

PROJECT REPORT

Northern Wyoming Community College District / National Science Foundation
Summer Energy Education Program 2012

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TITLE

Energy Prospecting

STATE STANDARDS

CA State Standards:

- 1a. Students Select and use appropriate tools and technology (such as computer-linked probes, spreadsheets, and graphing calculators) to perform tests, collect data, analyze relationships, and display data.
- 7b. Students know the global carbon cycle: the different physical and chemical forms of carbon in the atmosphere, oceans, biomass, fossil fuels, and the movement of carbon among these reservoirs.
- 7c. Students know the movement of matter among reservoirs is driven by Earth's internal and external sources of energy.
- 9a. Students know the resources of major economic importance in California and their relation to California's geology.

SUMMARY

Project Summary

This lab activity will demonstrate the complexity of locating and extracting mineral and energy resources. Students will take eight core samples locate the samples on a grid. They will analyze the samples and create a three dimensional diagram of different layers. They can excavate two of grids to locate the resource. Based on their results they can conclude the economic viability of their operation.

ENERGY CONTEXT

California Resources

The state of California has a large amount of natural resources. Many of these are located below the surface and are difficult to find. Some resources such as oil are situated in distinct formations. One method of locating valuable energy resources is to drill a core sample and examine the different layers.

ANTICIPATED TIME REQUIRED

This project will require:

- Preparation of lab - 4 hours
- Set up of lab – 10 minutes
- Locate core samples – 10 minutes
- Map core samples – 15 minutes
- Analyze core samples and create a layer map – 15 minutes
- Excavate resource – 20 minutes
- Analyze economic viability – 20 minutes
- Project future development - 30 minutes

INTENDED STUDENT LEVEL
This project will present learning activities and assessment activities intended for students entering the 9 th grade.
ASSUMED PRIOR KNOWLEDGE
This project will assume that students have prior knowledge of: <ul style="list-style-type: none"> • Basic mathematics • Basic report writing • Group lab etiquette
LEARNING OBJECTIVES
<ul style="list-style-type: none"> • Understand the concepts of locating potential energy and natural resources. • Recognize the concepts of design and construction of a core sample, like a mining engineer. • Comprehend that if an engineer can locate the layer of a mineral or resource they can determine if it is economically viable. • Plotting and mapping core samples and underground resources Understand the problems associated with extracting underground resources. • Analyzing the quality of extracted material and the economic importance.
MATERIALS
<p>Each group needs:</p> <ul style="list-style-type: none"> • 1 tray of premade layered topography • 1 brass tube for core sampling • 1 wooden dowel for extracting core sample • 1 worksheet for recording data • Calculator • Internet access for economic information
INTRODUCTION / MOTIVATION FOR STUDENTS
California natural resources and energy reserves are located underground. One method of locating these deposits is to drill a core sample. This core sample will reveal the layers below the drill site. Accurately recording the core sample locations and the stratified layers of the core will allow a three dimensional map of the deposits to be constructed. Accurate mapping of deposits is critical for effective economic exploitation. Returning the environment to natural condition is important for future generations...
PROCEDURE
<ul style="list-style-type: none"> • Divide the class into groups of 6 and hand out the worksheet. • Hand out brass coring tube and demonstrate how to use them • Have each group record the location of their core samples in relation to model grid. • Record the different layers from the core sample. Preserve core samples for later reference. • Construct a three dimensional map of underground resources based on core sample data.
SAFETY ISSUES
Brass coring tubes can be sharp and if not handled properly can cause injury.
TROUBLESHOOTING TIPS
Some students may have trouble transferring information from the model to plot on paper or extrapolating core data in layer map of deposits. Some review before the lab may be beneficial. Poor handling of core samples could lead to incorrect mapping.

ASSESSMENT

Pre-Activity Assessment

Question/Answer: Ask the students and discuss how resources are located when they are located below ground.

- Where would a likely spot be drill a sample core?
(Answer: Underwater, near a known deposit, geologic formation associated with a type of deposit.)
- What conditions are likely to influence the economics of the operation?
(Answer: Hazards (water, mountains, desert, weather, or population.))

Prediction: Ask the students to predict:

- What resources are likely the easiest to extract, which are have the highest return for the investment, which are more likely to cause problems for the environment

Post-Activity Assessment

Question/Answer: Ask the students and discuss as a class:

- What natural resource would have the biggest impact on the California economy?

SUGGESTED EXTENSIONS

Student could extend the concept by researching elements and materials needed to establish a viable environment on the actual model.