

Section One: Project/Lesson Overview

Grade: 10

Subject: Science (Introduction to Environmental Science 120)

Lesson Title: Magnificent Rocks: Introduction to New Brunswick's Oil & Gas Industry

Lesson Description: Students will use the website as a geological introduction to non-renewable resources, in particular, the fossil fuels: oil and natural gas. Students will uncover some of New Brunswick's oil and natural gas history from people involved to sites as a starting point for further research into contemporary gas exploration.

Time Required: 2-3 x 60 minute classes

Curriculum Outcomes:

- Explore one or a few local or regional issues with respect to the impact (e.g. oil & gas industry) on the environment, and on history, economics and social systems
- Outline the range of energy resources, renewable and non-renewable available in New Brunswick
- Describe energy use in NB, its impact on the environment and the factors that might affect its future

Section Two: Project/Lesson Implementation

Equipment/Materials Required: Access to *Magnificent Rocks* Learning Object content. Several objects/images to introduce the topic of fossil fuels: e.g. tube of toothpaste, plastic bowl, plastic ball point pen, nylon string, band aid, eye glasses (plastic lenses and/or frames), lipstick or lip balm, CD, cigarette filter, masking tape...or any other items. Students will discover (or teacher may specify) that the information they need to complete Worksheet #1 (appendix A) can be found under the following headings: How Continents Move, Magnificent Rocks of NB, and Lower Carboniferous.

Lesson Procedures/ Teaching Strategies:

1. *Introduction:* Begin by showing students at least 6 seemingly unrelated items and ask them to come up with one way in which they are all connected. The items all have a connection to fossil fuels – in particular, petroleum/oil.
2. *Instruction:* Open discussion with 'what is a fossil fuel?' Using fossil fuels as examples have students determine the basic difference between a renewable and a non-renewable resource.
3. Once it has been established that NB has been and continues to be a source of non-renewable resources (e.g. coal, natural gas, oil). Have students, in pairs, access *Magnificent Rocks* to begin their research to gain a preliminary understanding of the basics of the oil and gas industry in New Brunswick. Students will begin by researching some basic geology & geological processes (rock formation, plate tectonics, fossil formation) followed by a preliminary introduction to the people and places of historical significance to the oil and gas industry in New Brunswick.
4. *Research Activity:* Students, in pairs, will complete Student Worksheet #1 based on the Oil and Natural gas industry of New Brunswick including the geological basis of fossil fuels, the history of oil and gas exploration, and the history of individuals of the 19th century who were involved at the onset of the industry in New Brunswick. (see appendix A) Students will receive, along with the worksheet, a copy of the rubric outlining how their responses will be assessed. (See supplementary resources for link to a website for creating rubrics.)

Suggested Assessment Strategies:

- Worksheet #1 serves as a formative assessment of the students' on-line research with the *Magnificent Rocks* resource. This lesson serves as an introduction to the topic and a starting point for further research and presentation on a topic within the Oil & Gas Industry of New Brunswick which is of interest to the student.
- Worksheet responses should be assessed according to a predetermined rubric for accurate, comprehensive and clear content, as well as language usage.

Section Three: Project/Lesson Resources

Supplementary Resources:

www.nbm-mnb.ca/magnificentrocks

Create a rubric:

<http://rubistar.4teachers.org/>

Disclaimer: The recommended web-resources included here have been scrutinized for their grade and age appropriateness; however, contents on links on the Internet change continuously. It is advisable that teachers preview all links before recommending them to students.

Extensions:

- Studies on the history of the process of fossil fuel extraction.
 - Further research into the life of some of the key figures in the history of oil & gas development in New Brunswick (e.g. Abraham Gesner, Robert Foulis, Les Fyffe...)
 - Studies on the environmental impact of fossil fuel extraction.
 - Studies on the cost/benefit to alternative forms of energy from non-renewable resources.
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Section Four: Additional Information

Credits: New Brunswick Museum, Saint John, New Brunswick

WORKSHEET #1

Magnificent Rocks: Introduction to Oil and Gas Industry of New Brunswick

Using the information available on the *Magnificent Rocks* website, research and answer the following questions in paragraph format. Answers will be assessed on accuracy of content, clarity of information presented and language usage (i.e. grammar, spelling, punctuation).

1. How are rocks classified? Name the three basic rock types and describe how they are formed making reference to the Rock Cycle.
2. What is the relationship between Pangea and plate tectonics (Continental Drift)?
3. What is the purpose of the geological time scale?
4. How, when and where were the oil shales in southern New Brunswick formed that now produce oil and gas?
5. In the history of oil and gas exploration in New Brunswick, what is the significance of the Lower Carboniferous Albert Formation?
6. In a historical context, how is the Albert Formation connected to Abraham Gesner, albertite and kerosene?
7. Why are the shale reservoirs of the Albert Formation of significant interest to the New Brunswick Department of Natural Resources?
8. Outline the four major components of a petroleum system.
9. Define “hydraulic fracture stimulation”.