CAREER PATHS

NATURAL RESOURCES II

Mining

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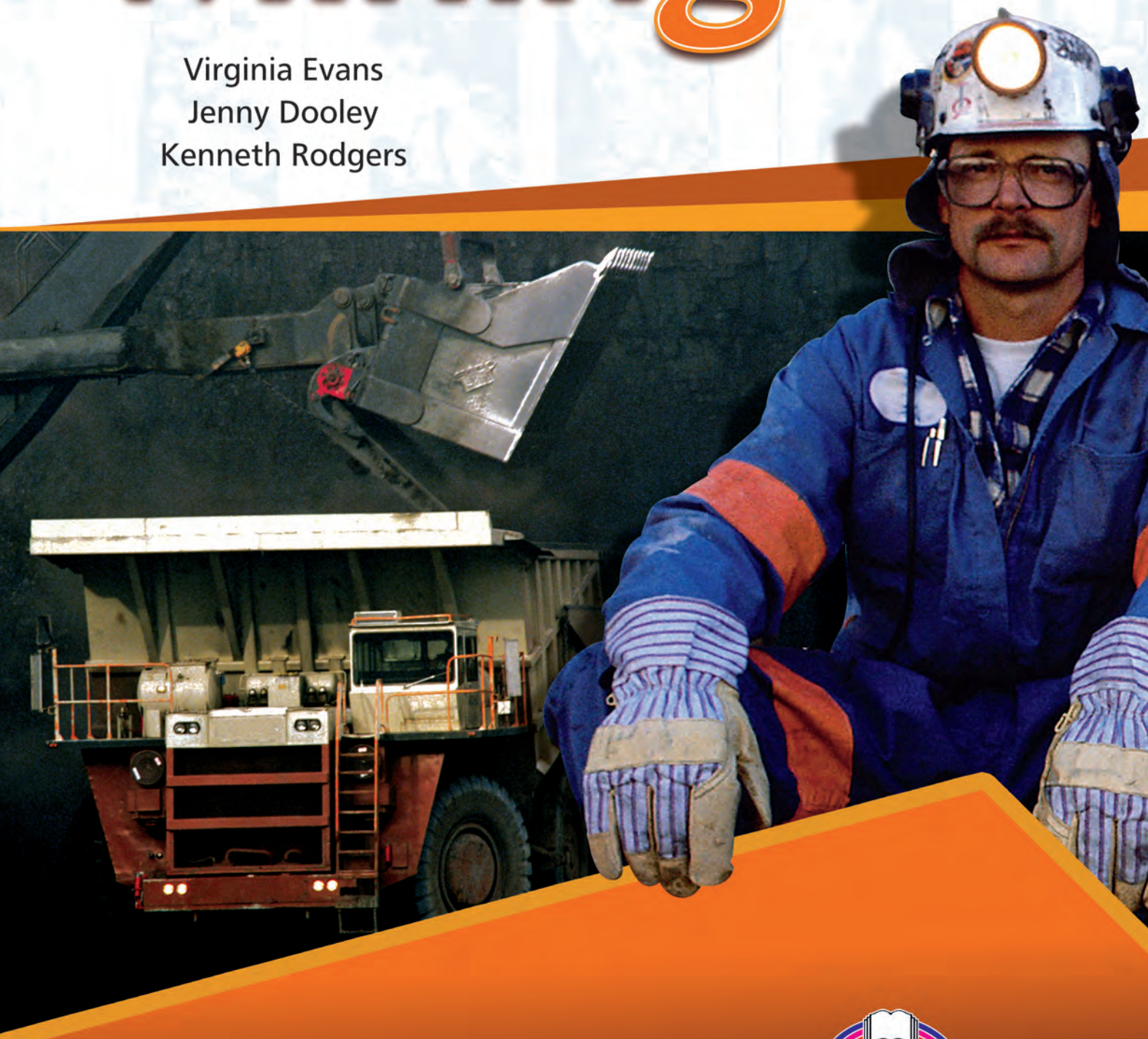

Express Publishing

CAREER PATHS

NATURAL RESOURCES II

Mining

Book 1

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Scope and Sequence

Unit	Topic	Reading context	Vocabulary	Function
1	The Role of Mining in the World	Pamphlet	agriculture, coal, construction, fertilizer, fossil fuels, manufacturing, minerals, power plants, precious metals, precious stones, steel	Adding information
2	Non-metallic Ores	Report summary	diamonds, gangue, gravel, gypsum, industrial minerals, ore, petroleum, potash, sand, waste rock	Presenting results
3	Metallic Ores	Textbook excerpt	base metals, copper, ferrous metals, gold, iron, lead, platinum, radioactive metals, silver, stainless steel, uranium	Identifying an error
4	Ore Deposits	Report	bank deposit, bench deposit, grade, lens-type, ore deposit, placer, seam, tabular, uniformity, vein	Disagreeing
5	Basic Mining Actions	Brochure	blasting, bore, channeling, dig, drill, excavation, extract, haul, hoist, load	Describing sequence
6	Types of Surface Mining	Webpage	borehole mining, dredging, highwall mining, hydraulicking, leaching, mountain top removal, open-cast mining, open-pit mining, placer mining, quarry	Explaining a term
7	Types of Subsurface Mining	Poster	block caving, caving methods, cut-and-fill stoping, longwall mining, room-and-pillar, shrinkage stoping, square-set stoping, stull stoping, sublevel stoping, supported methods	Talking about pros and cons
8	The Surface Plant	Memo	administration building, change house, electrical substation, emergency building, fuel station, fuel storage, fuel tanks, maintenance shop, vehicle storage, warehouse	Asking for clarification
9	The Crew	Career's webpage	apprentice, black hats, certification, equipment operator, maintenance worker, mechanic, medic, red hats, shift foreman, shift supervisor	Expressing desires
10	Hand Tools	Equipment catalogue	chisel, drill, hammer, knife, pliers, rock pick, screwdriver, shovel, wire cutters, wire stripper	Placing an order
11	Basic Gear	Handbook excerpt	belt pack, boots, cap lamp, coveralls, dust mask, earplugs, face shield, gloves, goggles, hard hat, pick holster, rain suits	Talking about sizes
12	Describing Places in a Mine	Daily report	back, bottom, breast, fall, head room, inby, outby, overhand, rise, steep, underhand	Giving instructions
13	Numbers 1: Volume/Weights	Advertisement	bank cubic meter, capacity, cubic feet, cubic feet per ton, cubic meter, m^3/ton, operating weight, power shovel, ton, yd^3/ton	Persuasive language
14	Numbers 2: Distance/Depth	Report	centimeter, core sample, depth, diameter, foot, inch, kilometer, meter, mile, millimeter, recover	Providing a solution
15	Numbers 3: Math Symbols	Chart	angle, decimal, degree, fraction, percent, ratio, X over Y, X point Y, X to Y, X-Yths	Confirming facts

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CAREER PATHS

NATURAL RESOURCES II

Mining

Book 2

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Scope and Sequence

Unit	Topic	Reading context	Vocabulary	Function
1	Places in a Surface Mine	Memo	access ramp, access roads, bench, berm, face, haulage road, outcrop, overburden, pit, sewage lagoon, waste dumps, waste rock	Giving warnings
2	Places in a Subsurface Mine	Course announcement	adit, crosscut, drift, level, raise, ramp, room, shaft, slope, stope, sublevel, tunnel	Asking for directions
3	Drilling	Buying guide	bit, circulation fluid, column-and-bar-mounted drifters, drill jumbo, drill rigs, large-hole rig, long hole drill, percussion drill, roller-bit rotary drill, rotary-percussion drill, small auger, stopper drill	Describing uses
4	Blasting	Report	ANFO, blasting agent, booster, detonator, drop ball, dynamite, emulsion, explosive, gel, mud cap, secondary blasting, slurry	Agreeing with an opinion
5	Surface Mining	Equipment Log	back hoe, bucket wheel excavator (BWE), bulldozer, crawler, dragline, front-end loader, hydraulic excavator, mechanical excavator, rubber-tired, scraper, shovel, walking bull	Making comparisons
6	Loading and Excavation: Subsurface	Webpage	cactus grab, clamshell, gathering arm loader (GAL), orange peel, overhead loader, raise borer, rope-drawn scraper, shaft mucker, shearer,shovel loader, slusher, tunnel-boring machine (TBM)	Talking about experience
7	Haulage	Course description	armored chain-and-flight conveyor, auger flights, belt conveyor, drawpoint, hydraulic conveyor, materials handling, rail, shuttle car, tractor-trailer, transfer point, transport, truck	Correcting self
8	Haulage Working Zone	Memo	bell, chutes, double-spotting, dumping point, gravity flow, grizzly, loadout point, one-way, orepass, traveling empty, traveling loaded, waiting line, working zone	Giving an opinion
9	Hoisting	Email	brake, cage, drum hoist, friction hoist, headframe, high-angle conveyor (HAC), hoist drum, hoist plant, hoist room, hydraulic pipeline, sheave, skip	Asking for help
10	Ground Control	Webpage	bolts, bolt trusses, combination-anchor bolts, concrete supports, mechanical supports, powered mobile hydraulic supports, roof bolts, shotcrete linings, steel mesh, steel sets, temporary hydraulic supports, timber sets, yieldable steel arches	Asking for repetition
11	Personnel Transport	Email	cabin, chairlifts, elevator, falling object protected systems (FOPS), lift cage, mantrips, manway, monorail, roll over protected systems (ROPS), rough terrain vehicles (RTV), shuttle jeeps, track	Confirming information
12	Communications	Memo	battery-powered, coverage, dial/page telephone, GPS, remote video, through the earth (TTE) communication system, trackers, transmit, two-way radio, wireless	Stating possibilities
13	Waste Disposal	Notice	bentonite, contamination, drainage, dry stacking, embankment dam, muck, spillage, tailing ponds, tailings, valley pond, waste	Describing skills and traits
14	Ventilation and Air Conditioning	Report	airway sealant, bleeders, cooling, dehumidification, dust control, exhaust, gas control, heating, hood enclosure, methane drainage, rock dusting, sprayfan, ventilation system	Giving a reminder
15	Auxiliary Operations	Handout	auxiliary operations, construction, flood prevention, ground control, lighting, maintenance and repair, materials delivery, material supply, place orders, power distribution, power supply, storage, water control	Making a suggestion

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CAREER PATHS

NATURAL RESOURCES II

Mining

Book 3

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Scope and Sequence

Unit	Topic	Reading context	Vocabulary	Function
1	Mineral Processing: Unit Operations	Webpage	as-mined, comminution, concentration, crushing, enriched, grinding, laboratory, liberation, ore beneficiation, ore matrix, run-of-mine ore, separation, sizing	Talking about sequence
2	The Mineral Processing Plant	Guide	24 hours a day, chemicals, conveyors, cylinder, feeders, fine ore bin, live storage, mill superintendent, motors, pipes, pulps, pumps, seven days a week, solutions, tanks	Apologizing
3	Crushing	Letter	circulating load, cone crusher, feed size, gyratory crusher, jaw crusher, oversize, primary crushers, secondary crushing, shorthead crusher, sorting, undersize, vibrating screens	Making a suggestion
4	Grinding	Memo	autogenous grinding, ball mill, box set, closed circuit, open circuit, revolve, rod mill, route, semi-autogenous grinding, size of liberation, spin, steel balls, steel rods	Asking for help
5	Sizing	Letter	aperture size, coarse, fine, fluidized classifiers, gas cyclone, hydrocyclone, ore particles, ore sorters, rake classifier, rotating trammel, slime, static, vibratory	Making observation
6	Equipment Malfunction	Poster	block, choke, debris, guard magnets, hand sort, jam, malfunction, metal detectors, screens, snag, tramp metal, unloaded, washing	Discussing possible consequences
7	Concentration Methods	Textbook excerpt	aerate, collectors, cone vessel, dense medium separation, drag tank, flotation columns, froth, froth flotation, gravity concentration, jigs, shaking table, sluice, spiral	Asking for a suggestion
8	Dewatering	Brochure	decant, dewatering, drain piles, filter cake, filtration, flocculant, moisture content, porous, reclaim system, sedimentation, thermal drying, thickener, vaccum belts	Changing topic
9	Extractive Metallurgy	Course description	absorption, anode, calcining, cathode, dissolution, distillation, electrometallurgy, electrowinning, hydrometallurgy, leaching, molten, precipitation, pyrometallurgy, roasting, smelting, solvent extraction	Talking about expectations
10	Mining and the Environment	Article	biodiversity, byproducts, coal fire, contaminants, deforestation, erosion, geological failures, groundwater, hazardous, pollutants, runoff, siltation, sinkholes	Making a point
11	Reclamation	Handout	demolish, infrastructure, mitigation, reclamation, recontouring, regulatory bodies, remediation, restore, revegetating, seal, stable soil, sustainability, treatment	Discussing future plans
12	Health Hazards 1	Pamphlet	asbestosis, black lung, break, fatigue, fracture, hand-arm vibration syndrome (HAVS), hazard, hearing loss, heat stroke, injury, mucker's mange, respiratory diseases, silicosis, sprain	Describing symptoms
13	Health Hazards 2	Report	afterdamp, bump, chokedamp, coal dust, collapse, explosions, fire, firedamp, rock falls, roof fall, shock wave, suffocation, underground earthquake	Reported speech
14	Disaster and Response	Poster	camera, dispatch, emergency, escape route, evacuate, food supply, microphone, probe, ration, rescue pod, rescue team, ventilation area	Giving instructions
15	The Future of Mining	Article	asteroid mining, automation, existing, hydraulic mining, implementation, methane drainage, ocean mining, promising, rapid excavation, robotics, underground gasification, underground retorting	Making predictions

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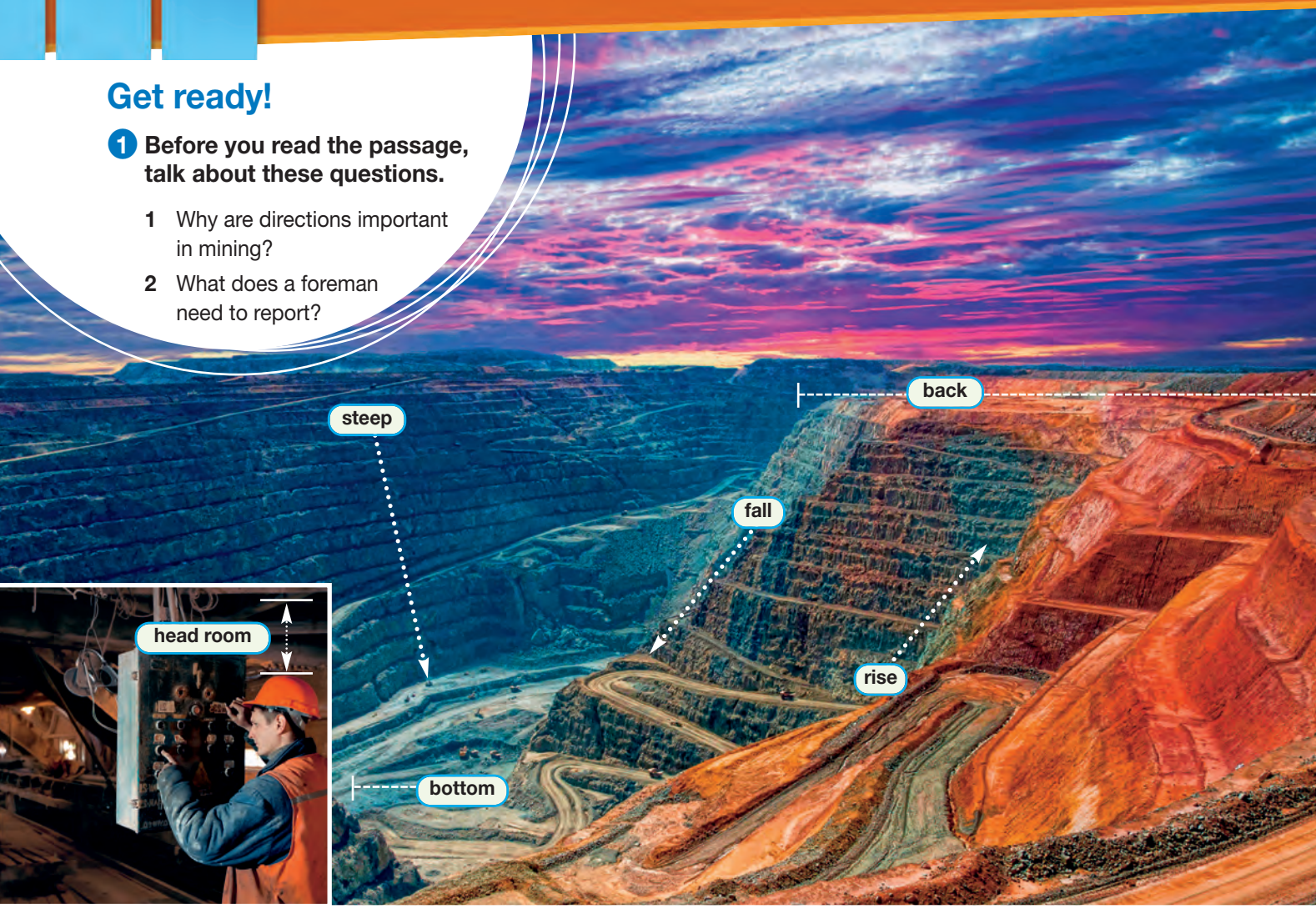
12 Describing Places in a Mine

Get ready!

1 Before you read the passage, talk about these questions.

1 Why are directions important in mining?

2 What does a foreman need to report?



Date: March 12

South Queens Mine

Foreman Reports

Regina Plumb, Foreman, Section 3

The **breast** is 20 meters farther **inby** today. We are continuing with a 10% **fall**. The **bottom** is at 1,200 feet. Our **underhand** progress is satisfactory. We have plenty of **head room**.

Max Ruiz, Foreman, Section 7

The breast is 25 meters farther inby today. We are continuing with a 5% **rise**. The **back** is at 800 feet. Have significant **overhand** progress. Head room is somewhat limited.

Dan Halloway, Foreman, Section 6

The breast is 5 meters farther inby today. We are doing **outby** work. We want to expand the mine. We need more head room. We also need more workers for the **steep** rock face.

Reading

2 Read the report. Then, choose the correct answers.

1 What information is NOT included in the report?

A The progress of different crews.

B The amount of head room in different sections.

C The direction of mining work progress.

D The cost of expanding a mine.

2 What is true about Max Ruiz's crew?

A They don't have enough head room.

B They are moving upwards.

C They are working at a surface mine.

D They need more workers.

3 What does Dan Halloway report?

A His crew is moving downwards.

B He doesn't have enough workers.

C His team has not made any progress.

D He wants to work in a different section.

Vocabulary

3 **Read the sentence pairs. Choose which word or phrase best fits each blank.**

1 **inby / outby**

A Work going away from the mine entrance is _____.

B Work going toward the mine entrance is _____.

2 **underhand / overhand**

A Work advancing upward is _____.

B Work advancing downward is _____.

4 **Match the words (1-6) with the definitions (A-F).**

1 __ back		4 __ steep	
2 __ bottom		5 __ rise	
3 __ breast		6 __ fall	

A having a slope of more than 45 degrees

B the highest point inside of a mine

C degree of downward slope

D degree of upward slope

E the working face inside of a mine

F the lowest point inside of a mine

5 **Listen and read the report again. How do miners report the upward or downward slope in a mine?**

Listening

6 **Listen to a conversation between a foreman and a crew member. Mark the following statements as true (T) or false (F).**

1 __ The man is a new employee.

2 __ The woman works in Section 3.

3 __ The speakers will continue outby work.

7 **Listen again and complete the conversation.**

Foreman: Hi, you must be Corey. This is your **1** _____ _____, right?

Crew Member: That's right. I'm really excited to start.

Foreman: Wonderful. Well, I'm Regina. I'm the foreman in Section 3. You're **2** _____ _____ _____.

Crew Member: Great. So what are we doing today?

Foreman: We're working on **3** _____ the section.

Crew Member: Why is that?

Foreman: The workers need a bit more **4** _____ _____.

Crew Member: What about **5** _____ _____ _____ with the expansion?

Foreman: We'll continue **6** _____ _____ with a 10 percent rise.

Speaking

8 **With a partner, act out the roles below based on Task 7. Then, switch roles.**

USE LANGUAGE SUCH AS:

So what are we doing today? / We're working on ...

What about after we finish ...?

Student A: You are a crew member. Talk to Student B about:

- what work you will be doing today
- why the work is necessary
- what work you will do after finishing

Student B: You are a foreman. Answer Student A's questions.

Writing

9 **Use the conversation from Task 8 to complete the work progress report.**

Work Progress Report

Foreman Name: _____

Description of Progress:

Today, our crew worked in Section _____.

First, we worked on _____.

This work was necessary because _____

_____.

Afterwards, we _____

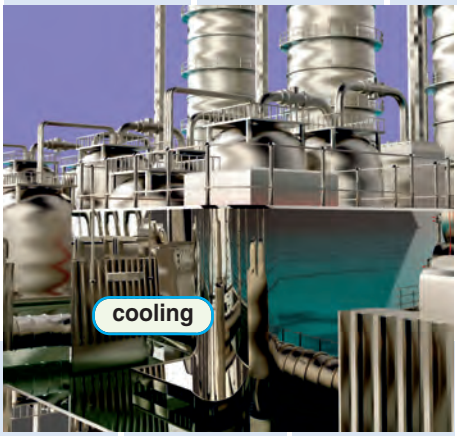
_____.

14 Ventilation and Air Conditioning

Get ready!

1 Before you read the passage, talk about these questions.

1 Why is mine ventilation important?
2 What are some processes related to mine ventilation?



Air Quality in Redding Mine

Air quality is a very important part of mine safety. At Redding Mine, we use a number of strategies to maintain good air quality.

Gas control helps remove dangerous gases and **exhaust**. We have installed the best **ventilation system** that we could afford. Ventilation systems keep the fresh air in and the dangerous air out. We check the **bleeders** on the **methane drainage** on a monthly basis. In order to move harmful gases out, we use **sprayfans**. These also help with **dust control**.

We understand that dust control is also a key part of maintaining good air quality in our mine. Improper dust control can lead to explosions. We use a **hood enclosure** and have a system for **rock dusting**. We also installed **airway sealant** to prevent exhaust from entering certain areas.

For climate control, we have **heating**, **cooling**, and **dehumidification** equipment. Though costly, this equipment keeps the mine at a comfortable temperature for workers.

Reading

2 Read the report. Then, mark the following statements as true (T) or false (F).

1 __ The report is mainly about the methods used to maintain good air quality at a mine.
2 __ Sprayfans are used for both gas control and temperature control.
3 __ Climate control equipment is expensive.

Vocabulary

3 Write a word or phrase that is similar in meaning to the underlined part.

1 The miner installed <u>devices that direct air</u> for better ventilation.
_ _ r _ _ _ a _ _
2 Whenever there is methane, workers need to make sure there are enough <u>systems that dilute and move methane-air mixtures</u>.
_ _ e _ d _ _ s
3 It is very important to remove <u>waste gas</u> from a mine so that it does not contaminate the air.
_ _ _ _ u _ _
4 Miners have to use proper methods of <u>removing rock dust</u>.
_ o _ _ _ _ _ _ i _ _
5 To take moisture out of the air, miners need a machine for <u>making the air less humid</u>.
_ e _ _ m _ _ i _ _ _ _ _ i _ _

4 **Fill in the blanks with the correct words or phrases from the word bank.**

WORD BANK

hood enclosure methane drainage dust control
ventilation systems

1 Workers have to empty the dust in the _____ often.
2 Mines need to have working _____ to ensure high air quality.
3 Whenever there is methane, mines need to have a working _____ .
4 Miners need to safely manage _____ when working with rock particles.

5 **Listen and read the report again. How can a mining company make sure that air in a mine is safe?**

Listening

6 **Listen to a conversation between a shift manager and a miner. Then, mark the following statements as true (T) or false (F).**

1 __ The mine will be closed for two days.
2 __ The closure is due to the breakdown of dust control equipment.
3 __ The mining company is updating their hood enclosures.

7 **Listen again and complete the conversation.**

Miner: See you tomorrow, Greg!
Shift Manager: Nope, not tomorrow. The mine's **1** _____ _____ _____ _____ tomorrow, remember?
Miner: Oh, right. I completely forgot. Is it just tomorrow?
Shift Manager: No, it's also going to be **2** _____ _____ Friday.
Miner: Okay. **3** _____ _____ the closure, anyway?
Shift Manager: The company's **4** _____ _____ _____ _____ .
Miner: Really? What kind of updates are they making?
Shift Manager: They're installing new equipment **5** _____ _____ _____ . They're worried about **6** _____ _____ _____ _____ .
Miner: I see. So ... is that it?

Speaking

8 **With a partner, act out the roles below based on Task 7. Then, switch roles.**

USE LANGUAGE SUCH AS:

What's behind the ...?
What kind of updates ...?
They are trying out ...

Student A: You are a shift manager. Talk to Student B about:

- why the mine will be closed
- new methods
- new equipment

Student B: You are a miner. Answer Student A's questions.

Writing

9 **Use the conversation from Task 8 to fill out the memo.**

MEMO

To: All employees
From: _____
Subject: Mine Closure

I would like to remind everyone that the mine will be closed on Thursday and Friday. The purpose of the closure is to _____ .
The updates include _____ _____ _____ .
Additionally, the company will also be installing new equipment, like _____ _____ .

Please contact your shift manager if you have any questions about the closure.

Glossary

regulatory bodies [N-COUNT-U11] **Regulatory bodies** are government agencies that make and enforce rules.

remediation [N-UNCOUNT-U11] **Remediation** is the process of removing contaminants from waste ponds.

rescue pod [N-COUNT-U14] A **rescue pod** is a protected compartment in which people can be safely moved.

rescue team [N-COUNT-U14] A **rescue team** is a group of people who save disaster victims.

respiratory diseases [N-COUNT-U12] **Respiratory diseases** are diseases that affect the lungs, throat, and respiratory system.

restore [V-T-U11] To **restore** something is to return it to its original condition.

revegetating [N-COUNT-U11] **Revegetating** is the process of planting vegetation in an area.

revolve [V-IT-U4] To **revolve** is to move in a circular path.

roasting [V-T-U9] **Roasting** is a process of pyrometallurgy that purifies metals using reactions between solids and gases.

robotics [N-UNCOUNT-U15] **Robotics** is the field of science that deals with robots.

rock fall [N-COUNT-U13] A **rock fall** is an occurrence in which rocks suddenly fall from a vertical or inclined surface.

rod mill [N-COUNT-U4] A **rod mill** is a type of grinder that uses rods to grind materials.

roof fall [N-COUNT-U13] A **roof fall** is the cave-in of the mine roof.

rotating trammels [N-COUNT-U5] **Rotating trammels** are a series of circular screens that rotate, causing small particles to fall through the holes, while pushing larger particles down the line.

route [V-T-U4] To **route** material is to send it on a certain course.

runoff [N-UNCOUNT-U10] **Runoff** is the flow of excess water over land.

run-of-mine ore [N-UNCOUNT-U1] **Run-of-mine ore** is ore that is delivered from the mine to the processing mill.

screen [N-COUNT-U6] A **screen** is a woven grid with small openings in the surface that allows select substances to pass through them.

seal [V-T-U11] To **seal** something is to close it so that nothing can pass through.

secondary crushing [V-IT-U3] **Secondary crushing** is the process of crushing rock that has already gone through primary crushers.

sedimentation [N-UNCOUNT-U8] **Sedimentation** is a water treatment process that settles solids out of the water with gravity.

semi-autogenous grinding [N-UNCOUNT-U4] **Semi-autogenous grinding** is a grinding method that is similar to autogenous grinding but also uses grinding balls.

separation [N-UNCOUNT-U1] **Separation** is the act of removing the waste from ore so that only the valuable materials remain.

seven days a week [EXPRESSION-U2] If something occurs **seven days a week**, it happens every day of the week.

shaking table [N-COUNT-U7] A **shaking table** is a device that concentrates medium sized particles on a sloped surface.

shock wave [N-COUNT-U13] A **shock wave** is a sudden wave of energy that often occurs after an earthquake.

short head crusher [N-COUNT-U3] A **short head crusher** is a type of cone crusher that is typically used to finely crush materials.

silicosis [N-UNCOUNT-U12] **Silicosis** is a respiratory disease that people get from inhaling crystalline silica dust.

siltation [N-UNCOUNT-U10] **Siltation** is the pollution of water with silt or clay.

sinkhole [N-COUNT-U10] A **sinkhole** is a hole in the earth's surface that usually results from lack of underground support.

size of liberation [N-UNCOUNT-U4] The **size of liberation** is the largest size the rock can be before separating out the minerals.

NATURAL RESOURCES II

Mining

Career Paths: Natural Resources II - Mining is a new educational resource for mining professionals who want to improve their English communication in a work environment. Incorporating career-specific vocabulary and contexts, each unit offers step-by-step instruction that immerses students in the four key language components: reading, listening, speaking, and writing. ***Career Paths: Natural Resources II - Mining*** addresses topics including types of ore, exploration methods, mining techniques, effects on the environment, and industry safety.

The series is organized into three levels of difficulty and offers over 400 vocabulary terms and phrases. Every unit includes a test of reading comprehension, vocabulary, and listening skills, and leads students through written and oral production.

Included Features:

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- Career-specific dialogues
- 45 reading and listening comprehension checks
- Over 400 vocabulary terms and phrases
- Guided speaking and writing exercises
- Complete glossary of terms and phrases

The **Teacher's book** contains a full answer key and audio scripts.
The **audio CDs** contain all recorded material in American English and British English.

Books 1-3 of ***Career Paths: Natural Resources II - Mining*** are rated for the Common European Framework of Reference for Languages at A1, A2 and B1 respectively.

Kenneth Rodgers is a licensed mining engineer. He has a degree in geological engineering and over thirty-five years experience overseeing engineering projects. Mr. Rodgers has managed environmental departments of power and mining companies. During his career, Mr. Rodgers directed numerous waste and chemical management projects, land reclamation projects, and groundwater investigations.

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