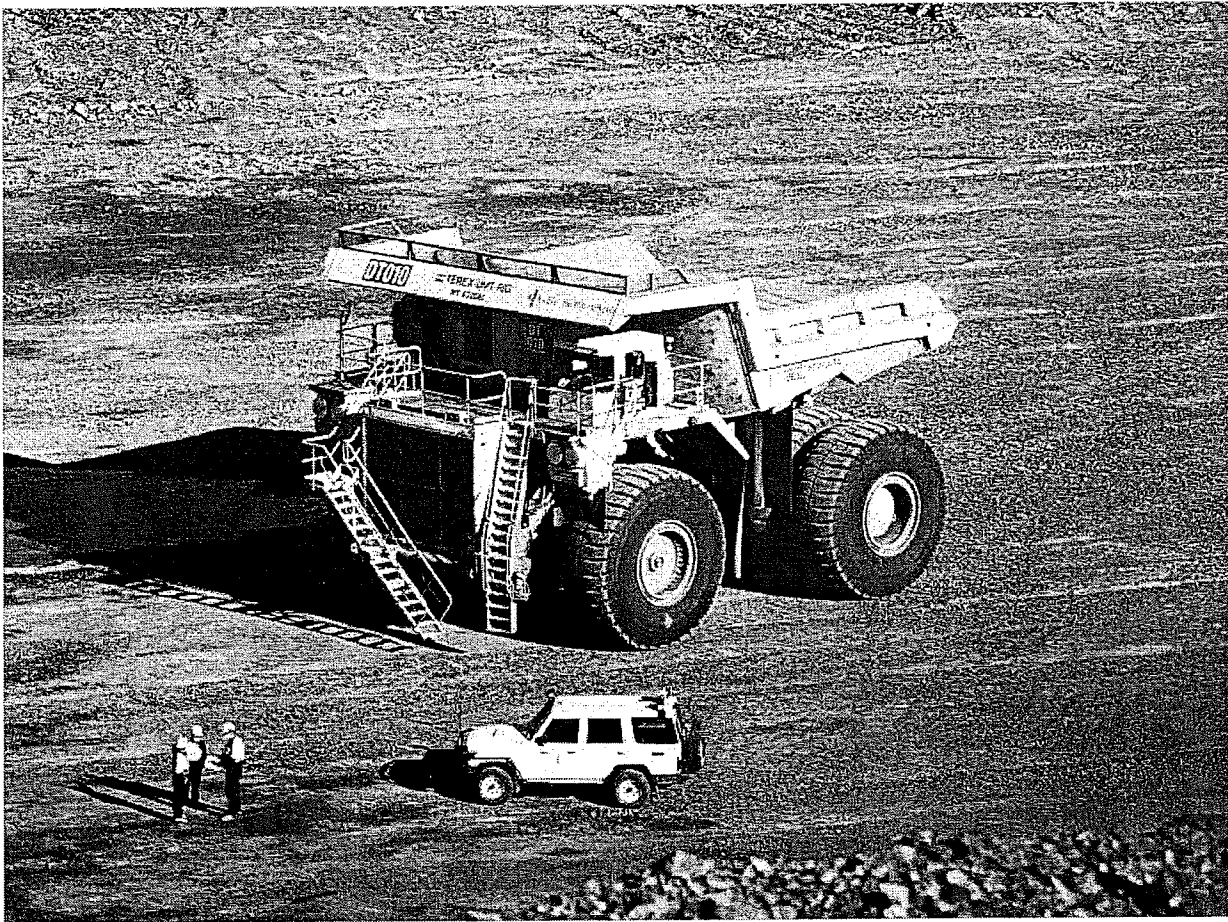


Name: _____

Earth Science 11

Mining Unit



The Geological Formation of BC

In the distant past the west coast of Canada was near Salmon Arm. The continent was made of a granite batholith, that formed as the Earth cooled 4.5 billion years ago, and sedimentary rocks from erosion. Sediments were also building up into layers on the west coast as erosion washed them toward the Pacific Ocean. In the tropical climate that existed here, due to our more southern location on the globe (as a part of Pangea), there were many swamps where vegetation lived, died and fell into. There was an inland sea covering Alberta and Northeastern BC where marine organisms lived, died and were buried. (Dinosaurs also lived in this area.)

About 200 million years ago Pangea broke up.

About 170 million years ago several strings of volcanic islands (a terrane) collided with the coast (the collision took many, many years at the rate of a few centimeters a year). The sedimentary layers that had been piling up were folded and faulted (thrust faults) by the compressional forces and became the Rocky Mountains. BC would have been 300 km wider if the crumpling had not occurred. Erosion wore the Rockies down at the same time (and ever since) or they would be 10 km higher than they are now.

These volcanic islands (that collided) had their tops eroded off over time and isostasy caused their roots (batholiths, magma cooled underground) to be raised up. These are the current Coast Mountains that we see north of Vancouver.

More "recently" lava has extruded through the Coast Mountains forming Mt Garibaldi (near Squamish) and Mt Edziza (recent, north of Terrace).

A hot spot has formed the Anahim chain of volcanoes Southeast of the Queen Charlotte Islands. The North American plate moved northwest over the stationary hot spot forming the chain with the youngest (most recently formed) furthest east.

Also, the Juan de Fuca plate is subducting under the North American plate. This causes the composite volcanoes in the Cascade Mountains (i.e. Mount St Helen's, Mount Baker, etc.). It also causes the threat of the "BIG" 9.5 earthquake we are expecting here.

The Rock Types

BC has all three rock types:

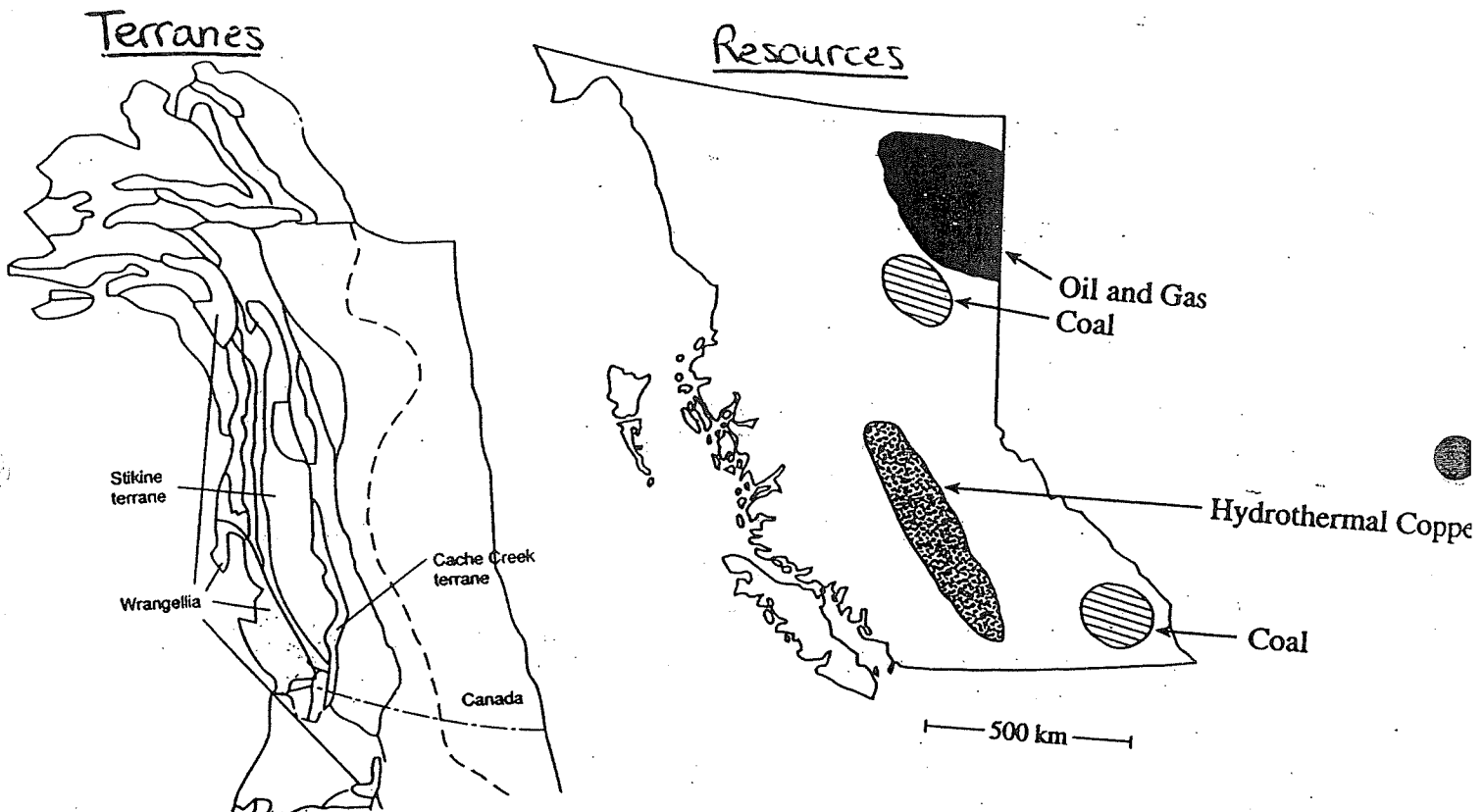
- Igneous - wherever there are volcanoes, roots of volcanoes, or dikes slicing through
- Sedimentary - in the Rockies and all over BC from the erosion that has occurred (3/4 of the continent's exposed rock is sedimentary)
- Metamorphic - in collision zones (from 170 million years ago or the subduction right now), involved significant T, P and water content changes yielding altered rocks

The Resources

The sedimentary layers in the Rockies contain coal that formed from vegetation falling into the swamps prior to the collision.

Northeastern BC and AB have oil and gas from the marine organisms that lived and died in the inland sea.

Metallic minerals (such as copper) are formed by magmatic processes and consequently are found near the Coast Mountains (roots of ancient volcanoes), Anahim chain (hot spot volcanoes), and Cascade Mountains (subduction volcanoes).



Summary

BC formed by elongated segments of mini-continents (terrane) that drifted across the Pacific and docked onto the older part of North America. This pushed up the Rockies. Erosion (glaciers, streams, mass wasting, wind) has formed/is forming what we see today.

Chapter 6 Worksheet (pg 85-103)

Topic 1

Basic resources: _____

Renewable resource: _____

Non-renewable resource: _____

Topic 2

How is oxygen used? _____

Replaced? _____

How is carbon dioxide used? _____

Replaced? _____

Topic 3

Pollutants from human activities: _____

Natural pollutants: _____

Topic 4

_____ % of Earth's surface is land

Soil is a mixture of: _____

Land is used for: _____

Topic 5

Problems in land and soil use include: _____

Topic 6

_____ % of Earth's surface is water

Fresh water is found in: _____

Why is water considered to be renewable? _____

What are two problems that plague water supplies? _____

Topic 7

Types of water pollution include: _____

Topic 8

Ore: _____

Ore mineral: _____

Gangue: _____

Resource: _____

Reserve: _____

Topic 9

Ore minerals of iron: _____ Use of iron: _____

Ore mineral of copper: _____ Use of copper: _____

Ore mineral of aluminum: _____ Use of aluminum: _____

Ore mineral of zinc: _____ Use of zinc: _____

Ore mineral of lead: _____ Use of lead: _____

Topic 10

_____ are used in the form that they come out of the ground.

Examples include:

sand, _____ and _____ fertilizers include: _____

salt: used for: _____ gypsum: used for: _____

sulfur: used for _____ graphite: used for _____

talc: used for _____

Topic 11

“Fossil” fuels are derived from _____

Topic 12

How coal forms: _____ are buried in _____. The sediment _____

and is _____. The % of carbon gradually _____ so the amount of energy

released in burning _____.

Stages of coal: peat, _____, _____, _____

Coal can be mined in _____ or _____ mines.

Topic 13

Petroleum forms when marine organisms are _____ in shallow marine coastal waters. They are

sealed in _____ rock layers called _____.

Uses: _____

Topic 14

Oil shale = _____

Tar sands = _____

Gasohol = _____

Topic 15

Uranium: fission of 1g U releases as much energy as _____ of coal or _____ of oil!

Topic 16

Three ways to conserve energy: _____

Topics 17-21: Renewable Sources

Water Power: _____

Wind Power: _____

Solar Energy: _____

Geothermal Energy: _____

Topic 22-25: Environmental problems

Acid Rain: _____

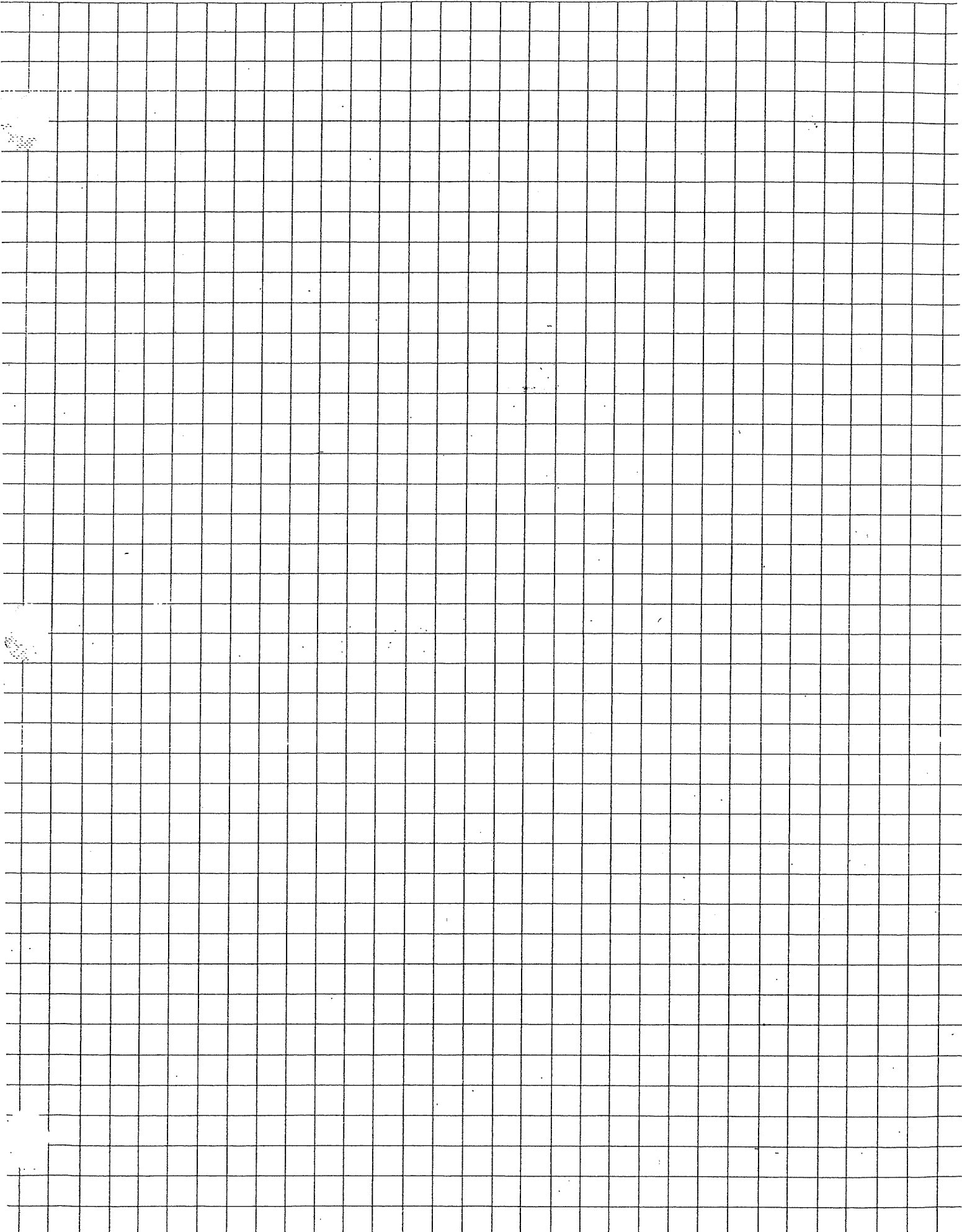
Toxic Waste: _____

Nuclear Waste: _____

Why conserve? _____

Create a Crossword

(with 20 clues)



COAL VIDEO QUESTIONNAIRE

ANSWER THE FOLLOWING QUESTIONS BY FILLING IN THE BLANKS

MODULE A

FUELING THE FUTURE

1. Coal mining in Canada has been around for _____ years.
2. Coal supplies _____ for many Canadian homes, schools and businesses.
3. Coal that is baked in ovens and used to make steel is called _____.
4. Most of Canada's coal is mined from _____ mines.
5. Transportation of coal is the largest source of income for Canada's _____.

MODULE B

BASICS

6. Coal began to be formed _____ of years ago.
7. It takes _____ metres of vegetation to make a coal seam 30 cm thick.
8. Most of Canada's coal is found in the _____ provinces.
9. The type of mining used where coal seams are folded and twisted is _____.
10. Land reclamation involves returning all mine sites to a condition as good as, or better, than existed before _____.

MODULE C

HISTORY

11. Canada's transcontinental railroad was completed in _____.
12. _____, as a country, had huge amounts of coal and led the way in its use as a fuel.
13. Brewmasters used coal to dry the malt that goes into _____.
14. Coal powered the first _____.
15. During the 1940s, _____ replaced coal for home heating in Alberta.
16. Due to an international incident, _____ started buying more Canadian coal for its steel industry.

MODULE D

POWER

17. _____ of Canada's provinces use coal to produce electricity.
18. For use in a generating plant, coal is crushed to a _____.
19. Steam produced by burning coal is sent to a turbine, which runs a _____.

COAL VIDEO QUESTIONNAIRE

MODULE E

EXPORTS

20. _____ of 100 cars carry enough coal to provide electricity for one home for 20,000 years.
21. _____ per cent of the coal mined in Canada is used to generate electricity.
22. Canada sells nearly _____ dollars worth of coal to other countries each year.
23. For shipping coal to the U.S. and Ontario, the coal port at _____ is used.
24. For shipping worldwide, Canada uses four coal ports. Three are located in British Columbia at: Roberts Bank near Vancouver, Vancouver's Inner Harbor and _____. The fourth is located at _____.

MODULE F

GLOBAL PERSPECTIVES

25. _____ per cent of the world's steel is produced using coal.
26. Coal, unlike _____ and _____, is more evenly distributed throughout the world.
27. To protect the environment the Canadian coal industry is developing _____ technologies.

MODULE G

THE ENVIRONMENT

28. When fossil fuels are burned, gases that are released are _____ and _____ oxides.
29. When combined with hydrogen, these gases form acids which may fall as _____.
30. Acid rain can be reduced by using coal with less _____.
31. New and existing technologies can reduce sulphur emissions by up to _____ per cent and nitrous oxide emissions by _____ per cent.
32. _____ and _____ are two environmental issues that have been linked to the burning of coal and other fossil fuels.
33. One way the coal industry is working to protect the environment is land reclamation, burning low _____ and developing _____.
34. In the mountains and foothills, coal companies usually return the land to _____ and _____.

The last line is:

"The coal industry is ..."

Environment and Mining

Methods of Mining

Odds and Ends

Leaving a Good Impression on the Land

Name: _____

1. What 3 things helped open up the province of B.C.?
2. Once gold was gone what other mineral deposits were found in B.C.?
3. List 3 products that are derived from mining.
4. Approximately how many people are directly employed by mining? _____ and indirectly? _____
5. B.C. is a major producer of _____ and _____ concentrate.
6. What is the safest heavy industry in the province (according to W.C.B. statistics)?
7. Summarize what is involved in getting a mine up and running.
8. What rules are there about reclamation? What are mining companies expected to do?