Chapter 26: Canada's Mineral Wealth

May 8, 2014.
What kind of mining products do you have on you today?
Types of minerals

- a mineral is a **naturally occurring**, **pure**, **non-living** substance found in rocks

**TYPES**

1. **metallic**: minerals that, when refined, yield **metals**
   - examples: gold, silver, platinum, iron, copper, nickel

2. **fossil fuels**: minerals that release **energy** when burned
   - examples: coal, natural gas, oil

3. **industrial (non-metallic)**: anything mined that is **not metallic** or a **fossil fuel**
   - example: asbestos, potash, gypsum, diamonds, gravel
Can you guess the price of this precious metal?

Cost of 24K gold?

$45.29 CAN per gram

If you had a coin of pure gold that was the same weight as a loonie, it would be worth $284!
Can you guess the price of this precious metal?

Cost of platinum?
$45.97 CAN per gram
Can you guess the price of this precious metal?

Cost of silver?

$0.62 CAN per gram
The World’s Most Expensive Metal is....

This shiny, silvery-colored metal is commonly used for its reflective properties in objects like search lights, mirrors and jewelry finish.

Its high melting point and ability to withstand corrosion allow rhodium to be a crucial addition in many industrial fields.

This extremely rare and valuable metal is found in only a few places. According to Kitco, a world retailer of precious metals, the average monthly price of rhodium was $46.52 per gram.

http://www.discovery.com/tv-shows/curiosity/topics/10-most-valuable-metals.htm
Industrial/Non-metallic
Importance of Mining in Canada

• Canada ranks third in the world in the production of minerals and is the largest exporter of minerals

• total value of all mineral production is more than $80 billion

• mining industry has contributed to the development of our transportation system: almost all railroad expansion and a lot of road expansion have occurred to allow the development of mining resources
THE MULTIPLIER EFFECT

• About 1.5% of the nation’s labour force are employed by mining or mining processing companies. This is referred to as direct employment.

• Another 6.5% of the nation’s labour force owe their livelihood to the mining industry. They may be truckers, homebuilders, government inspectors, or coffee shop waitresses. This is referred to as indirect employment.

• The mining industry has a multiplier effect of 4.
Finding valuable minerals

- a mineral becomes a useful resource (also called a **mineral reserve**) ONLY when it makes **economic sense** to mine it (you **make** more money from what you mine than it **costs** to mine it)

- in order to have a steady level of mining, we must continue to find **reserves**

- the problem is the more we mine, the **harder** it will be to find reserves that are **accessible**
Looking for metallic minerals

- metallic minerals are found in igneous and metamorphic rocks of the Canadian Shield and other regions

Since this area is so huge how do geologists find exactly where the metals are?

1. **ore bodies:** produce a magnetic field that can be detected by an instrument called a magnetometer; a map is created from information gained by the magnetometer

2. **Satellite images** and **aerial photos**

3. Lots of the **data** must be collected on the ground: **rock samples** and **soil** are tested.

4. If the data looks promising, it’s time to **drill**!
Mining metallic minerals

1. **Strip Mining**: used for minerals in horizontal layers
   - overburden removed
   - blasting
   - material loaded onto trucks
   - materials taken to a storage area

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
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<tbody>
<tr>
<td>- safer for miners</td>
<td>- expensive because lots of material to get rid of</td>
</tr>
<tr>
<td>- not expensive in terms of machinery</td>
<td>- harmful to the environment</td>
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Mining metallic minerals

2. **Underground Mining**: used for minerals deep in the earth
   - miners take an elevator to the working area
   - holes are drilled in the rock face and filled with explosives
   - after the blast, miners test the walls and ceiling and the weak parts are supported with timber
   - blasted rock is transported to a central underground location and crushed
   - lifted to the surface
## Mining metallic minerals

### Underground Mining:

<table>
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<th>Advantages</th>
<th>Disadvantages</th>
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<tr>
<td>- not as many chemicals in the open air</td>
<td>- possibility of mine collapsing</td>
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<tr>
<td>- getting more expensive products</td>
<td>- cost of elevators and constantly checking to make</td>
</tr>
<tr>
<td>- workers make more money</td>
<td>mines safe</td>
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<td></td>
<td>- problems with health of miners</td>
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Read pages 338 - 339. Describe the following issues in 1-2 points: acid precipitation, abandoned mines, exported jobs, world events, depleted reserves, foreign competition and one-industry towns.
With someone beside you, discuss:

1. Why do we use so many fossil fuels?

2. Are there alternatives?

3. How do changing energy prices affect you?
Figure 3.5 — Residential energy indicators, 1990 and 2008

1990
- 2.8 people per household
- 116 m² of living space
- 9.9 million households
- 15 appliances per house
- 23 percent of occupied floor space cooled

2008
- 2.5 people per household
- 128 m² of living space
- 13.2 million households
- 21 appliances per house
- 44 percent of occupied floor space cooled

Conclusions

Significance
Conclusions

Significance

Canada's Total Energy Consumption by Type, 2008

- Hydro: 26.4%
- Natural Gas: 24.8%
- Petroleum: 31.3%
- Nuclear: 7.1%
- Coal: 9.6%
- Non-Hydro Renewables: 0.8%

Source: EIA
Conclusions

Significance

**Figure 3.9 — Unit energy consumption of major electric appliance stock, 1990 and 2008**
Conclusions

Significance
Conclusions

Significance
Conclusions

Significance
processing metallic minerals

- ore is mostly waste rock: needs to be purified

1. Milling:

- wastes produced from this process are called **tailings** (toxic mixture of water, rock, particles and chemicals)
processing metallic minerals

2. Smelting:

- chemicals mix with waste rock and produce *slag* which rises to the top and is skimmed off