Name _____ **AP Environmental Science** **Mr. Daniel Smith**

Cookie Mining Simulation (25 points)

Modified from an activity available at: http://www.leusd.net/lchs/mewoldsen/Cookie_Mining_Instructions.htm

INTRODUCTION:

Many mineral resources are unevenly distributed and difficult to extract—Mining is not easy. The economics of mining require that the process of extraction is less costly than the value of the material being extracted. Thus, extraction processes that require greater quantities of energy/$$ are often less economical and therefore abandoned for "cheaper" and "easier" techniques. Consider this idea as you complete the exercise.

In this lab, you will demonstrate mining of the earth's surface and underground.

INSTRUCTIONS:

1) PLEASE **READ** all instructions before beginning.

2) Start with a sheet of graph paper on your desk.

3) You must buy your own "mining property" which is a **single** cookie. Cookies are for sale for various prices at the front of the room.

4) After you buy your cookie, place it on the graph paper and trace its outline.

5) You must also buy your "mining equipment." You can purchase as much equipment as you like, but you may not share with your peers. Mining equipment is for sale at the following prices:
   a. Flat toothpick - $2.00 each
   b. Round toothpick - $4.00 each
   c. Paper clips - $6.00 each

6) You must also pay your workers. Mining costs are $1.00 per minute up until the time that you finish land reclamation.

7) When you have finished mining, calculate your profits. A whole chocolate chip is worth $3.00 (broken chocolate chips can be combined to make 1 whole chip).

8) After the cookie has been "mined", the cookie should be placed back into the circled area on the grid paper. This can only be accomplished using the mining tools - no fingers or hands allowed. For every square outside the original circle that is disturbed by cookie debris, fine yourself $1.00 to reclaim the land.

9) ADDITIONAL RULES:
   a. You cannot use your fingers or other body parts to hold the cookie. The only things that can touch the cookie are the mining tools and the paper on which the cookie is sitting.
   b. If any of your mining tools break, they are no longer usable and a new tool must be purchased.
   c. The person who makes the most "money" mining in each period will be called "Master Miner" for the remainder of the class period. They also get a cookie.

SEE THE BACK OF THIS PAGE FOR A DATA TABLE AND ANALYSIS QUESTIONS

COOKIE MINING ECONOMIC ANALYSIS			
1.	Name of Cookie	.	
2.	Price of Cookie		A: $
3.	Size of Cookie	No. of squares covered _____	
4.	Equipment	Flat toothpick Round toothpick Paper clip	_____ x $2.00 = _____ _____ x $4.00 = _____ _____ x $6.00 = _____
5.	Total Equipment Cost		B: $
6.	Mining Cost	No. of minutes _____x $1.00=	C: $
7.	**TOTAL COST OF MINING** (A+B+C)		D: $
8.	Chip removal	No. of chips _____x $3.00=	E: $
9.	Reclamation	No. of squares _____x $1.00=	F: $
10.	**PROFIT/LOSS** (E-(D+F))		G: $

Questions:

1. Did you make a profit on your mining activities? If yes, why? If not, how could you ensure profit in the future?

2. This is a mining simulation activity. What does the chocolate represent? What does the cookie represent?

3. Where was the most money invested in the mining process? What are other economic requirements of mining not represented by our simulation?

4. Surface mining is often employed by mining groups. Given your chapter reading and "mining" experience, offer an explanation.

5. List and briefly describe at least three environmental impacts of surface mining and three environmental impacts of underground/deep mining.