

Modified from: Friedman, G.M., Johnson, K.G., 1982, Exercises in Sedimentology, John Wiley, p. 208

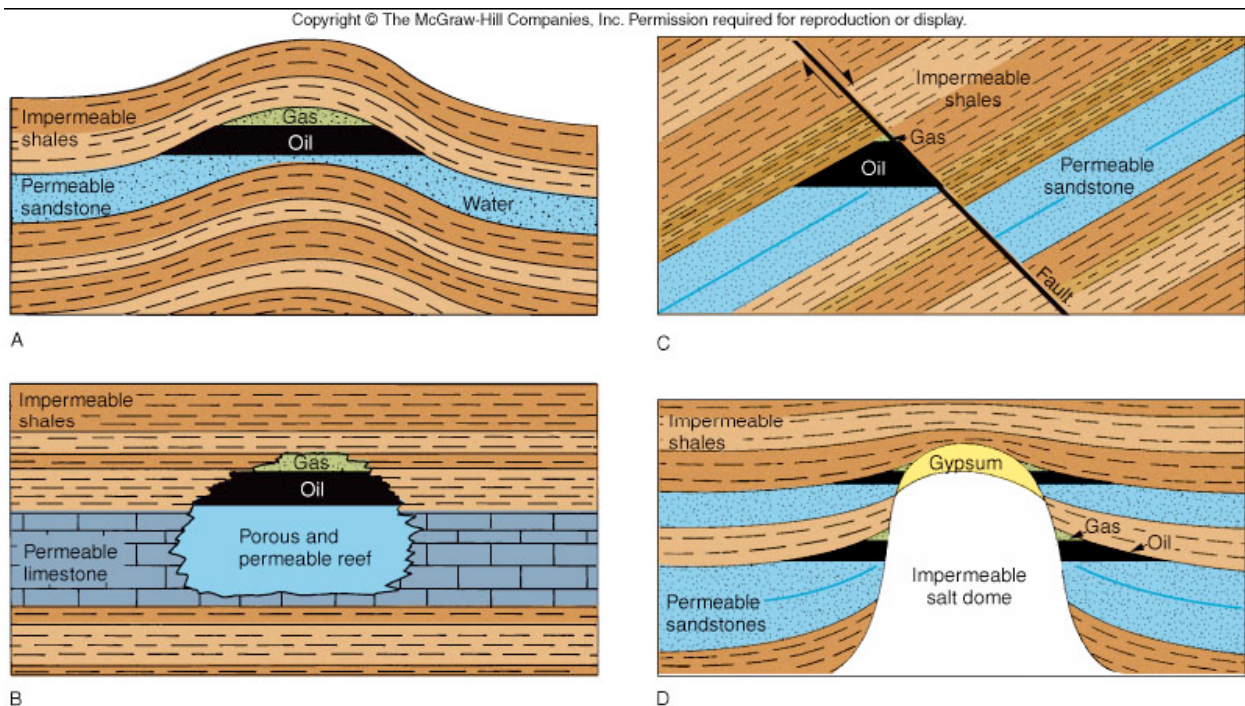
Introduction

This exercise simulates the geologic, economic, and competitive business conditions usually encountered in oil and gas exploration. Each student is now a geologist with their own exploration and production corporation, and all corporations are competing to find oil and gas resources in the map area provided. Every section in this quadrangle has been drilled by oil companies in the past. Everyone agrees there must be oil and/or gas here, but no one has been successful in bringing in a producing well. Apparently none of the companies bothered to hire a geologist to analyze the data (weird!). They have gone bankrupt and the leases are all available for sale. Suddenly several corporations with geologists (you) appear on the scene, but with limited capital. The principal goal is to make as big a profit as possible for your corporation; therefore you must find the most oil and gas possible in a limited amount of time. To find oil and gas deposits, there are essentially 3 steps:

- 1) Gather information about the geology of the area and determine areas that are potential traps
- 2) Make bids on the land that you determine has high potential
- 3) Drill wells to see if you are correct

Geologic Data

You are given a base map of the area of interest. It is divided into the township and range system. Within this map area, a potential reservoir rock exists at depth, but it has been folded into structures (domes and basins) and faulted in various places. As you know, oil and gas will only accumulate in the reservoir rock if a structural or stratigraphic trap exists. (Please refer to lecture powerpoints and read <http://www.fettes.com/orkney/Geology/Oil/OIL%20petroleum%20system.htm>) Oil and gas fields in this area are mainly structurally controlled, i.e., you will search for structures that might serve as traps for oil and gas. Note that not all structural highs are productive. Your primary task in exploration then is to determine the structure of the reservoir rock. To determine the structure of the reservoir rock, you must know the depth to it in numerous places.



The previous corporations that went under have supplied their data to the Geological Survey, and it is now public information. This information is given on your base map as data points that indicate the depth to the reservoir rock. The data are given in elevations below sea level – so they are all negative numbers, and numbers that are “less negative” indicate higher elevations. Your first task is to contour

this information as best as you can with the limited data provided. Use 100 meter contour intervals, and USE A PENCIL!!! You will not be given a second map, so use this one carefully – data of any kind (including maps) is valuable, so treat it with care. Remember, there is a lot of information you don't know, so to deal with your uncertainty, you will need to gather more data and then modify your contour lines. You may want to use 25 m or 50 m contour intervals as you gather more and more data. Your instructor will serve as the source of all geological data and will supply oil and gas production information.

The Public Property Map

Most of your data and information are private, and must be kept strictly confidential. However, some information is part of the public domain. A map of the area will be kept at the front, showing all public information, including:

- 1) the original data provided by the geologic survey;
- 2) all land currently leased, and who the owner of it is; and
- 3) the location and owners of all productive oil and gas wells.

All corporations should keep their maps up-to-date with this information.

Corporate Policy

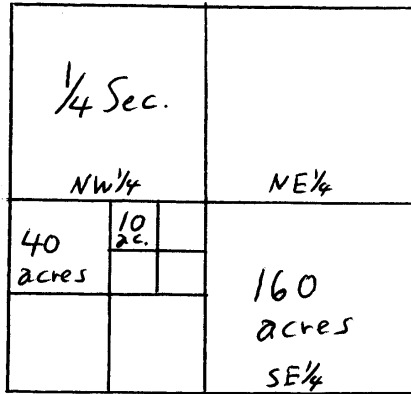
Each of you begins with \$2 million in capital, and you will need to supply a name for your corporation (be creative!). Two or more students may combine their efforts, finances, and information and form a merger, but thereafter all profits are divided equally. However, to prevent a monopoly from forming, the government has decided that not more than 3 people may combine into a single corporation. Once a merger is formed, the name of the merged corporation and members of it must be supplied to your instructor, and this will then be made public information. Corporations and operators must treat geological information and structural interpretation as strictly confidential. Each corporation must keep complete records of financial information (all bid purchases, income, sales, costs) and plot and interpret data on the base map. All deals between corporations, including the sale of information, must be authorized by the instructor and all corporations must learn of the deal and be able to bid on the holdings or information.

Profits & Expenditures

Your corporation may take several steps to further your business:

1. Spend capital on exploration. You may obtain new structural data by requesting an interpreted line at a cost of \$10,000 per mile. You will submit requests for this information by referring to your base map, and use the Township/Range method to identify the lines. Data lines may be taken only along the edges of sections.
2. Submit bids on desired acreage to lease for drilling on a "dollars per acre" basis (must be in multiples of \$1/acre). Identify acreage for the instructor by citing township, range, section and subsection divisions. Bids are accepted only in units of 160 acre tracts (1/4 section). No more than 3200 acres (20 quarter sections) may be bid on per 30 minutes by a corporation. Bids will be compared at the end of every 30 minutes, and winners will be compiled on the public property map and given notification.
3. Wells may be drilled on the leased land at any time at a cost of \$50,000 per well. The corporation that drills a well will be provided data on the depth to the reservoir rock in the well. Oil producing wells yield \$100,000 per 30 minutes; gas producing wells yield \$50,000 per 30 minutes. Wells begin producing on the minute they are drilled.
4. A 20-acre spacing of wells (center of a 40 acre tract) is maximum on most of the fields (16 wells per section; 4 wells per quarter section). However, some areas are tight structure fields, and allow 10-acre spacing (4 wells on a 40-acre tract). Such facts will be indicated only to land-holding operators in these fields after they have brought in one producing well (and will be made public after producing wells are drilled).

GEOL 105: Sustainable Earth
 Final Project – Oil and Gas Exploration Project



Grading:

Each person is expected to contribute to their corporation. This exercise is worth 200 points. The corporation that has the most profit (averaged between all individuals in the corporation) for the class will receive 220 points. All others will be graded based on their respective profits –

- 2nd place – 200 points
- 3rd place – 190 points
- 4th place – 180 points
- 5th place – 170 points
- 6th place – 160 points
- 7th place – 150 points
- 8th place – 150 points
- .
- .
- .

GEOL 105: Sustainable Earth
Final Project – Oil and Gas Exploration Project

Company Name:

Team of Geologists:

Costs:

Order information by date and list all information by the Township and Range Method

Seismic lines (\$10,000 per mile)

Land leases

Drilling wells (\$50,000 per well)

GEOL 105: Sustainable Earth
Final Project – Oil and Gas Exploration Project

Income:

List all producing wells by the Township and Range Method and the date drilled.

Gas wells (\$50,000 per 30 minutes)

Oil wells (\$100,000 per 30 minutes)