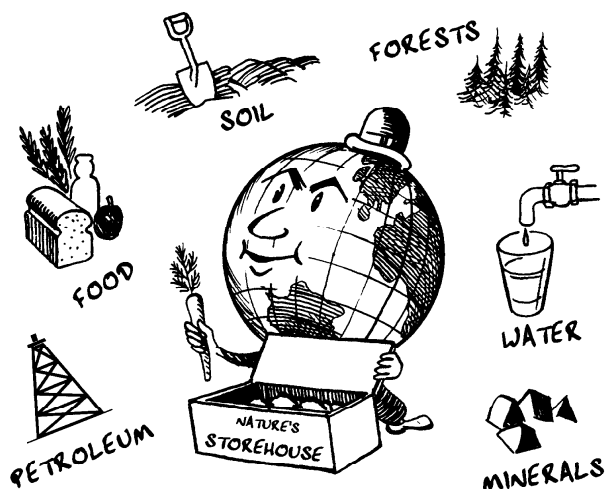


THE EARTH—NATURE'S STOREHOUSE

The Earth is a huge storehouse. It holds the water and food that plants need to grow. It has a great supply of other natural materials. Materials people use are called natural resources.

Natural resources are useful materials found on and under the Earth's surface. You use a variety of natural resources everyday. Food is a natural resource—so is water. Other resources include soil, trees, and minerals.



WHAT ARE MINERAL RESOURCES?

Mineral resources are found on and in the Earth's crust. More than 3,500 different minerals have been identified. We will study three classes of mineral resources—metals, nonmetals, and fuels. Copper, nickel, gold, silver, and iron are examples of metallic mineral resources. Common materials like sand, gravel, clay, limestone, and salt are examples of nonmetallic mineral resources. Nonmetallic minerals are often called *industrial minerals*. Minerals used for fuel are oil, gas, and coal. They are called *fossil fuels*. Uranium is a *metallic fuel*.

Minerals are everywhere around us. For example, it is estimated that more than 70 million tons of gold is in the ocean waters. It would be much too expensive to recover because it is so scattered. Minerals need to be concentrated into deposits by Earth's natural processes to be useful to us.

Some of Earth's natural processes concentrate mineral resources into valuable deposits. Moving water places sand and gravel along stream and river banks and ocean beaches. Water erodes gold-bearing rock from upland mountains and deposits gold in gravels along some rivers and streams.

Inside the Earth, rocks are melting and cooling. Melting and cooling can concentrate metals such as copper, molybdenum, nickel, and tin in a rock mass along with other common minerals like quartz and feldspar.

On the surface of the Earth, dead plants accumulated in swamps millions of years ago. Through time, heat and pressure—that plant material has become today's coal. Oil and natural gas have come from algae, spores, and plant material. Minerals may be everywhere, but only in a few places are they concentrated enough to make them valuable to us.

Mineral resources such as oil and gas, coal, copper, and tin, are called nonrenewable resources. Once they are removed from the Earth, they will not be replaced in our lifetimes. However, new mineral wealth is being created by such natural forces as volcanic activity and earthquakes.

HOW ARE MINERAL RESOURCES DISTRIBUTED THROUGHOUT THE EARTH?

Minerals are not evenly distributed in the Earth's crust. Concentrations of mineral resources profitable to extract are found in just a few small areas. Mineral deposits are really freaks of nature. In other words, a special set of circumstances happened in or on the Earth to create mineral deposits. There had to be a supply of certain elements available in the Earth, a process to concentrate them, and a host rock to trap the mineral or minerals. Many minerals like to be together, such as: quartz and gold; molybdenum, tin and tungsten; copper, lead and zinc; platinum and palladium—to name a few.

The signs of a mineral deposit are often small and difficult to recognize. Locating deposits requires the experience and knowledge of a trained geologist. Geologists search for years before finding an economic mineral deposit. Deposit size, its mineral content, extracting efficiency, and costs—ALL determine if a mineral resource can be profitably developed.

HOW ARE MINERAL RESOURCES USED TO SUPPLY FOOD?

Our food supply depends on mineral and energy resources. Farming starts with seeds in the ground and ends with food for us to eat. Plants come directly to us as fruits and vegetables—or—indirectly as food from animals that supply dairy products and meat. Growing plants get food (nourishment) from minerals in the soil. Fertilizers—such as potash, phosphate, nitrogen, and sulfur—are necessary to produce abundant crops.

That is just a start. The farmer's truck, tractor, and other machines are made from steel and other metal products. Power to operate the equipment is provided by fossil fuels such as gasoline and diesel fuel. The food products from the farm are shipped to processors or to markets in trucks, railway cars, and airplanes—all made from iron, manganese, nickel, molybdenum, and aluminum and many other minerals. The roads, highways, railroads, and airports used for food transportation are made using other mineral resources. Food is processed using equipment made from metal. Food packaging commonly is made of metal or containers made from petroleum products (such as plastic).

WHAT PRODUCTS ARE MADE FROM MINERAL RESOURCES?

Nearly ALL of the products we need to make our life more comfortable are made from mineral resources. Our society as we know it today could not function without a large and varied supply of minerals.

All products used at home, at play, and at work come from the Earth. Food, shelter, water supply, clothing, health aides, transportation, and communication all depend on mineral resources. We can see products made from minerals in the kitchen and on the dining room table. Stoves, refrigerators, dishwashers, toasters, forks, knives are good examples.

Nickel, copper, stainless steel, aluminum, and silver are necessary in cooking and eating. These products are more convenient and long-lasting and are more beneficial to our safety and health than wooden spoons, ice boxes, and dishpans.

HOW DO MINERAL RESOURCES CONTRIBUTE TO THE HOME AND INDUSTRY?

The raw materials of Earth are used to make equipment and consumer products. They are sometimes used by themselves, copper for example, or in combination with other minerals, for example: chrome, carbon and iron to make stainless steel. The output of our mines and wells makes almost every other product possible. We depend on mineral resources—they are the “building blocks” of civilization.

At home, we have instant clean water by turning on the faucet. The water treatment plant and the chemicals used for purification, the pipes and plumbing parts which bring us our water, and our waste disposal systems—are made entirely from mineral resources.

Our clothing depends on the production of mineral resources. Natural fibers grown with the aid of fertilizers are made into cloth with tools and machines made from minerals. Some textiles are made from coal and petroleum. They are called *synthetic materials*. Many coloring dyes come from minerals. Not only are these dyes used in our clothing, but are used in paints—both for household and industrial usage and works of art.

Homes, apartments, office buildings and factories are built using minerals. The structures use steel beams, gypsum for wallboard, copper wiring for telephones and electricity, and in equipment such as elevators. Zinc-coated heating ducts prevent corrosion (or rusting). The buildings sit on concrete foundations made of sand, gravel, and cement in which reinforced steel rods are embedded.

When we begin to think and investigate, we find the use of minerals is more dramatic and exciting than one can realize.

HOW ARE MINERALS USED IN TRANSPORTATION AND COMMUNICATIONS?

We now travel more and faster. We communicate by telephone, radio, and television. What has made this possible? Technology!

Aren't we glad that someone in our past invented the train? (It sure beats the horse and buggy or the wagon train.) The train, made of steel and wood, was fired by coal (eventually converted to diesel-fueled engines) that made it the transportation mode of the day. Today, we have airplanes as well as trains and automobiles.

The airplane—all of its components come from the raw materials of Earth—the same as the train and car! But, what makes it fly? What fuels it?—A highly refined kerosene made from petroleum, giving it power. It is made of light weight metals (aluminum, and specialty steels called alloys), and plastics that come from petroleum products. Its speed, because it is lightweight, makes it possible for us to travel from one coast to another in 6-1/2 hours or less.

The telephone—sure beats smoke signals! A review of history tells how exciting it was to listen to the radio and to call a friend instead of writing a letter. Today, radios,

telephones, and television sets command your attention. None of these conveniences could have been made, except “someone” was interested in the advancement of society and knew how to use minerals. An understanding of minerals—the connectors so vital in today's communications—is important. As you work with your classroom computers remember that it was just a few years ago that they were made available to your school. And who could have imagined what a quartz crystal could do? But that quartz crystal (silicon chip) could not work alone if other minerals were not used at the same time. We are lucky!

HOW DOES THE USE AND SUPPLY OF RESOURCES DIFFER AMONG PEOPLE AND PLACES?

Mineral and energy resources are essential to everyone. A nation cannot enjoy prosperity without a reliable source. No country is entirely self sufficient when it comes to mineral and needs. Because of this interdependency, countries of the world need to cooperate.

The United States is one of the most highly industrialized nations in the world. We have a high standard of living because of our mineral and energy resource base. We have 5% of the world's population and 7% of the world's land area, but we use about 30% of the world's mineral resources. Our needs, which the consumer demands, is so large that we must buy many resources from other countries. This is called *importing*. The need for mineral and energy resources in the world continues to grow and is a major part of world trade.

WHAT IS THE FUTURE OF MINERAL RESOURCES IN THE WORLD?

The growing use of mineral and energy resources throughout the world creates several important questions. Will we reach a time when our resources are gone? It is doubtful because we are so creative and continue to develop new technology that makes minerals we use go further. We also have learned, and continue to learn, how to use our resources more efficiently and how to recycle and conserve them. Will technological development, economic factors, and conservation methods overcome fears of running out of our mineral and energy resources? Will we someday mine the ocean and resources in outer space? The answers to these questions will help determine our way of life in the future. You will be challenged to develop new ideas and new technology in the years ahead.

DIG A LITTLE DEEPER

- What does the word *concentrate* mean? Why is it important to have minerals concentrated in one place rather than scattered all around? What processes help in concentrating mineral resources?
- Name at least 3 important natural resources that can be found in your state. Why are these important?
- Pick out your favorite clothes. Look at the tags sewn inside and learn if they are made from natural fibers, synthetic fibers or both. List the fibers used to make your clothes. How did minerals play a part in the making of your clothes? (Hint—Don't forget the *sewing machine*.)