



Chocolate Chip Cookie Mining

By Kim Sowder

Purpose: Activity 1 demonstrates the difficulties encountered in mining practices. Chocolate chip cookies as “earth”; chocolate chips within the cookie are “ore”. Paper clips and toothpicks are used as mining tools.

Activity 2 raises awareness of reclamation processes and considerations.

Materials (per person):

2 chocolate chip cookies
1–3 wooden toothpicks
1 metal paper clip
paper towel or napkin

Discussion 1:

Minerals and ores that are mined don’t often come in pure layers in the Earth. The valuable material must be separated from the rock surrounding it, and extraction can be a complicated process.

Mining for useful minerals dates back tens of thousands of years. Ancient people did not have the metals or machinery we use today in everyday mining operations. They used stone tools or sharpened sticks to extract minerals for many purposes, including making medicines, dyes, jewelry, and for ceremonies. Chert, ochre, gems, clays, and epsom salts are a few examples of the minerals that were prized by ancient people.

The Bronze Age (around 3,500 B.C.) ushered in the creation and use of metal objects. By the early 1800s, people in Indiana were mining with metal tools to extract minerals such as coal from mines, limestone

from open quarries, and saltpeter from cave deposits. Saltpeter is a primary constituent of gunpowder. Gold, silver, diamonds, coal, copper, and other precious ores are also sought today using high-tech mining techniques.

Activity 1:

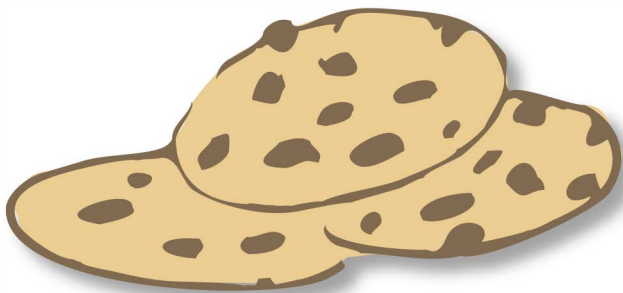
Examine one cookie for “ore” (chocolate chips). The challenge is to use the tools to extract as many of the chips as possible without breaking the cookie. Begin with the wooden toothpick and move on to the paper clip after at least one chip has been extracted with the toothpick.

Questions:

1. How difficult is it to extract the chips from the cookie?
2. Which tool worked better?
3. How many chips did you extract before breaking the cookie?
4. Did you continue to mine after the cookie was broken?
5. If we just crushed the cookie and didn’t selectively mine the chips, what methods can you think of to separate the chips from the cookie crumbs (ore from rock)?

Discussion 2:

All states having mining operations must follow rules pertaining to the reclamation of mined lands. Reclamation means restoring the mined land to its original natural setting. For example, if a farm field is mined, farmland must be restored. Top soil must be returned as the top layer, and refuse from the mine (the crumbs) must be dealt with. The type of mining activity determines the methods that are used to reclaim mined areas. Before a mining operation begins, the mine must have a comprehensive plan in place to reclaim the land. After mining is finished, the reclamation process must begin.



Activity 2:

Study the remaining cookie and compare it to the cookie that has already been mined. Think of how to mine the ore and then return the cookie to its original appearance (without chips!). Write down your plan, then mine the cookie with the understanding that you will have to reclaim it.

Questions:

1. How difficult is it to extract the chips from this cookie?
2. Did having a reclamation plan alter the way you mined?
3. Do you need any additional tools or materials to carry out your reclamation plan?
4. What other methods can you think of to “reclaim” the cookie?

