used extinguishing agent.
- III. Dry powder is highly effective against electrical risks.
- IV. CO2 is a suitable agent if your workplace has sensitive electronic devices such as

**D.** Think of as many derivatives of the given words as you can and complete the table.

Noun	Adjective	Verb
flame		
	hot	
		to equip
	combustible	
responsibility		

**Pronunciation**

**A.** Put the words below in the correct column of the table according to their word stress.

ignition combustion appliance <u>oxygen</u> electrical extinguisher exo-thermic dioxide hydrogen sustainable absenteeism maintenance			
○●○	○●○○	○○●○	●○○ oxygen

**Reading**

**A.** Before you read the article about the fire, discuss the question with a partner:

- What is the latest news concerning fires in Russia?
- What were the causes of these disasters? Were there any victims?



- Do you think employees must be trained how to act during the fire?

Why?

**B. Read and say how many people were killed in each accident?**

The **Joelma fire** occurred in the Joelma building, a 25-story building situated in downtown Sao Paulo, at 225 Avenue Nine of July. It is one of the most notable tragedies to have occurred in Brazil. On the morning of February 1, 1974, during business hours, a short-circuit in an air-conditioner on the 12th floor ignited the fire. Almost all of the building was occupied by a single banking company,



Banco Crefisul S/A. The large amounts of paper, plastics, electrical equipment and wooden walls and furniture contributed to the fire spreading rapidly. Most of the people attempted to escape upwards, due to the stairs being filled with smoke, in the hope of being rescued by helicopter, but Joelma did not have a heliport. Despite the bravery of the fire fighters, 18 people jumped to their deaths to escape from the fire or in failed attempts to reach to out-of-reach fire ladders. At the end the death toll reached 188.

It was the second serious fire in São Paulo in less than two years. The first one took place in 1972 in the Andraus building, also in downtown São Paulo, killing 16 people. After the Joelma fire, the legislation concerning the fire prevention codes in all of Brazil was updated.

**C. Now read the article more carefully. Which of these statements are true?**

1. The Joelma fire is the insignificant accident to have occurred in Brazil.
2. The malfunction of electrical appliance was the cause of this tragedy.
3. A lot of people were rescued by helicopter.
4. The fire fighters did their best to put the fire out.
5. Because of this tragedy less than one hundred people died.

**D.** Find words in the article which have the same meaning to the words below.

- |                |                  |
|----------------|------------------|
| 1. to rescue   | a. in spite of   |
| 2. despite     | b. to take place |
| 3. to try      | c. to get away   |
| 4. to ignite   | d. to save       |
| 5. to up- date | e. to modernize  |
| 6. to escape   | f. quickly       |
| 7. to occur    | g. to set fire   |
| 8. rapidly     | h. to attempt    |

**E.** Find words in the article which have the opposite meaning to the words below.

1. to extinguish
2. numerous
3. slowly
4. to succeed in something
5. out-of-date
6. unknown

### Grammar

### **Participles**

Non-finite forms of the verb, participles are often used in technical texts.

Forms of participles

	Active	Passive
Participle I	using	being used
Participles II	-----	used
Perfect Participle	having used	having been used

The ways to translate participles I, II

forms	переводить	
	причастием	деепричастием
building	строящий	Построив
having built	-----	построив
being built	строящийся (то есть который строят)	будучи строящимся (то есть когда его строили) будучи построенным (то есть когда его построили)
having been built	-----	будучи построенным (то есть когда его построили, после того как (уже) построили)
built	построенный	-----

**A. Form participle I and Participle II from the following verbs :**

e.g. *build – building – built*

break, use, require, design, give, hear, allow, take, set, pull.

**B. Fill in the blanks with Participle I or Participle II given in brackets.**

*Translate the phrases.*

1. a \_ ( building / built) house;
2. to follow\_ ( establishing / established) safety procedures;
3. \_ ( requiring / required) standards;
4. a man\_ ( working / worked) in the office;
5. Everything \_ ( doing / done) here is right.

**C. Replace the clauses by Participle I according to the model:**

e.g. *The students who study at our university have a wide range of career choices.*

*The students studying at our university have a wide range of career choices.*

1. People who use extinguishers pull out the fire.
2. An activity that minimizes or eliminates hazardous conditions that can cause injure is called safety.
3. When we were sitting in the room and discussing the plan we heard a fire alarm.
4. A person who wants to be an efficient and successful specialist must get some practical experience.
5. While he was breaking the window he cut himself.

**D. Replace the clauses by Participle II according to the model:**

e.g. *I want to inform you about the causes of the fire that were identified by specialists. – I want to inform you about the causes of the fire identified by specialists.*

1. Decisions that are made by the safety engineer are very important.
2. The hose reels that are located in our corridor are automatic.
3. Do not use electrical cords which were damaged or frayed.
4. Matches and lighters that are kept out of the reach of children help to prevent the tragedy.
5. An Emergency Escape Plan which is practiced frequently can help employees to behave confidently in case of fire.

**E.** *State the forms of the participles and translate the sentences.*

*The method used by our scientist proved to be quite reliable. (Participle II)*  
*Метод, который использовал наш учёный, оказался вполне надёжным.*

1. All staff must be familiar with the fire procedures required by the Fire Precautions Act.
2. Any person suspecting or discovering a fire shall follow fire action procedure.
3. Leave the building by the nearest available exit route – NOT USING LIFTS.
4. Since 1 January 1998 all new manufactured Fire Extinguishers have been coloured red, with only 5% of the container surface allowed to be used for colour coding.
5. Instructions given by the nominated staff must be followed.
6. Any person hearing an intermittently sounding fire alarm will be aware that this is an alert signal, not a requirement to evacuate.
7. Fires involving flammable gases such as propane, butane, North Sea and town gas require carbon dioxide, dry powder (or BCF extinguishants).
8. Designed specifically to deal with class B, C and electrical fire risks, these extinguishers deliver carbon dioxide gas to smother fire rapidly and harmlessly to material.

### **Fire Safety Quiz**

**A.** *Can you correctly **answer TRUE or FALSE** for each question below?*

1. Fire requires fuel, oxygen and heat for ignition to occur. Taken any one away and the fire cannot occur.
2. Class A fires are fueled by ordinary combustible or fibrous material, such as wood, paper, cloth and some plastics.
3. Class D fires can be extinguished with water.
4. Class B fires include flammable or combustible liquids, greases and gases, such as gasoline, paint and propane.
5. Keeping the work area free of litter is one way to help prevent Class A fires.
6. You should occasionally pull the pin and briefly squirt(выпустить струю) all fire extinguishers to ensure they are properly charged and in good working order.
7. Fire drills(пожарные учения) are necessary to test the Emergency Action Plan.

8. The last person to evacuate a room should lock the door to prevent vandalism or theft of equipment.
9. Combustible metals (Class D) are difficult to extinguish, because once ignited, they give off (выделять) sufficient oxygen to support combustion.
10. Do not use carbon dioxide or ordinary dry chemical extinguishers on Class A fires.

### **Speaking and Writing**

*Imagine that you are a group of people who have just started a new business. You have rented an office, bought some furniture, equipment but haven't made any fire precautions.*

*You know it's important to be ready for any emergency. Make a list of fire precautions and discuss what you should do to follow all the safety standards.*

*Below you're given some ideas which you can use to hold your discussion.*

**Student A**

- To use electrical appliances/ space heating appliances
- To have a separate smoking area
- To have proper electrical wiring in case of fire
- To exit quickly and calmly
- To go directly to the open air
- Not to stop to collect bags

**Student B**

- To make a plan of fire evacuation
- To practise the fire emergency plan frequently
- To be familiar with the exit routes/fire procedure
- To provide portable fire equipment (fire extinguishers, hose reels)
- Not to use damaged electrical cords

**Student C**

- To give somebody the relevant information
- To arrange a training course on the use of fire extinguishers
- To leave the building by the nearest available exit route
- To know how to call the fire brigade
- Not to use lifts
- Not to close the door behind you
- Not to re-enter the building until instructed



### **Case Study on fire safety signs in the workplace**

Every business needs a range of fire safety signs, including:

- fire exits
- assembly point
- fire equipment locations
- evacuation routes

The British Standard Code of Practice for safety signs (BS 5499-10:2006) provides guidance on safety signs that, quote:

"Provide information in a compact form

Provide information in a form that is independent of language

Have visual impact

Guide the viewer to a desired outcome or appropriate decision"

#### **Fire Safety Signs: Make them Visible**

It may sound obvious, but where you actually position your signs, and what type they are, can make a huge difference to their visibility by your staff. Clear signage can give staff crucial information when they need it, and potentially save lives.

#### **Effective Fire Safety Signs**

Not all fire safety signs are as effective as they might be. Self-adhesive signs are quick and easy to put up, but usually suffer from peeling in warm surroundings, or where bored little fingers can get at them! We always recommend rigid plastic or metal signs for permanence.

And what happens when the room goes dark? They disappear into the gloom...

#### **Photoluminescent Safety Signs: light in the darkness**

Photoluminescent safety signs absorb normal office fluorescent light during working hours, sufficient to make them glow in the dark for anything from one to ten hours. Furthermore, unlike ordinary self-adhesive vinyl signs, photoluminescent safety signs are themselves fire-retardant. Wipe-able, robust and reliable, these signs last for up to five years both indoors and outdoors, a good investment for any business premises.

### Signs of the times: what signs mean

Just as fire extinguishers are colour-coded, so are safety signs. You and your staff are probably already familiar with such signs, but have probably never actually considered what each colour means!

#### Red background with white graphics = fire equipment sign

These signs show the location of fire equipment. Essential signs for your business premises would include fire alarm points, sprinkler control locations, fire extinguisher location and types, and a fire marshal contact list.



#### Green background with white graphics = safe procedure sign

These show your staff safety exits or the way to safety equipment. Essential signs for your business premises would include the running man fire exit and emergency exit signs (with or without arrows), and fire assembly point signs.



#### Blue Background with white graphics = mandatory sign

In layman's terms, these signs say, "You must do this!"

#### Yellow triangle with black border and black graphics = warning sign

Indicating potential hazards, such as the familiar "Danger high voltage" sign.



#### White background with black graphic in a crossed-through red circle = prohibited sign

Actions indicated are prohibited; familiar versions include the "No Smoking"



### Task

*Work in groups. Prepare to discuss what fire safety signs should be presented for a chemical plant to minimize fire risks in that industry.*

*Each group presents its own set of signs and explain the reasons for the decision. As one group draw new visual aids.*

### Useful phrases

As you can see,...  
You'll notice that...  
...clearly shows...  
...indicates...  
...means...

## UNIT VII

### CAREER OPPORTUNITIES

#### Starting up

*You have already learnt about different types of safety. So, what do safety engineers have to do? What activities will they have to be involved in?*

*You can use ideas from the list to express your opinion.*

- provide safety at workplaces
- evaluate and minimise the risks
- give advice on safety rules
- control working conditions
- work without training
- ignore laws and regulations
- advise on career opportunities

e.g. I suppose/ think I'll have to... Safety engineers can...

In my opinion I won't have to... They can't...



#### Reading

**A.** *Let's compare your ideas with the following text about safety engineering:*

The term “safety engineering” refers to any act of accident prevention by a person qualified in the field. The majority of those practicing safety engineering are employed in industrial workers safe on a day to day basis. Safety engineers take an early design of a system, analyze it to find what faults can occur, and then propose changes to make the system safer.

Historically, many organisations viewed “safety engineering” as a process to produce documentation **to gain regulatory approval**, rather than **a real asset** to the engineering process. But the functions of safety engineers are extremely important. They **anticipate**, identify and evaluate hazardous conditions and practices. They develop, **implement** hazard control designs, methods, procedures and programs, advise others on them and evaluate their effec-

**to gain regulatory approval** – добиться одобрения властей

**a real asset** – реальный вклад

**to anticipate** – предвидеть

**to implement** – осуществлять

**ergonomics-**  
эргономика(отрасль научной организации труда, изучающая трудовой процесс и условия труда)

**paramount-**

tiveness.

To perform their professional functions, safety engineering professionals must have education, training and experiences in different fields. They need to have a fundamental knowledge of physics, chemistry, biology, physiology, statistics, mathematics, computer science, engineering mechanics, industrial processes, business, communication and psychology. Professional safety studies include industrial hygiene and toxicology, design of engineering hazard controls, fire protection, **ergonomics**, safety and health program management, accident investigation and analysis, product safety, construction safety, education and training methods, environmental safety, and safety, health and environmental laws, regulations and standards. Personality issues can be **paramount** in a safety engineer. They must be personally pleasant, intelligent, and **ruthless** with themselves and their organization. They have to be able to “sell” the failures that they discover, as well as the **expense** and time needed to correct them. They can be the messengers of bad news.

Safety engineers have to be ruthless about getting facts from other engineers. It is common for a safety engineer to consider chemical, electronic, electrical, mechanical, procedural, and training problems in the same day. Often the facts can be very uncomfortable as many safety related issues point towards **mediocre** management systems or worse, questionable business ethics.

основной, перво-  
степенный

**ruthless**-жестокий,  
беспощадный

**expense**-затраты,  
расходы

**mediocre**-  
посредственный

## Vocabulary

**A.** Read the text again, complete the table and answer the questions below:

knowledge	tasks and duties	personal qualities

*What knowledge have you already got? What knowledge do you have to get? Which tasks and duties are most interesting to you? Can you think of some other personal qualities to add to the table? (creative, inquisitive, analytical, detail-oriented, able to work in a team, communicative).*

Career guide for health and safety engineers gives a list of skills and abilities based on general occupational qualifications. Typically, you will not be required to have all the skills listed to be a successful performer. Recruitment and selection standards for an individual state job must be based on the specific knowledge, skills, and abilities for that job as indicated in the job announcement and job description in the Employee Work Profile.

**B.** Read the list and mark skills and abilities you have already got (+) and (√) you have to develop.

### **Skills**

1. Understanding written sentences and paragraphs in work related documents.
2. Talking to others to convey information effectively.
3. Communicating effectively in writing as appropriate for the needs of the audience.
4. Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
5. Persuading others to change their minds or behavior.
6. Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
7. Managing one's own time and the time of others.
8. Understanding the implications of new information for both current and future problem-solving and decision-making.
9. Teaching others how to do something.
10. Bringing others together and trying to reconcile differences.

**C. Complete the sentences with the verbs:**

listen to	speak	communicate (*2)	tell
read	identify	apply	come up
			combine

The **Ability** to:

1. ... and understand information and ideas presented through spoken words and sentences.
2. ... information and ideas in speaking so others will understand.
3. ... when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
4. ... information and ideas in writing so others will understand.
5. ... general rules to specific problems to produce answers that make sense.
6. ... pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
7. ... clearly so others can understand you.
8. ... with unusual or clever ideas about a given topic or situation, or to develop creative ways to solve a problem.
9. ... and understand the speech of another person.
10. ... and understand information and ideas presented in writing.

**INTERESTED?**

Like people, occupations have traits or characteristics. These characteristics give important clues about the nature of the work and work environment, and give you an opportunity to match your own personal interests to a specific occupation. When you choose a job in an occupation that matches your own interests you have taken an important step in planning a successful and rewarding career.

The Health and Safety Engineer occupation has the following characteristics:

**D. Complete the definitions with necessary adjectives:**

***Enterprising, social, investigative, realistic, conventional***

... — ... occupations frequently involve working with ideas, and require an extensive amount of thinking. These occupations can involve searching for facts and figuring out problems mentally.

... — ... occupations frequently involve starting up and carrying out projects. These occupations can involve leading people and making many decisions. Sometimes they require risk taking and often deal with business.

...— ... occupations frequently involve following set procedures and routines. These occupations can include working with data and details more than with ideas. Usually there is a clear line of authority to follow.

... —... occupations frequently involve work activities that include practical, hands-on problems and solutions. They often deal with plants, animals, and real-world materials like wood, tools, and machinery. Many of the occupations require working outside, and do not involve a lot of paperwork or working closely with others.

... — ... occupations frequently involve working with, communicating with, and teaching people. These occupations often involve helping or providing service to others.

## **Grammar**

### **Modal verbs**

**A.** *Read the text about safety engineering and pay attention to the underlined words. What do they have in common and what are they called?*

*Can, must, have to* are modal verbs. They are often used in English and have different forms and meanings.

*Can* is used to say that you have the ability to do something/ you are allowed to do something/ something is possible.

*Can't* is used to say that you do not have the ability to do something/ you are not allowed to do something/ something is impossible.

*Must* is used when the situation, a rule or a law forces you to do something.

*Mustn't* is used to say that you cannot do something because a rule or a law does not allow it, or it is dangerous.

*Have to* is used to say that something is necessary/ you have arranged to do it/ someone makes you do it.

*Don't have to* is used to say that something is not necessary.

**B.** Study the table which gives the modal verbs in three different forms – past, present, future:

Present	Past	Future
can	could	will be able
can't	couldn't	won't be able to
must	had to	will have to
mustn't	didn't have to	won't have to
have/has to	didn't have to	won't have to
don't/doesn't have to	didn't have to	won't have to

**C.** Complete the sentences with the right form of the modal verbs given above:

1. If you become a safety engineer, you ... do a lot to prevent accidents at plants and factories.
2. My brother is a safety engineer at a big factory. It ... work without such specialists to keep workers safe.
3. The workload was too heavy and most employees ... work productively at the end of a working day.
4. To gain regulatory approval every factory ... employ a safety engineer.
5. With some knowledge of management and administration you ... extend your expertise beyond basics of the safety engineering profession.
6. Every safety engineer ... be pleasant, intelligent, and ruthless with himself and his organization.
7. I graduated from university a year ago. As a student I ... study such disciplines as physics, engineering mechanics, industrial processes, communication and psychology.
8. A safety engineer ... help us to discover failures in the work system.
9. Many years ago, when working conditions were more primitive, employers ... think about ergonomics.
10. If we consider our safety engineer's advice, we ... be scared about hazards at work.

**D.** Make up your own sentences using the modal verbs given in Ex. B.

## Discussion

Career success is both about what you do (applying your technical knowledge, skills, and ability) and how you do it (the consistent behaviors you demonstrate and choose to use) while interacting and communicating with others. Hopefully, by studying the Commonwealth competencies\*, identifying your developmental opportunities, and working to refine your own competence, you can take charge of your career!



*Prepare a career plan and discuss it with your partner. Think about*

- Type of occupation you would like to be involved in
- Tasks and duties you will have to perform in future
- Knowledge you have to get
- Skills and abilities you need to develop
- Your personal qualities that will help you to become successful

---

\*For additional information about the **Commonwealth Competencies** go to: [http://jobs.virginia.gov/cd\\_competencies.html](http://jobs.virginia.gov/cd_competencies.html). For the competencies, we first list the competencies and then define each. Finally, we list competency indicators; to describe what successful performance looks like.

## PROJECTS

### 1. Project based on Unit V

Occupational Health and Safety

**An Internet Hotlist on OH&S**

#### Introduction

Your task is to create a brochure or poster that will alert staff of any possible hazards in the workplace you have chosen. Your brochure or poster must include:

The name of the workplace.

List of possible hazards in this workplace.

One image of a safety sign in this workplace.

The responsibilities of the workers and the employers in this workplace.

You may use these links to search for information and images. Good Luck!

#### The Internet Resources

**Workplace hazards** - A list of different potential hazards in the workplace

- <http://www.labour.gov.on.ca/english/hs/faqs/hazards.php>
- <https://safetylinelneworker.com/blog/workplace-hazards/>
- <https://smallbusiness.chron.com/top-five-types-workplace-hazards-16112.html>

#### **Hazard signs**

- <https://www.safetysign.com/facility-signs> - Images of caution signs: flammable, slippery, exit, etc.
- <http://www.online-sign.com/> - safety signs online
- <http://www.compliancesigns.com/> - OSHA Safety Signs and Labels
- <https://www.mysafetysign.com/> - **Safety Signs: Caution Signs, Warning Signs and Danger Signs**
- <http://www.officesafety.co.uk/quick-guides/safety-signs.html> - workplace safety posters



## Safety in the Workplace

- <http://www.safetysolutions.net.au/articles/1480-Protecting-young-workers-from-workplace-hazards> - this site has information about workplace hazards concerning young people in particular
- [https://osha.europa.eu/en/priority\\_groups/young\\_people](https://osha.europa.eu/en/priority_groups/young_people)



## Responsibilities of employees and employers

- <https://www.hse.gov.uk/workers/employers.htm> - This website lists the responsibilities of the employer in the workplace
- <https://www.educaloi.qc.ca/en/capsules/rights-and-responsibilities-employers-and-employees>
- <http://www.labour.gov.on.ca/english/hs/faqs/rights.php> - This website contains information about workers and employers rights and responsibilities in the workplace.

## 2. Project based on Unit VII WEBQUEST “JOBS AND CAREERS”

### Introduction



This Webquest is designed to teach competencies for students of Pre-Intermediate level:

- Understanding of the benefits of higher education;
- Understanding of the relationship between work and learning;
- Development of skills to understand and use career information;
- Understanding of the career planning process.

After completion of this Webquest students should:

- Identify their career interests via online survey;
- Be well-informed about the different aspects of their career choice;
- Create a job description;
- Know how to write a resume;
- Know how to do research on the Internet.

If you have decided after researching your career that you are no longer interested in this career field, you may go back to the resources and study some other careers. After all, this will be one of the most important decisions that you will make in your life.

### The Task

Nobody will say for sure what career you will have. With some proper research, you can find out what sort of jobs is suitable for you. Through this webquest you will also study various careers, select one which seems good to you, look for information about that career, and learn what you must do to start this career. And the main goal of this webquest is to find at least 1 possible long-term career possibility, write a resume for the chosen job and then make an oral report at your English Language lesson.

## The Process

### STEP 1

Create an Answer Sheet at the desktop, use a sample which follows the task. Get acquainted with the information tables that you should fill in. Notes should be made in an *electronic* way, and then you may send them to your mail box or save at flash drive for further preparation of your lesson report.

### STEP 2

Begin with an assessment of your career interests.

<https://www.thebalancecareers.com/take-this-quiz-to-find-out-if-you-should-be-an-engineer-4083206> - Are you thinking of becoming an engineer? Take this quiz to find out if this is a good career choice for you.



<http://joboutlook.gov.au/careerquiz.aspx> - This quiz will help you identify what types of work you most like doing.

### STEP 3

Make notes about your psychological portrait on your Answer Sheet. Then choose at least 5 occupations you are suitable for and copy them to the table "The best occupations I am suitable for".

### STEP 4

Now choose one occupation you like most of all and follow the link. Have a look at the diagrams and study the information below under such titles as **At Work, Education Training and Experience, Work Prospects and Important Facts.**

### STEP 5

Make notes on your Answer Sheet in next table about job description, necessary education and experience, future work prospects and salary.

**STEP 6**

Visit [Californiajobs](http://www.californiajobs.com/) (<http://www.californiajobs.com/>) link and search for a suitable job. While searching choose region, category and job class. Make notes on your Answer Sheet about company, job title, position type, location, job description, job qualifications, requirements and benefits. Provide salary information if it is available.

**STEP 7**

Visit Youtube link <https://www.youtube.com/watch?v=VYvkX6r9IIE> and watch about 3 styles in resumes (chronological, functional and combination). Choose 1 style and write your own resume. (this task can be done at home)

**STEP 8**

Prepare an oral report about your Webquest and present it at your English lesson. The notes from your Answer Sheet will help you. Attach your resume to your Answer Sheet. The information about the date of your report will be provided by your English Language teacher.

**ANSWER SHEET**

<b>Name:</b>	
<b>Surname:</b>	
<b>Group number:</b>	
<b>Level:</b>	
<b>Teacher:</b>	

**My psychological portrait**

--

**The best occupations I am suitable for**

1.	
2.	
3.	
4.	
5.	

**Title (Write the job you've chosen)**

Job description:	
Necessary education and experience:	
Future work prospects:	
Salary:	

**Job posting details**

Company:	
Job Title:	
Salary:	
Actual Location:	
Job description:	
Job Qualifications / Requirements and Benefits:	



## APPENDIX I

### Memos

-----MEMO-----

*To:*       **Charles Stancombe**  
              **CFO**

*From:*     **Maria Castellano**  
              **Human Resources**

*Date:*      **15 July 2008**

*Subject:* **Appointment:**  
              **Commercial Manager, France**

I have interviewed three candidates for this position and recommend the appointment of Tim Scooba.

My reasons are the follows:

- 1     He has the required qualifications.
- 2     He has a lot of experience with the products we sell in the French market.
- 3     He speaks French fluently.
- 4     His removal expenses will be minimal as he has no family at present.

If you approve our recommendation, I will prepare the contract for signature. Please let me know your decision as soon as possible.

M.C.

cc:        **Thierry Baptiste**  
              **CEO**

Memos are used only **inside** the company.

They should include the following headings:  
***To/From/Date/Subject.***

They should be **short** and include only **useful information.**

Points should be arranged **in logical order.** In longer memos it is normal **to number** the different points.

Memo style is **formal** or **neutral.**

You can end with your **initials** or a **signature.**

#### **Common abbreviations**

**cc:** copies (the names of the people who receive a copy are included in the letter)

**CEO** Chief Executive Officer

**CFO** Chief Financial Officer

## Emails

Email is one of the most commonly-used forms of communication in the international business world. It is used extensively within companies to circulate information, requests, results, instructions, recommendations, minutes of meetings, etc. Email is an effective, rapid and relatively cheap means of communicating. Because of the brevity, rapidity and relative informality of emails, it is important to check that **all information has been given** and that **the tone is appropriate**.

<p><b>From:</b> Sarah Bates, Personal Assistant  <b>To:</b> Tom Peterson  <b>Cc:</b> Alan Baker, Production Manager  <b>Sent:</b> 12 January 2008 14:54  <b>Subject: Re:</b> Request for dispatch confirmation  <b>Attachment:</b> Invoice doc</p> <p>Dear Mr Peterson</p> <p>Thank you for your mail. I have checked with Mr Baker, our Production Manager, and I can confirm that the 200 cases you ordered left our warehouse yesterday and should arrive at their destination by tomorrow at the latest. Please let me know if there is any delay.</p> <p>I am sending a copy of the invoice as requested, in the attached file.</p> <p>Yours sincerely  Sarah Bates  Personal Assistant</p>	←	←
------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---	---

### Salutation

When you **know the name** of the recipient:

*Dear Mr/Mrs/Ms Peterson*

Note: In AmE Mr., Mrs., Ms. include a full stop, e.g. *Dear Mr. Peterson*

When you **don't know the name** of the recipient:

*Dear Sir or Madam*

### Endings (BrE)

When you **know the name** of the recipient:

*Yours sincerely*

When you **don't know the name** of the recipient:

*Yours faithfully*

### Endings (AmE)

*Yours truly,*

*Sincerely,*

Transco, a UK pipeline company, which was originally part of British Gas opted for (выбрал) the Safety Charity Challenge when many other attempts to introduce a safety culture had failed the company.

It dramatically reduced accidents (33 per cent in 18 months) saving 2,521 workdays! It also led to huge cost savings and generated a lot of good publicity, which had a positive effect on workforce morale (моральное состояние). Efficiency also improved greatly. The challenge was also very beneficial for the charity Mencap, which deals with people with learning disabilities (необучаемость).

The Institute for Business Ethics says, “If a way can be found to improve both the productivity of the company and the well-being (здоровье, благосостояние) of the community, then necessity will become a virtue”.

### Unit I (Workplace Safety Is No Accident Quiz)

1. **False.** Workplace safety is everyone’s responsibility. It is best to establish a safety culture through policies, procedures, training and supervision.
2. **False.** One person’s common sense is not necessarily the same as another’s. The entity should identify its expectations for safe workplace procedures through policies, checklists, training and supervision.
3. **False.** OSHA provides many eTools on various construction topics. These tools allow the user to get training and in some cases customize policies for their entities. Booklets, fact sheets, checklists, and alerts are available through the OSHA Web site.
4. **True.** Dress for success in the workplace by wearing the appropriate personal protective equipment. Other safe practices include: not wearing dangling jewelry, tying back long hair or wearing it under a cap, wearing closed-toe shoes and not wearing flowing garments.
5. **True.** Personal protective equipment is meant to protect workers from specific hazards associated with their job responsibilities. Policies, procedures, training and supervision all contribute to the safe use of PPEs. (personal protective equipment)
6. **True.** Serious conditions often arise from small injuries if they are not cared for at once.

### Unit III (Case Study)

Litenow replaced the existing fluorescent light fittings with 14 x 400 Watt Metal Halide low bay fittings spaced to provide a high level of light distribution throughout the workshop. Redundant light fittings and lamps were taken away for recycling and reprocessing.

Lighting levels are dramatically increased whilst energy consumption has been reduced.

With a 50% increase in expected lamp life maintenance costs are reduced.  
A brighter, safer working environment is the result of this Litenow solution.

### **Summary**

The paper entitled ... deals with the field of (politology, economics, safety engineering).

The theme of the paper is related to... (the industrial accidents).

The main (principal) idea of the work is....

The first chapter is devoted to...

discusses...

analyses...

The most important conclusions here are...

The second chapter describes...

examines...

offers...

The author comes out for (against)...

The third chapter focuses on...

reviews...

reveals...

It is stressed that...

It is pointed that...

In conclusion, it is underlined that...

The general conclusion is that...

## APPENDIX II

### Poor Office Lighting Poses Sight Risk

Office workers are at risk of developing eye problems due to poor lighting in workplaces, according to the Illuminating Engineering Association of Thailand (TIEA). The Energy Ministry's latest survey found that the average level of illumination in the state agency's office was about 200-400 lux, which is below the international lighting standard for a workplace of 500 lux, said Kitti Sukutamatunti, a lighting expert from the TIEA.

The lux meter is a measure of illumination. A lux is equal to the total intensity of light that falls on a one square metre surface that is 30cm away from the source of the light.

Many state agencies surveyed were found to have dim light conditions in their offices as the agencies are trying to meet the energy saving target set by the previous government, Mr Kitti told a seminar on illumination in workplaces.

"It can be said that state offices are dangerous places for staff because the executives are negligent of the officials' health safety," he said.

"They always cite budget constraints and energy saving campaign as reasons to switch off the light in office buildings." The Labor Ministry has been trying to tackle the problem by issuing a new regulation on lighting standards in workplaces, but unfortunately the regulation was not in line with the international standard, according to the association.

Under the regulation, the lighting level in an office room with computers should not be less than 600 lux, which is above the international standard of 500 lux.

The association called on the ministry to revise the regulation to prevent office workers from exposure to too much brightness.

## About the Chernobyl Disaster

On April 26, 1986, the fourth reactor of the Chernobyl Nuclear Power Plant, exploded at 01:23 AM local time. The workers were performing an experiment with the reactor's safety systems. Problems occurred when during the tests, the reactor did not receive enough coolant, and had built up too much heat in the core, and had fully withdrawn control rods, all of which contributed to very unstable and unpredictable reactor operation. When the control rods were reinserted in an attempt to regain control of the unstable reactor, there was a sudden increase in reactivity, caused by the design of the RBMK reactor and its control rods, a uncontrollable run away reaction occurred. The reactor produced tremendous amounts of steam, eventually causing a steam break/explosion, which destroyed part of the reactor. Graphite fires broke out, due to the high temperatures of the reactor and that the graphite was exposed to oxygen, causing it to burn, which occurred after the reactor was damaged from the steam explosion. Radioactive debris was flung several miles, and smoke containing radioactive contaminants from the burning graphite, traveled as far as Belarus. All permanent residents of Chernobyl and Zone of alienation were evacuated because radiation levels in the area had become unsafe.

The Chernobyl City and its surrounding suburbs are now home to nuclear scientists, maintenance officials for the Chernobyl Power Plant, Liquidation Officials, doctors, physicists, and most of all, radiation physicists. Although Pripyat, a neighboring city to Chernobyl remains unmaintained, Chernobyl has been renovated and is now home to more than 2000 people, including visitors to the Zone of Alienation who stay at a local lodge in the Chernobyl suburbs.

## **Coal Mines Closed After Deadly Blast**

26 July 2001

**China, --** All small coal mines in Xuzhou of East China's Jiangsu Province will be closed in an effort to guard against accidents like Sunday's blast that trapped 105 miners underground.

A small coal mine in Jiawang District of Xuzhou was demolished and six others were shut down on Tuesday afternoon, beginning a thorough evaluation of small coal mines in the region, according to a local official.

All small coal mines in Xuzhou that do not meet safety standards will be closed, said Jiangsu Governor Ji Yunshi.

Ji urged strengthened inspections of factories to ensure safe production, and punishments for officials who approve illegal industrial operations and take bribes, Xinhua quoted him as commenting on the event.

A private small coal mine in Gangzi Village of Jiawang District exploded on Sunday morning.

Zhuang Jincai, the owner of the mine, has been arrested.

The mine was closed by the local administration on June 15 because it failed to meet safety standards. However, the mine opened again on July 15 without approval from the local government.

To date, 58 have been confirmed dead in the accident.

Thirteen victims are now in stable condition in local hospitals. Those still trapped in the mine have little hope of survival given the density of gas in the shafts.

At least four female miners were working underground when the accident occurred although the Law on the Safety of Mines bans women from working in the mine shafts.

Three of the female workers have been rescued.

Jiawang District and Tongshan County are major coal-producing areas in Xuzhou.

Nearly half the coal mines in Jiawang District were operating illegally at the time of the accident, according to a local official.

**UPDATED: Smithfield fire a "workplace accident"**

BY KATHERINE FENECH

22/08/2008 1:00:00 PM

Fire crews stayed on the scene of a Smithfield factory fire all night to ensure embers didn't re-ignite.

Metal Top Recyclers owner, who only gave his name as Abas, said the fire started at about 4.30pm on Thursday.

"It was a workplace accident, that's all I can say," he said.

"No one was injured."

NSW Fire Brigade operational media coordinator Superintendent Norman Buckley said 12 crews were at the Woodpark Road factory in nine minutes.

"The fires contained it to the rear of the building where it started," Superintendent Buckley said.

"There was a lot of severe fire damage to that area and a partial roof collapse."

He said "it will take a while" for fire investigators and police to establish the fire's cause.

"The fire was extinguished within two hours," he said.

"There were a couple of employees that were evacuated."

He said at least three crews stayed at the site until midnight.

"When we have big fires it doesn't take much for it to reignite once the air gets in and things start to move," he said.

The scrap metal recycling factory was closed on Friday but Abas said it would re-open on Saturday.

Investigations are continuing.

## **Pulp Fiction: Chemical Hazard Reduction At Pulp And Paper Mills**

Across the country, pulp and paper mills, petroleum refineries, chemical plants and other industrial facilities use and store large amounts of hazardous chemicals that could be released in the event of an accident or terrorist attack. Releases at these chemical facilities could endanger thousands or even millions of people working and living in nearby communities. According to the Environmental Protection Agency (EPA), more than 100 facilities each would endanger at least one million people in a worst-case chemical release. Another 3,000 facilities each would endanger at least 10,000 people or more.

Many of these chemical facilities can eliminate the health and safety risks they pose to local communities. Chemical facilities often have multiple options for their production processes, and some of these options are inherently safer than others. Facilities that reduce or eliminate the use of hazardous chemicals, or that make changes to storage pressure or other processes, can remove the potential of a hazardous chemical release, making the facilities inherently safer and less appealing targets for terrorists.

Pulp and paper mills stand as a salient example of chemical facilities that can implement readily available safer alternatives to eliminate or reduce unnecessary risks to workers and local communities in the event of an accidental or deliberate chemical release.

Chlorine and chlorine dioxide are used as bleaching agents in many pulp and paper-making processes. The dominant industry processes are the elemental chlorine (EC) process, which relies on chlorine gas, or the elemental chlorine-free (ECF) process, which uses chlorine dioxide, a gas with hazards similar to chlorine.

In the event of an accidental or deliberate release, chlorine and chlorine dioxide present serious hazards. Chlorine, used as a chemical weapon, is highly toxic and corrosive. It irritates the mucous membranes of the nose, throat, and lungs, and causes breathing difficulties, violent coughing, acute tracheobronchitis, and chemical pneumonia. Exposure to relatively low levels of chlorine can be fatal. Similarly, chlorine dioxide causes shortness of breath, bronchitis, and emphysema. Acute exposure can cause potentially fatal pulmonary edema.

To estimate the number of Americans at risk of injury or death in the event of a chlorine or chlorine dioxide release at a pulp and paper mill, we examined Risk Management Plans submitted to EPA by the owners or operators of each facility. These plans, legally required under the Clean Air Act, estimate the distance that an extremely hazardous chemical could travel off-site in the event of a release, and the number of people living in the affected area or “vulnerability zone.” This data analysis revealed that pulp and paper mills that continue to rely on chlorine or chlorine dioxide endanger millions of people.

## **Пожар на производстве гипсокартона в поселке Саперное**

По второму номеру сложности тушили сегодня производство гипсокартона в поселке Саперное.

Информация о пожаре на территории ОАО «Леспром» поступила в дежурную часть в 4.13. В 4.45 ему присвоили второй повышенный номер сложности.

По предварительным данным, очаг возгорания находился в цехе, арендуемом ОАО «Веско», в котором располагалось производство гипсокартона площадью 2,5 тысячи квадратных метров, площадь возгорания составила около 200 квадратных метров.

На месте работало 15 единиц техники. По имеющейся информации, у пожарных были проблемы с подвозом воды, однако прилегающее к месту пожара швейное производство со складом готовой продукции удалось отстоять.

В 5.12 была дана локализация повышенному номеру сложности. Сейчас на месте ведется проливка и разборка завалов. Устанавливаются причины возгорания.

**South Korean arson**

More than 100 people are now known to have died in flames and smoke after a man apparently set fire to flammable liquid inside a station in Daegu, South Korea.

Many of the victims were trapped in carriages unable to escape, while the thousands of rescuers who rushed to the city-centre station had to battle the heat and fumes.

The intensity of the fire - which began at the tail end of the morning rush hour on 18 February 2003 - left victims' bodies charred and entangled with each other, rescuers said.

**Austrian inferno**

Only 12 people survived a blaze inside a funicular train in the Austrian ski resort of Kaprun in November 2000.

A total of 155 people - most of them skiers - died when the fire started, possibly triggered by a faulty electric heater.

Victims were trapped inside the carriages of the train which was 600 metres into the 3.2-kilometre-long (two-mile-long) mountain tunnel when the fire started.

Prosecutors later blamed a "mosaic of mistakes" for the fire itself and the trouble encountered by people trying to escape and the rescuers who were trying to reach them.

"**Human factors**" is a term used mainly in the United States. Variants include "human factors engineering", an extension of an earlier phrase, "human engineering". In Europe and the rest of the world, the term "ergonomics" is more prevalent.

"Human factors" is an umbrella term for several areas of research that include human performance, technology, design, and human-computer interaction. It is a profession that focuses on how people interact with products, tools, procedures, and any processes likely to be encountered in the modern world.

Human factors practitioners can come from a variety of backgrounds; though predominantly they are Psychologists (Cognitive, Perceptual, and Experimental) and Engineers. Designers (Industrial, Interaction, and Graphic), Anthropologists, and Computer Scientists also contribute.

Whereas ergonomics tends to focus on the anthropometrics for optimal human-machine interaction, human factors is more focused on the cognitive and perceptual factors.

Areas of interest for human factors practitioners may include the following: workload, fatigue, situational awareness, usability, user interface, learnability, attention, vigilance, human performance, control and display design, stress, visualization of data, individual differences, aging, accessibility, shift work, work in extreme environments, and human error.

Simply put, human factors involves working to make the environment function in a way that seems natural to people. Although the terms "human factors" and "ergonomics" have only been widely known in recent times, the field's origin is in the design and use of aircraft during World War II to improve aviation safety.

## **Six trapped in Russian mine**

Six Russian miners are trapped underground after a cave-in at their pit in the Siberian region of Kemerovo.

When the incident occurred, 17 people were working underground in the Lenin mine, but 11 of them escaped to safety.

A rescue operation was underway. "It is very hard work indeed. Rescue workers can use only their hands, because machinery can provoke a new cave-in," she told Reuters by telephone from the regional capital of Kemerovo, also known as the centre of the giant Kuzbass coal basin.

"The mishap occurred at a depth of 400 metres. If need be, the rescue operation will continue through the night."

Accidents are not uncommon in Russian coal mines, many of them caused by outdated equipment or neglect of safety rules.

A methane gas explosion killed 110 miners at the Ulyanovskaya mine in March last year, becoming Russia's deadliest mine accident since the fall of the Soviet Union.

Two months later, a methane gas blast killed 38 people at a neighbouring mine, Yubileynaya, operated by the same company.

**Read the statements and say if they are true or false.**

- 1. Eleven miners were injured to death during the incident.**
- 2. The rescue team used machinery to help the miners.**
- 3. The tragedy happened at a depth less than 500 metres.**
- 4. Such accidents often occur because of outdated equipment.**
- 5. The cause of gas explosion at the Ulyanovskaya mine was chlorine.**

## **Computer Waste Impacts in Asia Alastair Iles**

Electronic wastes are a rapidly growing transnational problem. Electronic wastes result when consumer, business, and household devices, including computers, refrigerators, fax machines, cell phones, software, and home entertainment systems, become obsolete and are disposed of or sent for recycling. The billionth computer worldwide was sold at some point in early 2003, with tens of millions already in storage. Much of this waste is traded from industrial nations to developing countries. In 2002 alone, the US exported up to 10.2 million obsolete computers (or around 50-80% of all PCs sent for recycling in the US) to Asia, most of them to China. The problem is not just industrial countries exporting computers to developing countries. Within China alone, 5 million computers may already be obsolete because of the economy's rapid growth over the past decade. Electronic wastes contain up to 1000 toxic substances, ranging from lead, chromium, to plastic additives. Dumping or recycling can lead to these substances contaminating ecosystems and human bodies, and to adverse health outcomes. Electronic wastes exemplify the pattern of technology and materials flows in the contemporary...

Техника безопасности на строительной площадке обеспечивается благодаря целому ряду организационных и технических мероприятий, которые способствуют предотвращению травматизма и вредных воздействий на здоровье человека. Травматизм возникает из-за несоблюдения режима личной безопасности рабочими, нарушения технологии, установленной проектом. Рабочие не ознакомлены с правилами работы и техники безопасности, не обеспечены специальной одеждой, а также нет защитных ограждений около машин и механизмов. Если каменщик неправильно захватывает камень или кирпич и неправильно укладывает, то он обязательно ранит пальцы на руках. Отсутствие ограждений на лесах, подмостях, стремянках приводит к падению рабочих. Если подмости перегружены строительными материалами — это приводит к обрушению. К травматизму приводит отсутствие защитных козырьков, падение забытых на возводимой стене инструмента, кирпича, строительного мусора. Монтаж конструкций, выполненный неисправными приспособлениями, неправильной строповкой и др., приводит к несчастным случаям. Для того чтобы закрыть возможность для посещения стройки посторонними гражданами, площадку обязательно ограждают забором. Если забор находится вдоль улицы, то по всей его длине устраивают козырек. На строительной площадке обязательно устраиваются проезды, проходы как для рабочих, так и для транспортирования строительных материалов.

accident, n	авария, несчастный случай
affect, v	воздействовать, влиять
eliminate, v	устранять, ликвидировать
fine, n	штраф
hazard, n	опасность, риск
high absenteeism, n	намеренное игнорирование мероприятий
impact, n	воздействие, влияние
incapacitated, adj	нетрудоспособный
injury, n	повреждение
limb, n	конечность
low morale, n	неустойчивый моральный дух
prevent, v	предотвращать
reduce, v	сокращать, уменьшать
requirement, n	требование
risk assessment, n	оценка риска
sustainable, adj	долгосрочный, устойчивый
threaten, v	угрожать
undertake, v	предпринимать
welfare, n	благополучие
work environment, n	производственная среда

## UNIT II

carbon monoxide, n	угарный газ
damage, v	повреждать, разрушать
earplugs, n	беруши, ушные тампоны
excessive, adj	чрезмерный
explosive, adj	взрывоопасный
expose, v	подвергать
frayed, adj	потертый
fungi, n	гриб
improper, adj	неисправный
increase, v	возрастать
infectious, adj	заразный, инфекционный
install, v	устанавливать
lubrication, n	смазка
lung cancer, n	рак легких
maintenance, n	содержание и техническое обслуживание
solvent, n	растворитель
undergo, v	предпринимать
vapour, n	испарения
wiring, n	электропроводка

**UNIT III**

blindness, n	слепота
dreary environment, n	мрачная обстановка
energy consumption, n	энергопотребление
ensure the safety, v	обеспечить безопасность
eye strain, n	напряжение зрения
glare, n	блеск
general malaise, n	общее недомогание
illumination, n	яркость
lead to visual fatigue, v	привести к зрительному утомлению
light intensity, n	интенсивность освещения
light output, n	светоотдача
light source, n	источник света
overhead light, n	верхнее освещение
poor lighting, n	плохое освещение
proper lighting, n	надлежащее освещение
reflectance, n	отражательная способность
reflective surface, n	отражающая поверхность
stroboscopic illumination, n	прерывистое освещение
visual limitations, n	зрительные ограничения

**UNIT IV**

air velocity, n	скорость воздушного потока
contribute to skin rashes, v	вызвать кожную сыпь
clothing insulation, n	теплоизолирующее свойства одежды
electrostatic charge, n	электростатический заряд
evaporative cooling, n	испарительное охлаждение
have respiratory problems, v	иметь проблемы с дыханием
heat exhaustion, n	тепловое истощение
metabolic heat, n	тепло, выделяемое в результате обмена веществ
radiant temperature, n	температура излучения
reduce the hazard, n	уменьшить риск
sedentary activities, n	сидячая работа
thermal comfort, n	тепловой комфорт

account for, v	являться причиной
construction site, n	стройплощадка
disaster, n	бедствие, катастрофа
dump, v	сваливать
exposure, n	воздействие, подвергание
failure, n	авария, повреждение
fatality, n	несчастный случай со смертельным исходом
foreman, n	мастер, прораб
gas emission, n	выделение газа
hydrocarbon, n	углеводород
hydrogen cyanide, n	синильная(цианисто-водородная) кислота
hydrogen acid, n	соляная(хлористоводородная) кислота
immature, adj	незрелый
incompetence, n	некомпетентность
lack, n	недостаток, отсутствие
lead, v	приводить, выводить
mercury, n	ртуть
negligence, n	небрежность, халатность
poisonous, adj	вредный, ядовитый
refinery, n	нефтеперегонный завод
spill, v	разливать
suffer, v	страдать, понести убытки
supervised, adj	проконтролированный
supply, v	снабжать, обеспечивать

## UNIT VI

assembly points, n	сборные пункты
carbon monoxide, n	угарный газ
carbon dioxide, n	углекислый газ
combustion, n	возгорание, горение
extinguish, v	гасить, тушить
extinguisher, n	огнетушитель
fail, v	потерпеть неудачу
fire alarm, n	пожарная тревога
flammable, adj	огнеопасный, легковоспламеняющийся
foam, n	пена
fuel, n	топливо, горючее
heating appliances, n	нагревательные приборы
ignite, v	воспламенять, зажигать
liquid, n	жидкость
oxygen, n	кислород
rescue, v	спасать
self-adhesive, adj	самоклеющийся
smother, v	гасить, ликвидировать
solid, n	твердое вещество
sprinkler, n	разбрызгиватель
succeed, v	преуспеть, достичь цели
suitable, adj	подходящий, соответствующий

**UNIT VII**

approach, n	подход, метод
current, adj	текущий, данный
combine, v	объединять, сочетать
evaluate, v	оценивать
ignore, v	пренебрегать, игнорировать
implement, n	осуществлять
implication, n	вывод, результат
industrial hygiene, n	гигиена труда
involve, v	вовлекать
inquisitive, adj	любопытный, пытливый
persuade, v	убеждать
provide, v	обеспечивать
reconcile, v	согласовывать, приводить в соответствие

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