



## **Lesson Four: By-product Bonanza**

**Grade Level:** 2<sup>nd</sup> Grade

**Time:** 45 minutes

**Essential Question:** How can we be stewards of Wyoming's minerals and energy to benefit current and future generations?

**Objective:** Students will:

- Identify objects that contain a nonrenewable natural resource produced in Wyoming.
- Recognize that Wyoming's natural resources are important because they affect people's daily lives.

**Purpose:** Students learn that without Wyoming's nonrenewable natural resources, we wouldn't have many of the items we use every day.

**Required Materials/Resources:**

- Products or images of products found in the classroom that are made from nonrenewable Wyoming resources
  - Bentonite - crayons, pet litter, lotions, shampoos (Source 1)
  - Natural Gas - bandages, toothbrushes, tires, golf balls (Source 3)
  - Oil - balloons, sunglasses, dice, ballpoint pens, (Source 4)
  - Trona - baking powder, baking soda, toothpaste, swimming pool products (Source 6)

- Coal - paint, buttons, perfume, road and building materials (Source 8)
- Chart paper
- Mystery bags (brown paper bags) for each student pair or small group
- Index cards
- Resources in Our Lives sheet (one for teacher to model and one per student)
- Nonrenewable Resource Information sheet (one to display) - (Sources 1,2,5,6,7)

### **Suggested Teacher Preparation:**

- Decide if you will group students as pairs or small groups.
- Label a piece of chart paper "Lesson 4 Anchor Chart."
- Collect products or images of the products that are listed above in the Required Materials/Resources. Be sure to have enough examples to fill each mystery bag per student pair or small group.
- Have a clear understanding of the products listed and what the nonrenewable resource is within that item.
- Write the name of the resource that the products come from on index cards.
- Prepare a mystery bag for each pair or group with a product and labeled index card with what resource it comes from.
- Review and be able to display the Nonrenewable Resource Information sheet.

### **Standards:**

Social Studies: SS2.3.1 (Explicit)

ELA: 2.SL.1, 2.SL.6, 2.W.8 (Practiced/Encountered)

## Vocabulary:

- **Bentonite** - a kind of absorbent clay formed by the breakdown of volcanic ash
- **Coal** - a black/dark brown rock made from old plant matter found mainly underground. Coal is mined and used as fuel.
- **Natural gas** - odorless gas that is taken from under the ground and used as fuel and used to make materials
- **Natural resources** - sources of life, materials, or energy that we are able to get naturally from the earth
- **Nonrenewable resources** - resources that cannot be replenished (made again) in a short period of time
- **Renewable resources** - resources that are capable of being replenished
- **Oil** - a natural liquid formed from plants and animals that lived millions of years ago that can be refined into gasoline, diesel fuel, jet fuel, wax, asphalt, and many other valuable products
- **Reclamation** - the act of returning something to a former, better state
- **Trona** - a gray mineral that occurs as an evaporate in salt deposits and consists of a hydrated carbonate and bicarbonate of sodium

## Instructional Procedure/Steps:


1. Say: **“In this lesson, we will learn about what objects and products are made possible because of nonrenewable Wyoming natural resources.”** Begin by asking the students:
  - **“What is a nonrenewable natural resource?”** *A nonrenewable natural resource is a resource that cannot be replenished (made again) in a short period of time. Examples are coal, oil and natural gas, bentonite, and trona.*
  - **“What are some things you use in your life that are made possible because of a Wyoming nonrenewable natural**

**resource?"** *An argument can be made that because of coal energy, almost all products can attribute their production from a nonrenewable natural resource. However, our goal is to illustrate products in which a natural resource is a component, such as trona is in baking soda.*

Record students' answers to the questions above on chart paper. It is okay if students do not know the answers to the questions yet; this activity will guide them to better understanding the role nonrenewable natural resources play in our daily lives.

2. Say: **"Your houses are full of objects and products that contain a component of a Wyoming nonrenewable natural resource. I have brought some examples to share today."**
3. Show students a mystery bag that contains a product that has an element from a Wyoming nonrenewable natural resource such as a balloon, which is a petroleum (oil) product.
4. Open the bag and pull out the object and an index card that has the resource it comes from written on it. Have students name the object that you pull out, and ask the following questions:
  - **"Are you surprised that this is made from \_\_\_\_\_ (name the resource), a Wyoming nonrenewable natural resource?"**
  - **Why or why not?**
5. Display the Nonrenewable Resource Information sheet. Read and discuss it with students. Emphasize how Wyoming is unique in our nonrenewable resource production. For example, we produce 90% of the nation's trona. There is no other place that produces more trona. Wyoming produces 40% of the nation's coal, and our coal

is considered clean burning. (Source 7) Discuss the wealth of nonrenewable natural resources that Wyoming produces and how they make Wyoming unique. Add the nonrenewable resources to the vocabulary anchor chart.

6.  Pass out the Resources in Our Lives sheet to each student. Students will record their observations on the Resources in Our Lives sheet when they explore their own mystery bag. Model how to fill out the sheet using the product shared in step 4.
7. Divide the students into partners or small groups and give one mystery bag to each group. Have students open the bag, pass the object around, and examine it. Have students complete numbers 1 & 2 on their Resources in Our Lives sheets.
8. Ask: **“Why is this object or product important in your life?”** Have the students fill out number 3 on the Resources in Our Lives sheet.
9. Ask: **“What would it be like if we did not have this product?”** Have the students fill out number 4 on the Resources in Our Lives sheet
10. Help students connect that there are nonrenewable natural resources contained in many objects and products we use every day. Have each group or pair share out their product and what it comes from (this is written on the index card). After each pair/group presents, ask: **“Are you surprised to learn that \_\_\_\_\_ contains \_\_\_\_\_? Why or why not?”**
11. Help students connect the availability of nonrenewable natural resources to the availability of products that are significant in our daily lives. Ask: **“What could cause these products or objects to not be available**



In this task, students will be engaged in the higher order thinking skill of analysis by organizing ideas that they've learned about the products and recognizing the impact on their own lives if the natural resource is no longer used.

**anymore?”** Allow students to respond. Say: **“Think back to the popcorn activity we did. How does conserving our natural resources help to ensure that our products don’t go away?”** Have students fill out number 5 on the Resources in Our Lives sheet. This is a great opportunity to check if the students are beginning to make the connection between lack of resources and lack of products. *Students may suggest that since these products are sourced from nonrenewable natural resources, and nonrenewable natural resources exist in finite quantity: if the resources are used up, we will have less products, etc.*

12. Draw students’ attention to the final question on the Resources in Our Lives sheet. Help students connect the finite amount of Wyoming’s nonrenewable resources (popcorn activity) to being a good steward of our resources. Ask: **“How can we be good stewards of Wyoming’s natural resources to make sure we have them for ourselves and others in the future?”** *Students may suggest not using more than your share, turning off lights, not using too much gas, or not being wasteful. Depending on the student’s schema, they may have more ideas about conservation.* Add conservation ideas to the chart paper used at the beginning of the lesson. These ideas will move students toward the essential question: How can we be stewards of Wyoming’s natural resources for current and future generations? *These resources are helpful in our daily life. The focus is on responsible development, care, and use.*

13. Return to student responses from the introductory questions in step 1. If nonrenewable is not on the vocabulary anchor chart, add the term to the chart now.

a. **What is a nonrenewable natural resource?**

*A natural resource that cannot be replenished (made again) in a short period of time such as coal, oil and natural gas, trona and bentonite.*

b. **What are some things you use in your life that are made possible because of a Wyoming nonrenewable natural resource?**

As a class, delete ideas from the start of the lesson that don't fit these criteria, and add to the list any definitions, ideas, and examples that can serve as anchor chart resource for students to refer to in the future. You can continue to add to this chart throughout the unit. Emphasize that even though we may not have realized it before, many products and objects that we use in our daily lives contain a nonrenewable natural resource from our state. Say: **"Wyoming is unique because our state has these natural resources in its land. In following lessons, we will explore where in our state these resources come from and the people whose jobs it is to extract and produce them."**

**Assessment:** Collect the Resources in Our Lives sheet and evaluate them for individual understanding of conservation and stewardship.

**Credits/Sources:**

1. Wyoming Mining Association. (2017). *Bentonite*. Retrieved July 26, 2017, from <https://www.wyomingmining.org/minerals/bentonite/>
2. U.S. Energy Information Administration - EIA. (2016, December 15). *Wyoming: State Profiles and Energy Estimates: Profile Analysis*. Retrieved July 26, 2017, from <https://www.eia.gov/state/analysis.php?sid=WY>
3. Texans for Natural Gas. (2015, May 1). *25 Things you didn't know were made with Natural Gas*. Retrieved July 26, 2017, from [http://www.texansfornaturalgas.com/25\\_things\\_you\\_didnt\\_know\\_were\\_made\\_with\\_natural\\_gas](http://www.texansfornaturalgas.com/25_things_you_didnt_know_were_made_with_natural_gas)
4. Ranken Energy Corporation. (2017) *A partial list of products made from Petroleum (144 of 6000 items)*. Retrieved September 29, 2018, from <https://www.ranken-energy.com/index.php/products-made-from-petroleum/>
5. U.S. Energy Information Administration - EIA. (2016, December 15). *Wyoming: State Profiles and Energy Estimates: Profile Overview*. Retrieved July 26, 2017, from

<https://www.eia.gov/state/?sid=WY>

6. Wyoming Mining Association. (2017). *Trona*. Retrieved July 26, 2017, from <https://www.wyomingmining.org/minerals/trona/>  
Wyoming Mining Association. (2017). *Coal*. Retrieved July 26, 2017, from <https://www.wyomingmining.org/minerals/coal/>
7. University of Kentucky. (2012). *Power Up KY: Coal Products*. Retrieved July 26, 2017, from [http://www.powerupky.org/coal\\_products.php](http://www.powerupky.org/coal_products.php)