

APES- Exploring for Petroleum- Modeling an Oil Reserve

Name: _____

Background: *Since 1970, oil and natural gas have provided more than half of the energy used each year in the United States to produce electricity, heat, transportation fuels, and many everyday products from balloons to vitamins. Oil and natural gas are forms of petroleum, a word that literally means, “oily rock.” Petroleum is called a fossil fuel because it is geologically very old and is found in the ground, like fossils. Abundant oil and natural gas form only where conditions in the Earth are just right. Doing this investigation will help you understand how geoscientists identify and explore petroleum-rich reserves.*

Materials:

- An opaque box with cardboard lid
- Sand/soil
- Marker pens
- Clear plastic drinking straws
- Graph Paper
- Small rock samples
- Balloon with water
- Masking tape
- Bamboo kebab skewer



Procedures:

- 1) In a small box or opaque container- set up the model with layers of rock, sand and soil. Place a small balloon containing water (to represent oil) into the layers. ***Think carefully about where to place your oil reserves in the model. Putting it in the middle might be too obvious or placing it against the side of the box might be too confusing!***
- 2) Mark the sides of the box, with **NORTH, SOUTH, EAST and WEST**. Make a map of your model to show the location of the water-balloon “oil reserve.”
- 3) Place a lid securely on the box and fasten it with masking tape. *Exchange your model with another group.*
- 4) With the other group’s box, you will model the method used by exploration geologists in the field. *You may not move the box, and you may not look inside it.*
- 5) Attach a piece of graph paper to the lid of the box. Tap on the box and list for an area that “sounds different”. *Use the graph paper to record the locations of areas that sound different and seem like likely candidates for oil exploration.*

6) Use the skewer to probe the box to search for “oil” (water balloon) in the places you identified. Mark off divisions of one centimeter on a bamboo skewer, beginning at the bottom. Use the bamboo skewer to penetrate the box lid at the location where you think the oil may be located.

7) Probe gently through the sand. Look at the skewer for evidence of “oil”. This models the drilling process.

8) Exploring and Drilling for oil is very expensive and difficult. For every centimeter of depth that you “drill”- it will cost you \$150,000. In addition, each time you move to a new spot to drill- it will cost you \$75,000 to move the equipment.

9) Keep a record of how many centimeters you drill and how many times you move the skewer to a new spot so you can calculate the total cost of your exploration. Continue “drilling” until you find “oil”.

Data:

- What was the total cost of your exploration? (**Show your calculations**)

Analysis:

- If you were to start over, *how would you change your exploration procedure to save money?*
- Compare your results with the group that constructed the model. Look at their map. *Was the oil deposit where they said it should be?*
- What could you have done to make your exploration more cost effective?
- What factors make it difficult for us to find and drill for oil? **Discuss.**
- How are the cost of exploration and drilling passed on to the consumers? **Explain.**

Conclusion: What did you learn from doing this activity? Discuss in 2-3 paragraphs.