**Student Handout 3**

**Digging Into Energy from Arkansas Rocks**

**A Unit for Discovery**

**Lesson 3: Sedimentary Rocks**

**Focusing on Sedimentary Rocks:**

Sedimentary rocks are formed by larger rocks or particles breaking down into smaller pieces called sediments. The larger rocks are broken by many processes such as weathering or erosion by wind or water. Those smaller pieces, called sediments, then get deposited or dropped off at a new place after being carried by water, wind or other methods of transportation. One layer of sediment gets deposited on another, then another. The weight of each layer presses the next layer together with great force ultimately forming a new rock from old sediments. Examples of sediments are pebbles, grains of sand, plant and animal remains, silt and clay.

Some sedimentary rocks contain fossils. Fossils are the remains or imprints of once living organisms. These remains often get trapped in sediment and as layers of sediment form atop one another a fossil is embedded in the rock. Look at the sample sedimentary rocks at your table that contain fossils. Discuss within your group how you think those fossils were formed.

Shale is the most abundant type of sedimentary rock and is found worldwide.  In Arkansas, we have two areas of shale where natural gas is found - the Arkoma Basin in western Arkansas and eastern Oklahoma and in The Fayetteville Shale which covers ten counties from western to eastern Arkansas.  Millions of dollars of natural gas is produced in Arkansas every day.  In fact, Arkansas now ranks as the 8th leading natural gas producing state in the US.

**Activity:**

We are going to make our own edible sedimentary rock model called shale in class today.

**Sedimentary Sandwiches**

(15 minutes)

Adapted from: <http://www.pages.drexel.edu/~ks73/Ediblerocks.htm>

**Materials:**

Loaf of white bread

Loaf of brown bread

Graham cracker crumbs

Red jam

Purple jam

Raisins

Crunchy peanut butter

Animal shaped crackers or candy (optional)

Plastic knives—one per student

Paper plates—one per student

**What to Do:**

1. Sedimentary rocks are formed when layers of sand, small bits of rock, clay, plants, bones, and mud are piled on top of each other and eventually get compressed and harden into rock.  Sedimentary rocks are often formed in river bottoms and lakes since the water carries materials from other places that then settle to the bottom in layers.  This process takes a long time (hundreds of thousands of years). You will see a model of this process when you make your Sedimentary Sandwich.
2. Use a paper plate to represent the bottom of a river.
3. Before you begin to build your model, examine the various materials you can use as layers in your sedimentary rocks: white bread for white sand, brown bread for dust, peanut butter for mud, raisins for big rocks, red jam for old decaying plants, purple jam for old bones and remains of animals, and graham cracker crumbs for clay.
4. Make your own sedimentary sandwich using the ingredients in any order you choose, thinking with each addition, what each layer represents. *(If your teacher includes the fossil in the activity, be sure to tell how the plant or animal got into the layers.*)
5. These layers get compressed, or smashed together, over time to become rock.  Press down on your sandwich to represent the compression of the layers. You may want to cover your model and use a book for even pressure.
6. After you have made your sandwich, write a story explaining what events took place in your sedimentary rock’s formation. Use the descriptions that accompany the list of ingredients at the end of this worksheet to plan your story.
7. Look at each other’s sandwiches and notice the variations in layers.
8. What will happen if an earthquake occurs or a mountain is formed by a shift in a geological plate? Illustrate that by bending or breaking your sandwich. What happens to the layers? Look at other students’ “rocks” to see what happened with different layers when they simulated an earthquake or plate shift. How is this like a real earthquake or shift in geologic plates?
9. Be prepared to share the story of your rock’s formation and answer questions about your rock.

Use the following to help you tell the story of your rock:

WHITE SAND White Bread

The river washes small pieces off the surrounding rocks.  These pieces of sand are carried along by the water and left on the bottom of the river.

MUD AND ROCKS Peanut Butter

A flood washes mud and rocks into the river.

CLAY Brown Bread

The river is dammed so that the water barely moves.  The water no longer has the power to carry the rocks and dirt so these all fall to the bottom of the river making a layer of clay.

PLANT PARTS Red Jam

As the plants along the river’s edge die, their remains fall into the river and settle at the bottom.

ANIMAL BONES Purple Jam

There are many kinds of creatures living in and around the river.  When they die, their bones fall to the bottom of the river.

DUST Graham Cracker Crumbs

There is a drought so the area is dusty and dry. Strong winds pick up bits of dust from nearby mountainside.  These fall in the river.

ROCKS Raisins

A part of the riverbank falls into the river, dumping lots of rocks on the bottom of the river.

(Optional:

FOSSILS Animal shaped cracker or candy

A large animal died and fell to the bottom of the river. Conditions were such that the carcass was immediately covered with clay and the animal was preserved as a fossil.