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ДЕЛОВОЙ ИНОСТРАННЫЙ ЯЗЫК

ТЕХНОСФЕРНАЯ БЕЗОПАСНОСТЬ

Методические указания к самостоятельной работе для студентов магистратуры направления 20.04.01

FOREIGN LANGUAGE

TECHNOGENIC SAFETY

САНКТ-ПЕТЕРБУРГ
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Предлагаемый материал направлен на совершенствование навыков профессионально-ориентированного чтения на английском языке. Данные методические указания включают тексты на языке оригинала, а также комплекс лексико-грамматических упражнений и заданий, способствующих развитию речевой, языковой, социокультурной и информационной компетенций студентов, необходимых для общения в сфере профессиональных интересов. Предназначены для самостоятельной работы по английскому языку со студентами магистратуры.

Предназначены для студентов магистратуры направления 20.04.01 «Техносферная безопасность» профиля «Управление безопасностью на предприятиях минерально-сырьевого комплекса» и согласованы с программой по иностранному языку для студентов неязыковых вузов.

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ПРЕДИСЛОВИЕ

Данные методические указания предназначены для учебно-методического сопровождения курса английского языка для студентов магистратуры неязыковых вузов, обучающихся по направлению 20.04.01 «Техносферная безопасность», направленность (профиль) программы «Управление безопасностью на предприятиях минерально-сырьевого комплекса».

Методические указания содержат учебные и аутентичные тексты на английском языке с разработанным комплексом упражнений. Изучение предложенного материала направлено на развитие умений просмотрового и изучающего чтения текстов по направлению подготовки, а также их перевода на русский язык с последующим использованием полученной информации для речевой практики; совершенствование навыков и умений всех видов чтения (изучающего, ознакомительного, поискового и просмотрового) и перевода специальной научно-технической литературы для извлечения информации, ознакомление с узкоспециализированной горной терминологией на английском языке.

Методические указания состоят из 5 разделов, включающих разное количество текстов по горной тематике, а также для работы предлагаются разнообразные виды упражнений. Предложенные материалы предназначены как для самостоятельной работы, так и для работы в аудитории.

UNIT I. WHAT IS YOUR FUTURE OCCUPATION?

1. Read and translate the following text.

What does a Mining Safety Engineer do?

A mining safety engineer investigates the safety of a work environment by inspecting sites or facilities to ensure specifications or standards are met. They may inspect equipment for safe, economical, and environmentally sound extraction and/or underground construction work. They may also create, coordinate, and implement mine safety courses.

They must have knowledge of engineering and technology, mathematics, design, and production and processing.

These engineers must also be skilled in complex problem solving, critical thinking, decision making, speaking clearly and effectively, and reading comprehension. They should also have the ability of deductive and inductive reasoning, oral comprehension, and information ordering. It would be vital for them to have excellent technology skills, such as a working knowledge of scientific software, map creation software, and project management software.

Job Description of a Mining Safety Engineer

A mining safety engineer must prepare technical reports for use by management personnel, mining, and engineering. They inspect job sites to determine if there are any unsafe working conditions, equipment, or structures. They also select safe locations for underground or surface mining that are environmentally safe and economical. Along with inspecting areas, they must also advise others on safety and health issues or concerns.

A mining and safety engineer interacts with computers (including hardware and software). They are also be expected to solve problems, make decisions, and need to gather information from relevant sources and process information.

Those in this career field must communicating with managers, peers, or subordinates through email, phone, in person, or in written form.

2. Match the words with their Russian equivalents.

1. equipment	a. программное обеспечение
2. hardware	b. связанный с
3. software	c. знания, опыт, навыки
4. facilities	d. производственные площадки
5. relevant	e. механическая часть компьютера
6. skills	f. оборудование

3. Read the descriptions of four occupations: ecologist, safety engineer, industrial hygienist, environmental engineer and say which corresponds to your future profession.

ECOLOGIST

Job description: An ecologist is a biologist who studies the relationship between organisms, and between organisms and their environment. Ecologists work for environmental consultants and organizations, and for government.

Typical tasks: The ecologist will collaborate with senior technical staff in the field and office, conduct natural resource surveys, support cost estimates, and communicate with the public, clients, subcontractors and various other parties.

Workplace: As an ecologist, you will spend a large amount of your time out in the field, conducting scientific investigations, classifying plants, animals and other organisms, and recording the data that you accumulate. You will spend your time in a laboratory or office analysing, evaluating and unravelling the data that you have collected.

SAFETY ENGINEER

Job description: Safety engineers are responsible for keeping people free from danger, risk, or injury in the workplace. They develop safety programs to minimize losses due to injuries and property damage. They try to eliminate unsafe practices and conditions in industrial plants, mines, and stores as well as on construction sites and throughout transportation systems.

Typical tasks: The safety engineer develops broad safety programs. They study the buildings, equipment, procedures, and records of accidents in their plant and point out safety hazards. They may suggest ways to fix

unsafe structures or recommend changes in the layout of the plant. Sometimes they draw up plans for the regular maintenance of machinery or teach safe work habits to managers and workers.

Workplace: Safety engineers work for a wide variety of industrial and commercial companies. Many work for insurance companies. Others are employed by government agencies or safety organizations. Still others teach in colleges and universities or work as independent consultants.

INDUSTRIAL HYGIENIST

Job description: An industrial hygienist protects employees' health in the workplace by creating and implementing programs, policies and procedures to measure and reduce employees' exposure to physical, chemical, biological and ergonomic stress factors.

Typical tasks: The industrial hygienist examines the workplace for environmental or physical factors that could affect employee health, safety, and output. You might take into account factors such as lighting, equipment, materials and ventilation to anticipate possible hazards that may arise. You will also have the opportunity to develop and conduct employee safety and training programs. Such programs can cover a wide range of topics, such as how to use safety equipment effectively and how to respond in an emergency setting.

Workplace: As an industrial hygiene professional, one might have to travel frequently to sites and work in a wide range of environments, both indoors and out. As such, you are expected to work on the road, in the field, and in the office. This job carries some risks, so hygienists are required to use protective clothing, gear, and equipment to keep themselves safe.

ENVIRONMENT ENGINEER

Job description: An environment engineer focuses on protecting the environment by reducing waste and pollution. They protect the air, water, land for human usage and other kinds of living organisms and they reduce polluted sites.

Typical tasks: Their primary duties include collecting and analyzing environmental data, studying human influences on the environment and improving environmental conservation management.

Workplace: They may work on waste treatment, wastewater treatment, site remediation, or pollution control technology. They also work in of-

fices with complete facilities that will actually help them in their research, paper works, and etc.

4. Read the following text and say which of the tasks listed are included in your professional scope.

What Mining and Geological Engineers, Including Mining Safety Engineers Do

- Select locations and plan underground or surface mining operations, specifying processes, labor usage, and equipment that will result in safe, economical, and environmentally sound extraction of minerals and ores.
- Design, implement, and monitor the development of mines, facilities, systems, or equipment.
- Inspect mining areas for unsafe structures, equipment, and working conditions.
- Examine maps, deposits, drilling locations, or mines to determine the location, size, accessibility, contents, value, and potential profitability of mineral, oil, and gas deposits.
- Select or develop mineral location, extraction, and production methods, based on factors such as safety, cost, and deposit characteristics.
- Prepare technical reports for use by mining, engineering, and management personnel.
- Monitor mine production rates to assess operational effectiveness.
- Prepare schedules, reports, and estimates of the costs involved in developing and operating mines.
- Lay out, direct, and supervise mine construction operations, such as the construction of shafts and tunnels.
- Devise solutions to problems of land reclamation and water and air pollution, such as methods of storing excavated soil and returning exhausted mine sites to natural states.

- Evaluate data to develop new mining products, equipment, or processes.
- Design, develop, and implement computer applications for use in mining operations such as mine design, modeling, or mapping or for monitoring mine conditions.
- Supervise, train, and evaluate technicians, technologists, survey personnel, engineers, scientists or other mine personnel.
- Select or devise materials-handling methods and equipment to transport ore, waste materials, and mineral products efficiently and economically.
- Implement and coordinate mine safety programs, including the design and maintenance of protective and rescue equipment and safety devices.
- Test air to detect toxic gases and recommend measures to remove them, such as installation of ventilation shafts.
- Design mining and mineral treatment equipment and machinery in collaboration with other engineering specialists.
- Conduct or direct mining experiments to test or prove research findings.

5. Answer the questions.

1. What is the full name of your department?
2. Why did you choose this speciality?
3. What subject are taught at your faculty?
4. What are the specialized subjects?
5. What are the specialized subjects aimed at?
6. What do safety engineers do and where do they work?
7. What does engineering mean to you?
8. What are the demands for specialists in safety?
9. What fundamental knowledge do safety engineers need to have?
10. Where can a safety engineer work?

6. Prepare a short presentation about your future profession (10 - 15 sentences).

Useful phrases

As far as I know… To my knowledge… If you ask me… I think… In my opinion… I'd like to tell you…

UNIT II. WORK, ENVIRONMENT AND HEALTH

1. Read the text below and decide which word from the box best fits each space.

Rates, injuries , metals , safety, microorganisms

Occupational and environmental health

Occupational and environmental health is the multidisciplinary approach to the recognition, diagnosis, treatment, and prevention of illnesses, injuries, and other adverse health conditions resulting from hazardous environmental exposures in the workplace, the home, and the community. It is a component of medical care and of public health — what we, as a society, do collectively to ensure that the conditions in which people live and work are healthy.

Environmental health focuses not only on hazardous substances emanating from industrial facilities but also on such fundamental issues as sanitation, safety of food and water, and control of pests.

The highest fatal occupational injury 1) _____ are in mining, construction, and agriculture.

Many hazardous exposures occur in both workplaces and the general environment, such as the following:

• Contamination of the ambient air and water near a chemical factory, where its workers are also exposed to hazardous substances

• Application by agricultural workers of pesticides that may contaminate surface and ground water

• Inadvertent transport of lead, asbestos, and other hazardous substances home on workers' clothes, shoes, skin, and hair

• Exposure of workers and community residents to hazardous wastes from an industrial facility

Occupational and environmental 2) _____ and health hazards can be classified in many ways, including the following:

1. Safety hazards, which result in 3) _____ through the uncontrolled transfer of energy to vulnerable recipients from sources such as electrical, thermal, kinetic, chemical, or radiation energy. Examples include unsafe playground equipment, loaded firearms in the home, motorvehicle or bicycle crashes, unprotected electrical sources, work at heights without fall protection, work near unguarded moving machinery, and work in unshored trenches.

2. Health hazards, which result in environmental or occupational illnesses, including the following:

a. Chemical hazards, including heavy 4) _____, such as lead and mercury; pesticides; organic solvents, such as benzene and trichloroethylene; and many other chemicals. There are approximately 80,000 chemicals in commercial use, 15,000 of which are frequently produced or used. Approximately 1,000 new chemicals are added to commercial use annually.

b. Physical hazards, such as excessive noise, vibration, extremes of temperature and pressure, and ionizing and nonionizing radiation.

c. Biomechanical hazards, such as heavy lifting, repetitive or awkward or forceful movements that result in musculoskeletal disorders, like carpal tunnel syndrome and low back pain.

d. Biologic hazards, such as human immunodeficiency virus (HIV), hepatitis B and hepatitis C viruses, the tubercle bacillus, and many other bacteria, viruses, and other 5) _____ that may be transmitted through air, water, food, or direct contact.

e. Psychosocial hazards, such as workplaces where there is high stress due to excessive demands on, and low control by, workers; stress and hostility resulting from urban congestion, such as “road rage”; and unemployment — a major stressor.

2. Answer the following questions.

1. What is the difference between occupational and environmental health?
2. Where are the highest occupational injury rates?

3. Can you give examples of safety hazards?
4. What health hazards do you know?

3. Match the words (1-10) with their definitions (a-j). Translate the words using a dictionary, then choose any three and make up your own sentences.

1. hazard	a. the action or state of making or being made impure by polluting or poisoning
2. noise	b. a hazard or risk
3. illness	c. exposed to the possibility of being attacked or harmed, either physically or emotionally
4. contamination	d. a disease or period of sickness affecting the body or mind
5. wastes	e. not protected or kept safe from harm or injury
6. pesticides	f. a place, amenity, or piece of equipment provided for a particular purpose
7. solvent	g. substances used for destroying insects or other organisms harmful to cultivated plants or to animals.
8. unprotected	h. a sound, especially one that is loud or unpleasant or that causes disturbance
9. vulnerable	i. the liquid in which a solute is dissolved to form a solution.
10. facilities	j. unwanted or unusable material, substances, or by-products.

4. Mark the following statements as True or False.

1. Environmental health focuses only on hazardous substances from industrial plants.
2. Examples of safety hazards include bicycle crashes, unprotected electrical sources, work at heights without fall protection etc.

3. Chemical hazards can be caused by heavy metals, organic solvents, and many other chemicals.
4. Biologic hazards may be transmitted through air, water, food, or direct contact.
5. Unemployment is a major stressor.

5. Read and translate the following text.

Health Problems from Mining

Mining causes serious accidents such as fires, explosions, or collapsed mine tunnels that affect miners and people living in communities near mines. Even in places where mining happened long ago, people can still be exposed to health threats from mining waste and chemicals that remain in the soil and water. Mining damages health in many ways:

• **Dust, chemical spills, harmful fumes, heavy metals and radiation** can poison workers and cause life-long health problems as well as allergic reactions and other immediate problems.

• **Heavy lifting** and working with the body in awkward positions can lead to injuries to the arms, legs, and back.

• **Use of jackhammers or other vibrating machinery** can cause damage to nerves and blood circulation, and lead to loss of feeling, very dangerous infections such as gangrene, and even death.

• **Loud, constant noise** from machines can cause hearing problems, including deafness.

• **Long hours working** underground with little light can harm vision.

• **Working in very hot conditions** without drinking enough water can cause heat stress. Signs of heat stress include: dizziness, weakness, rapid heartbeat, extreme thirst, and fainting.

• **Hiring and labor practices** of mining companies create divisions among families, neighbors, and communities. These disagreements can lead to tears in the social fabric, an increase in personal stress, and mental health problems throughout the community.

• **Water pollution and overuse of water** resources leads to many health problems.

• **Land and soil are destroyed,** leading to food scarcity and hunger.

• **Air pollution** from power plants and smelting factories built near mines causes serious illness.

6. Answer the following questions.

1. What accidents can mining cause?
2. What are the negative effects of mining?
3. How does mining affect human health?
4. What are the environmental impacts of mining?

7. Complete the sentences.

1. Mining causes serious accidents such as …
2. Dust, harmful fumes, heavy metals and radiation …
3. Long hours working underground …
4. Working in very hot conditions …
5. Air pollution …

8. Translate the words in bold and try to explain them in English. Give their synonyms.

9. Read and translate the text. Five sentences have been removed from the text. Choose from sentences, (A-E), the one that best fits each gap (1-5) to complete the text.

A. The entire mining site was later restored between 1994 and1995.
B. cannot be replaced after the process has ended.
C. The loss of normal pH of water can have disastrous effects on life sustained by such water.
D. Mining leads to a massive habitat loss for a diversity of flora and fauna ranging from soil microorganisms to large mammals.
E. Diseases of the respiratory system and allergies can be triggered by the inhalation of such airborne particles.

Environmental Impacts of Mining

Mining activities can harm the environment in several ways. These are as follows:

Air Pollution

Air quality is adversely affected by mining operations. Unrefined materials are released when mineral deposits are exposed on the surface

through mining. Wind erosion and nearby vehicular traffic cause such materials to become airborne. Lead, arsenic, cadmium, and other toxic elements are often present in such particles. These pollutants can damage the health of people living near the mining site. 1) _____

Water Pollution

Mining also causes water pollution which includes metal contamination, increased sediment levels in streams, and acid mine drainage. Pollutants released from processing plants, tailing ponds, underground mines, waste-disposal areas, active or abandoned surface or haulage roads, etc., act as the top sources of water pollution. Sediments released through soil erosion cause siltation or the smothering of stream beds. It adversely impacts irrigation, swimming, fishing, domestic water supply, and other activities dependent on such water bodies. High concentrations of toxic chemicals in water bodies pose a survival threat to aquatic flora and fauna and terrestrial species dependent on them for food. The acidic water released from metal mines or coal mines also drains into surface water or seeps below ground to acidify groundwater. 2) _____

Damage to Land

The creation of landscape blots like open pits and piles of waste rocks due to mining operations can lead to the physical destruction of the land at the mining site. Such disruptions can contribute to the deterioration of the area's flora and fauna. There is also a huge possibility that many of the surface features that were present before mining activities 3) _____. The removal of soil layers and deep underground digging can destabilize the ground which threatens the future of roads and buildings in the area. For example, lead ore mining in Galena, Kansas between 1980 and 1985 triggered about 500 subsidence collapse features that led to the abandonment of the mines in the area. 4) _____

Loss of Biodiversity

Often, the worst effects of mining activities are observed after the mining process has ceased. The destruction or drastic modification of the pre-mined landscape can have a catastrophic impact on the biodiversity of that area. 5) _____ Endemic species are most severely affected since even the slightest disruptions in their habitat can result in extinction or put them at high risk of being wiped out. Toxins released through mining can wipe out entire populations of sensitive species.

10. Match the words (1-10) with their definitions (a-j). Translate the words using a dictionary, then choose any three and make up your own sentences.

1. extinction	a. a group of living organisms consisting of similar individuals capable of exchanging genes or interbreeding
2. impact	b. suddenly fall down or give way
3. pollutant	c. disturbance or problems which interrupt an event, activity, or process
4. disruption	d. having been deserted or left
5. species	e. not processed to remove impurities or unwanted elements
6. collapse, v.	f. the state or process of being or becoming extinct
7. irrigation	g. a marked effect or influence
8. abandoned	h. transported by air
9. unrefined	i. the supply of water to land or crops to help growth, typically by means of channels
10. airborne	j. a substance that pollutes something, especially water or the atmosphere

11. Answer the following questions.

1. What are the environmental impacts of lead, arsenic and cadmium?
2. What does water pollution include?
3. How is land damaged at the mining site?
4. How does mining affect biodiversity?
5. How can we reduce the environmental impact of mining?
6. What type of mining is the most harmful to the environment?

12. Mark the following statements as True or False.

1. Air quality is not affected by mining operations.

2. Wind erosion and nearby vehicular traffic cause unrefined materials to become airborne.
3. Water pollution includes metal contamination, increased sediment levels in streams, and acid mine drainage
4. Piles of waste rocks can lead to the physical destruction of the land at the mining site.
5. Mining toxins can wipe out some sensitive species.

UNIT III. IMPACTS OF MINING

1. Read and translate the following text.

Surface mining

Surface mining (also known as open cast, mountaintop or strip mining) involves scraping away earth and rocks to get to coal buried near the surface. In many cases, mountains are literally blasted apart to reach thin coal seams within, leaving permanent scars on the landscape as a result.

Surface mining accounts for about 40 percent of the world's coal mines but, in some countries, such as Australia, open cast mines make up 80 percent of mines. Even though it's highly destructive, industry often prefers strip mining as it requires less labour and yields more coal than underground mining.

Impacts of surface mining

- Surface mining destroys landscapes, forests and wildlife habitats at the site of the mine when trees, plants, and topsoil are cleared from the mining area. This in turn leads to soil erosion and destruction of agricultural land.
- When rain washes the loosened top soil into streams, sediments pollute waterways. This can hurt fish and smother plant life downstream, and cause disfiguration of river channels and streams, which leads to flooding.
- There is an increased risk of chemical contamination of ground water when minerals in upturned earth seep into the water table, and watersheds are destroyed when disfigured land loses the water it once held.
- Surface mining causes dust and noise pollution when top soil is disrupted with heavy machinery and coal dust is created in mines.

The result of all this is barren land that stays contaminated long after a coal mine shuts down.

Although many countries require reclamation plans for coal mining sites, undoing all the environmental damages to water supplies, destroyed habitats, and poor air quality is a long and problematic task. This land disturbance is on a vast scale. In the US, between 1930 and 2000, coal mining altered about 2.4 million hectares of natural landscape, most of it originally forest. Attempts to re-seed land destroyed by coal mining is difficult because the mining process has so thoroughly damaged the soil. For example, in Montana, replanting projects had a success rate of only 20-30 percent, while in some places in Colorado only 10 percent of oak aspen seedlings that were planted survived.

In China, coal mining has degraded the quality of land of an estimated 3.2 million hectares, according to a 2004 estimate. The overall restoration rate (the ratio of reclaimed land area to the total degraded land area) of mine wasteland was only about 10–12 percent.

2. Mark the following statements as True or False:

1. Surface mining accounts for about 20 percent of the world's coal mines.
2. Ground water can be chemically contaminated.
3. Surface mining destroys landscapes, forests and wildlife habitats at the site of the mine.

4. Barren land stays contaminated long after a coal mine shuts down.
5. Attempts to re-seed destroyed land in the USA were successful.

3. Answer the following questions.

1. What is surface mining?
2. Why is surface mining is more common?
3. What impacts can surface mining cause?
4. Why the risk of chemical contamination is high?
5. What is the difference between surface and subsurface mining?

4. Read and translate the following text. Fill in the table.

Underground mining

The majority of the world's coal is obtained through underground mines. While underground mining, which allows coal companies to extract deeper deposits of coal, is viewed as less destructive than strip mining, the effects of mining widespread damage to the environment. In room-and-pillar mines, columns of coal are left to support the ground above during the initial mining process, then they are often taken out and the mine is left to collapse, which is known as subsidence. In longwall mines, mechanical shearers strip the coal from the mines. Support structures that enable the shearers' access to the mine are eventually removed, and the mine collapses. It is these effects of mining that nobody sees but are the most troubling of all.

Figure 1-2. Coal miners face many occupational health and safety risks, including injuries and exposure to hazardous dusts, gases, and other substances. (A) Coal miner tests the roof support bolts in a mine. (B) Coal miner is exposed to ergonomic hazards from working in narrow mine passages.

Impacts of underground mining

- Underground mining causes huge amounts of waste earth and rock to be brought to the surface – waste that often becomes toxic when it comes into contact with air and water.
- It causes subsidence as mines collapse and the land above it starts to sink. This causes serious damage to buildings.
- It lowers the water table, changing the flow of groundwater and streams. In Germany for example, over 500 million cubic metres of water are pumped out of the ground every year. Only a small percentage of this is used by industry or local towns – the rest is wasted. What's worse is that removing so much water creates a kind of funnel that drains water from an area much larger than the immediate coal-mining environment.
- Coal mining produces also greenhouse gas emissions.

Impacts of surface mining	*Impacts of underground mining*

5. Match the left and the right.

In longwall mines …	… and rock to be brought to the surface.
Underground mining lowers the water table …	… is obtained through underground mines.
Underground mining allows coal	… mechanical shearers strip the

companies to …	coal from the mines.
Coal mining produces …	… and change the flow of ground-water and streams.
Subsurface mining …	… extract deeper deposits of coal.
Underground mining causes huge amounts of waste earth …	… greenhouse gas emissions.
The majority of the world's coal …	… causes subsidence.

6. Match the word combinations with their meanings.

1. room-and-pillar mines	a. оседание породы
2. longwall mining	b. очистной комбайн
3. subsidence	c. камерно-столбовая разработка угля
4. shearer	d. вскрышные горные работы
5. strip mining	e. разработка длинными очистными забоями
6. collapse	f. опорные конструкции
7. deposit of coal	g. обвал, обрушение
8. waste rock	h. крепление кровли
9. support structures	i. пустая порода
10. roof support	j. месторождение угля

7. Open the brackets and transform the sentences into Passive voice.

1. The majority of the world's coal (obtain) through underground mines.
2. Underground mining (view) as less destructive than surface mining.
3. In room-and-pillar mines, columns of coal (leave) to support the ground above.
4. That process (know) as subsidence.
5. Support structures (remove) and the mine collapses.
6. In Germany over 500 million cubic metres of water (pump) out of the ground every year.
7. Only a small percentage of this water (use) by industry or local towns.

UNIT IV. SAFETY AT MINES

1. Read and translate the following text.

Mining companies are responsible for making mines operate safely. Governments, miners, and their unions are responsible for making sure the companies do that. Unfortunately, many governments do not enforce health, safety, and environmental regulations.

Workers and communities need the right to protect themselves from harm, information, and equipment and training to reduce exposure to harmful materials. Miners and communities often form safety committees to make sure conditions are as safe as possible. Safety committees can also prepare for emergencies with plans to transport hurt workers and evacuate anyone in danger.

Mine operators should provide protective equipment for all workers and maintain it in good condition. Mine operators should also make sure every mine operation has first aid supplies, and that all workers have access to them. Most importantly, all workers should be trained about mining dangers, such as chemicals, using explosives, and landslides.

To make sure mining does as little harm as possible to the environment, communities and their allies should monitor water and air near mine sites for signs of pollution. People who may be exposed to toxic chemicals, excessive dust, or other dangers should be tested by health workers on an ongoing basis, and be given treatment at the first signs of health problems.

2. Match the left and the right.

to reduce	materials
toxic	exposure
harmful	chemicals
good	supplies
aid	pollution
signs of	condition
excessive	problems
health	dust

3. Read and translate the text.

Mine safety is a broad term referring to the practice of controlling and managing a wide range of hazards associated with the life cycle of mining-related activities. Mine safety practice involves the implementation of **recognized hazard controls** and/or **reduction of risks** associated with mining activities to legally, socially and morally acceptable levels.

Mining ventilation is a significant **safety concern** for many miners. Poor ventilation inside sub-surface mines causes exposure to harmful gases, heat, and dust, which can **cause illness**, injury, and death. The concentration of methane and other airborne contaminants underground can generally be controlled by **dilution** (ventilation), **capture** before entering the host air stream (methane drainage), or isolation (seals and stoppings).

Gases in mines can poison the workers or displace the oxygen in the mine, causing asphyxiation. For this reason, the U.S. Mine Safety and Health Administration requires that groups of miners in the United States carry **gas detection equipment** that can detect common gases, such as CO, O_2, H_2S, CH_4, as well as calculate % Lower Explosive Limit.

Ignited methane gas is a common source of explosions in coal mines, which in turn can initiate more **extensive** coal dust explosions. For this reason, rock dusts such as limestone dust are spread throughout coal mines to **diminish** the chances of coal dust explosions as well as to limit the extent of potential explosions, in a process known as rock dusting. Coal dust explosions can also begin independently of methane gas explosions. **Frictional heat** and **sparks** generated by mining equipment can ignite both methane gas and coal dust. For this reason, water is often used to cool rock-cutting sites.

4. Translate the words in bold using a dictionary and try to explain them in English. Give their synonyms and make sentences with them.

UNIT V. PERSONAL PROTECTIVE EQUIPMENT

1. Read and translate the text.

Personal protective equipment (PPE), also known as personal protection wear, is any type of clothing or equipment worn by a person to protect them from some specific hazard. Typically this is protection from any physical, radiological, electrical, chemical, biological, mechanical, or other threat in the workplace.

Types of Personal Protective Equipment

Workplaces are responsible for providing their employees with the proper types of personal protective equipment based on the specific hazards that exist in the facility. There are many types of PPE available to keep people safe. The following are some categories of personal protective equipment and the options within them.

Breathing Protection | Respirators

Respirators are a type of personal protective equipment designed specifically to protect the **lungs** of the people wearing them. They can help filter out dust, **debris**, chemicals, and many other potential dangers. There are many types of respirators used for PPE, including:

- ***Basic Facemask*** - A facemask can minimize the risk of **exposure** to simple biological contaminants, dust, debris, and other harmful **impurities** in the air. In a **pinch**, even a simple handkerchief could serve as a facemask (though not recommended for regular use).
- ***Filtered Respirator*** - If there are known impurities that can cause serious damage or illness, having a filter on the respirator is important. There are many types of filtered respirators available depending on how many impurities need to be removed.
- ***Self-Contained Breathing Apparatus*** - In situations where the air is extremely toxic, a self-contained breathing apparatus allows the employee to bring a supply of fresh air with them. This is also used when there is no oxygen to breath, such as under water.

Many chemicals and other materials can cause serious injuries or illnesses when they come in contact with the skin. When working with these hazards, having proper personal protective equipment is extremely important.

- ***Protective Clothing*** - The most common type of skin protection equipment is general protective clothing. Something as simple as a **lab coat** helps reduce the risk of getting splashed with potentially hazardous **solutions**. While it isn't a high level of protection, it is sufficient for many situations.
- ***Plastic Gloves*** - Plastic (or latex) gloves are among the most common types of skin protection equipment. They can keep a wide range of hazards away, including biological and chemical solutions.
- ***Cut-Resistant Gloves*** - Employees who work with sharp objects should wear cut-resistant gloves. These gloves are made of special materials that prevent blades from slicing through them.
- ***Heat-Resistant Clothing*** - When working with fire or other high temperature hazards, employees should wear heat-resistant clothing. This could be **heat-resistant** gloves or it could be an entire suit, depending on the situation.
- ***Electricity-Resistant Clothing*** - When working with or around high voltage areas, having PPE that can reduce the risk of electrical shock is essential. This could be rubber boots, gloves, or an entire body suit.
- ***Face Shields*** - Face shields reduce the risk of having something splash up into the face, causing damage. Whether working with hot items, corrosive materials, or biological

materials, face shields can protect one of the most **vulnerable** parts of the body.

- ***Hard Hats*** - Hard hats are a great way to keep someone's head safe when working in an area where something could fall on it.

2. Translate the words in bold using a dictionary and try to explain them in English. Give their synonyms and make sentences with them.

3. Read and translate the following text.

Eye Protection

Protecting the eyes is extremely important because even a minor accident can cause long-term eye damage or even blindness. Here are several of the most common types of eye protection equipment:

- **Goggles** - Simple safety goggles provide a strong layer of protection to the eyes. This is good for preventing objects from flying into the eyes such as sawdust, stones, and shards of glass.
- **Welding Masks** - While welding masks sometimes cover the entire face, their main function is to protect the eyes from the extremely bright light of a torch. These masks are darkened significantly to prevent the light from reaching and damaging the eyes.
- **Sunglasses** - This is a simple type of PPE that most people never give a second thought. If you're regularly working in the sun or around bright lights, wearing sunglasses can help prevent many eye conditions down the road.

Hearing Protection

Protecting the hearing of employees is very important, but can be difficult. Many people don't notice when they are working around the constant noise of a factory or other workplace. While it

may not be something people realize is happening, this can cause significant damage to the hearing over time. Wearing personal protective equipment for the ears is critical.

- **Ear Plugs** - Ear plugs are easy to use and provide a fair amount of protection by preventing loud noises from entering the ear at all.
- **Ear Muffs** - Ear muffs go over the entire ear, and when worn properly, can provide a significant amount of noise reduction.
- **Electronic Ear Muffs** - These advanced hearing protection devices work like ear muffs to stop the noise from coming in, but also have an electronic microphone that picks up voices and other noises and then plays them into the ear so people can still hear. The sounds are played at a low level so they do not cause damage.

There are different types of personal protective equipment for just about every situation. Figuring out what type is needed in a facility is a matter of evaluating the risks and determining what PPE can offer the needed protection.

4. Match the words (1-10) with their definitions (a-j). Translate the words using a dictionary, and then make up your own sentences using them.

1. goggles	a. broken pieces of something
2. sawdust	b. a liquid into which a solid has been mixed and has dissolved
3. voltage	c. a device worn over the mouth and nose to prevent harmful substances from being breathed in
4. debris	d. something that is dangerous and likely to cause damage
5. shards of glass	e. poisonous
6. solution	f. the fact of experiencing something or being affected by it be-

	cause of being in a particular situation or place
7. respirator	g. special glasses that fit close to your face to protect your eyes
8. hazard	h. very small pieces of wood and powder that are produced when you cut wood with a saw
9. toxic	i. pieces of broken glass, cup, container, or similar object
10. exposure	j. the force of an electric current, measured in volts

5. Find 10 words connected with protective equipment hidden in the grid.

e	q	u	i	p	m	e	n	t	g
b	c	a	o	a	u	o	o	a	l
o	d	a	m	a	g	e	i	l	o
o	g	o	g	g	l	e	s	k	v
t	i	n	j	u	r	y	e	u	e
s	u	n	g	l	a	s	s	e	s
q	h	a	z	a	r	d	i	e	r
w	b	f	a	c	e	m	a	s	k
x	i	l	l	n	e	s	s	r	t

6. Match the left and the right.

1. welding mask	a. беруши
2. ear plugs	b. маска для защиты лица сварщика
3. ear muffs	c. значительный ущерб
4. noise reduction	d. защитная маска
5. significant damage	e. противошумные наушники
6. face shields	f. термостойкая одежда

7. heat-resistant clothing	g. поглощение/уменьшение шума
8. self-contained breathing apparatus	h. защитная каска
9. harmful impurities	i. вредные примеси
10. hard hats	j. противогаз с запасом кислорода

SUPPLEMENTARY READING

Coal mine methane

Coal mine methane, less prevalent in the atmosphere than CO2, but 20 times as powerful as a greenhouse gas, forms during the geological formation of coal, and is released during the coal mining process. Most coal mine methane come from underground mines. While this methane is often captured and used as town fuel, industrial fuel, chemical feedstock and vehicle fuel, it's very rare that it all gets used.[vii] Methane is also used in power generation projects. However, despite big investment in research, only about 50 such projects exist worldwide.

In China, which mines more than 95 percent of its coal underground, about 300 of the state-owned mines are classified as methane-outburst prone. The effects of mining coal in China have become increasingly clear in modern times.

Worldwide emissions are expected to increase by 20 percent in the next 12 years.

Acid mine drainage

Acid mine drainage is created when water mixes with coal and other rocks unearthed during mining, taking on toxic levels of minerals and heavy metals. This toxic water leaks out of abandoned mines to contaminate groundwater, streams, soil, plants, animals and humans. As a result an orange colour can blanket the river, estuary or sea bed killing plants and making surface water unusable as drinking water. Acid Mine Drainage is one of the biggest effects of mining being felt around the world, especially in South Africa where the problem has been ignored for over 100 years. A well known organisation in South Africa, the Federa-

tion for a Sustainable Environment, spearheaded by Ms Mariette Liefferink has been fighting the issue of the effects of mining and Acid Mine Drainage with government and mining companies for 2 decades.

Sources of acid mine drainage can remain active for decades or centuries after a mine closes.

Coal fires

Coal fires – burning or smouldering coal seams, coal storage piles or coal waste piles – are a significant environmental problem in many countries, including China, Russia, the US, Indonesia, Australia and South Africa. Underground coal fires can burn for centuries, filling the atmosphere with smoke laden with carbon-monoxide (CO), carbon-dioxide (CO2), methane (CH4), sulphur dioxide (SO2), nitrous oxides (NOx) and other greenhouse or toxic gases – as well as fly ash from vents and fissures.

Other effects of coal fires include rising surface temperatures and contamination of groundwater, soil and air.

Although coal fires can be caused by thunderstorm lightning, and forest or peat fires, they are often caused by mining accidents and improper mining techniques. In Indonesia, the same fires that are used to clear large tracts of rainforest have ignited over 300 coal fires since the 1980s.

China has the world's most coal fires, while India accounts for the world's greatest concentration. In China, between 15 and 20 million tons of coal burn uncontrollably each year, accounting for between 0.1 percent and 1 percent of the world's human-induced CO2 emissions, (Although coal fires are significant, emissions from power plants are far higher.)

Blasting

Blasting is when a rock mass is broken down into manageable size by means of explosives. The mining cycle of all surface mines incorporates blasting as its core activity. When done correctly and according to laid down procedures blasting does not cause any harm. The major problem is not following the laid procedures of the mine for safe blasting techniques. Unsafe blast practices are one of the major role players in injuries and fatalities to employees. Improper use of explosives also contributes to unsafe blasting practices which will lead to crippling injuries

and fatalities. Surface mines use the most amounts of explosives as compared to underground mines hence it is of utmost importance that only competent personnel use and handle these explosives. Before blasting can commence the responsible miner/blaster will examine and ensure that the area for blasting is safe. He/she will ensure that no overloading of explosives has been done and that all the holes are charged and connected to the firing line. This he does as part of ensuring that the blast can be as safe as possible and that the correct blast design is followed or adhered to. Hazards associated with blasting include among others; flyrock, misfires, premature blast and lack of security at a blast area.

Flyrock

Flyrock can be defined as the rock that during blasting is projected outsidethe boundaries of a blast area/ blast site. The speed at which the rock move is so high that it can cause property damage and fatal if it comes across a person. It is, therefore, paramount that this hazard be controlled and at all times be eliminated. To eliminate this, one needs to know what causes flyrock. According to a report by Centers for diseases control and prevention, fly rock is caused by:

- Substandard blast design,
- Insufficient stemming,
- Substandard blasthole layout,
- Insufficient burden,
- Overloading of blastholes
- Geology and rock conditions

Flyrock injuries account for more percentages with the highest being 68.20%. This is a clear indication that a lot still needs to be done in order to combat this hazard that is claiming people's lives and causing serious injuries.

Controlling flyrock is important in order to keep a good safety record for the mine. Mine management in collaboration with the rock engineering department must ensure that a proper blast design pattern is designed and approved by the mining engineer and chief rock engineer. This blast pattern must be designed in such a way that all factors such as burden, spacing, stemming, blasthole layout, and charge diameter are considered before approval of the blast design. The type of explosives to be used must be selected with careful consideration as the energy released

by explosives can influence whether there will be flyrock during the blast or not. The most approved explosives used by both surface mines and underground mine is ANFO explosives because of their advantages over the other explosives. Priming of explosives should not be taken for granted also because based on a research conducted by the Bureau of mines it was found that toe priming reduces flyrock as compared to collar priming. One other thing that must be given attention before drilling commences is ensuring that face (blast site) preparation is done correctly according to mine procedures. It is vital that the face is inspected to check any geological discontinuities as they may cause flyrock.

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CONTENTS

What is your future occupation?..... 4
Work, environment and health……... 9
Impacts of mining …….. 16
Safety at mines…… 21
Personal protective equipment…… 23
Supplementary reading……... 28
Библиографический список……. 31

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