



MINERALS  
EDUCATION  
VICTORIA

# Treasures from the Earth

## ***SUGGESTED UNIT PLANNER: TREASURES FROM OUR EARTH***

- This planner provides a sequential structure in which you can incorporate activities from the activity matrix.
- Background teacher information, student activity sheets and some references are provided.
- It is also highly recommended that incursions by Minerals Education Victoria be incorporated into your program.

### MINERALS EDUCATION VICTORIA INCURSIONS

Minerals Education Victoria offers interactive incursions for both primary and secondary levels. Sessions are offered to class-sized groups and are approximately one hour in duration. Times are negotiated to suit your school timetable.

All the details can be found on their website: [www.minerals.org.au/victoriaeducation](http://www.minerals.org.au/victoriaeducation) or in the Appendix.

Incursions particularly relevant to this unit would be:

#### **Rock Into Minerals**

An introductory session that explores why minerals are so important in our everyday lives! Students will soon discover that rocks and their products are found in very surprising places. Covers: layers of the Earth, rocks and mineral identification, processing of minerals, uses of rocks, different types of mining, occupations, health and safety issues.

#### **Gold!**

To complement any historical and social study of gold, this session focuses on the science of gold. Covers: properties of gold, uses of gold, value of gold, gold mining with particular reference to Victoria.

#### **Mind the Environment**

Covers: the environmental impact of mining and what must be done to care for the environment before, during and after mining.

#### **Metals Rock!**

This session takes a closer look at metal bearing rocks. What makes a metal a metal? The properties and uses of metals are explored in detail.

Contact : Minerals Education Victoria: 9629 1851

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## 1. ALL ABOUT ROCKS

### **Background notes for teachers:**

Rocks and minerals are all around us. We see and use them every day, but most people are not very familiar with them.

All rocks are made up of minerals! Minerals are the building blocks of rocks. Some rocks contain only one type of mineral, others are made up of many different types of minerals. Minerals are found in soils, water, plants and animals. They are in paper, our bodies and they are even in the food that you eat. You may have seen the word “mineral” on a cereal packet. These “minerals” are the same minerals as those found in rocks. Plants and animals need minerals to help them grow and stay healthy. Plants obtain these minerals from the ground. These plants are eaten by animals, the animals are eaten by other animals, and so the minerals are passed along the food chain.

**What is a mineral?** Minerals are natural substances made from non-living materials. They have definite chemical compositions. There are over 10,000 different types of minerals.

**What is ore?** Rocks which contain large amounts of useful minerals are called ORE. For example, hematite (iron ore) contains a lot of iron. Valuable minerals are often mixed with not so useful materials. Separating the useful minerals from the waste can be quite complicated and may involve many different processes. Crushing, grinding and smelting are all methods used to recover minerals from their ores.

### **Suggested activities from the matrix:**

Activity 1 – Brainstorm [a good introduction]

Activity 8 – Observe a variety of rocks

Activity 16 – Data and picture chart of different rocks

Activity 24 – Flowchart about formation of rocks

**OPTION: “Rock into Minerals Incursion” – Minerals Education Victoria.**



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## 2. THE INSIDE OF THE EARTH

### **Background notes for teachers:**

Information about the layers of the Earth is outlined on Activity Sheet 20a.

### **How do we find the minerals we need?**

Anyone wanting to search for minerals must first have an exploration licence from the government.

Mining companies employ teams of geoscientists who work together to explore the earth's surface to find mineral deposits. Deposits very rich in minerals are called ore bodies.

A **geologist** studies maps, historical records, satellite pictures and samples from the earth to help determine where minerals may be found.

A **geophysicist** uses high tech equipment to measure tiny differences in the earth's physical properties, such as magnetism and gravity. This can be done on the ground or from a helicopter or plane.

A **geochemist** analyses soil and rock samples to determine which minerals are present in soils, rocks and streams in nearby areas.

If an ore body is found, a company must get permission from the government to mine. They must provide a plan which outlines how the mine will be operated and how the environment will be cared for before, during and after mining. Only 1 in every 1,000 exploration projects becomes a mine.

### **Suggested activities from the matrix:**

Activity 20a – Layers of the Earth

Activity 20b – Layers of the Earth



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## 3. LOCATION OF MINERALS

### **Background notes for teachers:**

Australia is one of the world's major producers of minerals. Gold, bauxite (aluminium ore) and iron ore are our most important mineral exports. More than 80 per cent of Australia's minerals are exported. Western Australia and Queensland account for more than 60 per cent of the total value of Australia's mineral exports.

**How are minerals mined?** In most cases, mining is a temporary use of the land. When we add up all the land area that is used for mining around Australia, less than one per cent is disturbed. There are two main mining methods used in Australia.

**Open Cut Mining:** this type of mining is used when minerals are found close to the surface. Large holes are dug with 'stairs' (benches) around the edges. This allows the mining machinery and equipment to get into the pit so the ore can be removed. **Underground Mining:** when the minerals are buried deep in the earth, miners must go underground. To reach the ore body, vertical shafts or an inclined roadway must be created. Horizontal tunnels are developed on several levels to access the mining areas. The actual area being drilled and blasted is called the 'face'. Blasted rock is hauled away by loaders or trains and is taken to the surface for processing.

### **Suggested activities from the matrix:**

Activity 3: Minerals in Australia

Activity 22: 'Where will I find Australian minerals?'

## 4. USES OF MINERALS

### **Background notes for teachers:**

Some "everyday" rocks are easy to notice. They may be crushed, shaped or polished but they still look like rocks. Gravel and crushed stone are used for roads, footpaths and tennis courts. Marble, sandstone and slate are clearly visible as part of buildings and other constructions.

Many rocks are useful because they are made up of certain minerals. These rocks are not so well known because the mineral often looks nothing like the rock it comes from. For example, aluminium is obtained by processing bauxite.

Everything we use and wear at home and school depends directly on these minerals.

### **NOTE: The Rock Files Website**

[www.minerals.org.au/victoriaeducation/teacher\\_services/resources](http://www.minerals.org.au/victoriaeducation/teacher_services/resources)

**provides excellent information on Australia's main minerals. Information on the properties, location, uses of the mineral is age appropriate for middle school students and presented with tables, illustrations and maps.**

### **Suggested activities from the matrix:**

Activity 26: Mind map of mineral

Activity 44: Collage of products made from rocks

Activity 18: Price of minerals

Minerals Education Victoria

VELS Unit – Treasures from the Earth September 2007

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## 5. GOLD

### **Background notes for teachers:**

Gold has a significant place in Australia's history. In addition to the historical and social perspective, the scientific properties of this metal can be investigated.

Refer to the 'Rock Files' website for background information on the uses, location and properties of gold.

### **Suggested activities from the matrix:**

Activity 9: Concept map – gold

Activity 11 and/or Activity 12: Timeline of gold in Australia/Victoria

*OPTION: Gold Incursion – Minerals Education Victoria*

## 6. SOCIAL AND ENVIRONMENTAL IMPLICATIONS OF MINING

### **Background notes for teachers:**

Refer to 'Mining and the Environment' on the Rock Files website for background information which considers the impact of mining on the environment and how rules and regulations have changed over time.

### **Suggested activities from the matrix:**

Activity 10: Flow chart of mining and impact on environment

Activity 25: Digging and repairing the land

Activity 30: Mining stakeholders

Activity 41: Jobs in mining

*OPTION: Mind the Environment – Minerals Education Victoria*

## 7. STUDENT CHOICE

For a designated time period (2-3 weeks) students choose activities from the boxes in the matrix that have not been completed in class. Some activities are appropriate for groups/ some for individuals. As a suggestion requirements may need to be met according to the number of activities completed and spread over the grid. Teachers may allocate a **number** of units and **weighting** of units across the grid. E.g. 1 point allocated for activities in lines one and two, 2 points for activities in lines three and four and 3 points for activities in lines five and six. Therefore, students may for example, have to complete a minimum of two units and have a total of 6 points.



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## 8. CHANGE OVER TIME

### **Background notes for teachers:**

Any activity, such as building a house, school, road or factory, developing a farm or opening a mine has some effect on the environment. Mining minerals provides the many things we use every day, but it is important to care for the environment.

Mining companies employ environmental scientists who plan how best to look after the mine site and surrounding areas before, during and after mining. They also keep a close watch on air and water quality and noise levels.

Mining is usually a temporary use of the land. Reclamation is the process where the land is rehabilitated once the ore has been removed. The land is replanted, most often with trees, shrubs and other plants native to that area and wild-life is encouraged to return.

Sometimes, after community consultation, the affected area may be used differently. Open cut mine sites may be filled in and used as tips, sporting fields, shopping centre carparks or farming land. In other places, they create lakes or wetlands.

### **Suggested activities from the matrix:**

Activity 38: Evaluate future use of disused quarry – deBono's thinking hats

Activity 46: Brochure or powerpoint.

## 9. CONCLUSION

### **Suggested activities from the matrix:**

Activity 14: Pictionary: play the game as a whole class to revise vocabulary associated with minerals and mining.

Redo Activity 1: Brainstorm words A>Z completed earlier in the unit for students to see how much they have learned.